Appendix 1.1 EIA Scoping Opinion

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Marine Scotland - Licensing Operations Team Scoping Opinion

Scrabster Harbour (per RPS), Re-development of St. Ola Pier, Scrabster Harbour

THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 (AS AMENDED)

SCOPING OPINION FOR THE PROPOSED MARINE LICENCE APPLICATIONS TO CONSTRUCT WORKS, TO CARRY OUT DREDGING AND TO DEPOSIT DREDGE SPOIL WITHIN THE SCOTTISH MARINE AREA.

Contents

1. Executive Summary 3
2. Introduction 6
2.1 Background to scoping opinion 6
2.2 The requirement for Environmental Impact Assessment 6
2.3 The content of the scoping opinion 6
3. Description of works 7
3.1 Background to the works 7
4. Aim of this scoping opinion 8
4.1 The scoping process 8
5. Consultation 9
5.1 The consultation process 9
5.2 Responses received 9
6. Contents of the EIA report 11
6.1 Requirements of the 2017 MW Regulations 11
6.2 Non-Technical Summary 11
6.3 EU Guidance 11
6.4 Mitigation 12
6.5 Design Envelope 13
7. Interests to be considered within the EIA report 14
7.1 Introduction 14
7.2 Coastal Processes 14
7.3 Flood Risk 14
7.4 Marine Biodiversity 14
7.5 Water Quality 15
7.6 Terrestrial Biodiversity and Ornithology 15
7.7 Transportation 16
7.8 Air Quality and Climate 16
7.9 Noise and Vibration 17
7.10 Waste Management 17
7.11 Soils, Geology and Contamination 18
7.12 Cultural Heritage 18

7.13 Landscape and Visual 18
7.14 Population, Human Health and Socio-Economics 19
7.15 Major Disasters and Accidents 19
7.16 Material Assets 19
7.17 Cumulative Assessment 20
7.18 Navigation 20
8. Marine Planning 21
8.1 Background 21
8.2 The UK Marine Policy Statement 2011 21
8.3 Scotland's NMP 2015 21
8.4 Application and EIA Report 21
9. Multi-Stage Regulatory Approval 22
9.1 Background 22
10. Judicial review 23
11. Gaelic Language 23
Appendix I: Consultee Responses 24
Historic Environment Scotland 25
Health & Safety Executive 28
Highland Council 30
Maritime and Coastguard Agency 33
Ministry of Defence 37
Northern Lighthouse Board 39
Royal Yachting Association Scotland 41
Scottish Environment Protection Agency 43
Scottish Natural Heritage 46
Transport Scotland 51
UK Chamber of Shipping 55
Appendix II: Licensing Process 57
Appendix III: Gap Analysis 60

1. Executive Summary

This is the scoping opinion adopted by the Scottish Ministers, under regulation 14 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) ("the 2017 MW Regulations"), as to the scope and level of detail of information to be provided in the Environmental Impact Assessment report ("EIA report") for the proposed re-development of St. Ola Pier, Scrabster ("the proposed works"). The scoping opinion has been requested by RPS on behalf of the applicant, Scrabster Harbour ("the applicant").

This scoping opinion is based on the information provided in the applicant's request, dated 10 July 2018, for the Scottish Ministers to adopt a scoping opinion. The request included the submission of a scoping report. The Scottish Ministers have consulted on the scoping report and the responses received have been taken into account in adopting this scoping opinion. The matters addressed by the applicant in the scoping report have been carefully considered and use has been made of professional judgement (based on expert advice from stakeholders) and experience in order to adopt this opinion.

Detailed information is provided in the specialist topic sections. Matters are not scoped out unless specifically addressed and justified by the applicant and confirmed as being scoped out by the Scottish Ministers. Table 1 summarises the Scottish Ministers' advice on whether topics are to be scoped in or out.

Table 1: The Scottish Ministers' opinion as to whether topics are to be scoped in or out.

Topic	Reason for scoping in / out
Coastal Processes	Scoped OUT. Issues relating to water quality should be included in the water quality chapter.
Flood Risk	Scoped OUT. SEPA have confirmed that a flood risk assessment is not required.
Marine Biodiversity (including Fisheries, Marine Mammals and Benthic Ecology)	Scoped IN. Multiple potential impact pathways on this receptor from the construction phase of the works, in particular underwater noise.
Water Quality	Scoped IN. Potential impacts from dredging works on water quality. Works are in the vicinity of Thurso designated bathing waters.
Terrestrial Biodiversity (including Ornithology and Otters)	Scoped IN. Proximity of North Caithness Cliffs SPA which could be impacted by noise, light and pollution from the construction works. Potential for otters to use the shoreline and harbour area.

Transportation	Scoped IN. Request by Transport Scotland for a transport statement to assess the potential impacts associated with increased traffic from the development. Also the need to assess the impact of increased vessel traffic.
Air Quality & Climate	Scoped IN. Requirement for an air quality assessment and mitigation plans to address emissions from plant and vehicles and dust levels.
Noise & Vibration	Scoped IN. Requirement to assess the need for mitigation of impact of noise from plant/equipment, vessels and road traffic both in-air and underwater.
Waste Management	Scoped OUT. Site Waste Management Plan to be included in Construction Environment Management Plan and disposal of dredge arisings to be discussed in Best Practicable Environmental Option document.
Soils, Geology & Contamination	Scoped IN. Ground investigation works to inform potential re-use of dredge arisings. Pre-dredge sample analysis required to determine contaminant levels.
Cultural Heritage	Scoped OUT. Sufficient assessment provided in scoping report and no concerns raised by Historic Environment Scotland.
Landscape & Visual	Scoped OUT. No issues raised by consultees and sufficient assessment provided by applicant in scoping report.
Population, Human Health & Socio-economics	Scoped OUT. Population and human health issues to be covered within specialist chapters elsewhere in the EIA report.
Major Disasters & Accidents	Scoped OUT. Impact on receptors to be addressed in specialist chapters elsewhere in the EIA report.
Material Assets	Scoped OUT. Potentially significant effects on material assets are to be covered elsewhere in the EIA report.
Cumulative Impacts	Scoped OUT. Cumulative impacts to be assessed for each receptor in the specialist chapters of the EIA report.
Navigation	Scoped IN. Review of existing Safety Management System required to take account of effects of the development on vessel traffic as required by the MCA.

For the avoidance of doubt, the adoption of this scoping opinion by the Scottish Ministers does not preclude the Scottish Ministers from requiring the applicant to submit additional information in connection with any EIA report submitted with their application for a marine licence relative to the proposed works.

In the event that an application is not submitted by the applicant for the proposed works within 12 months of the date of this scoping opinion, the Scottish Ministers recommend that the applicant seeks further advice from them regarding the potential to update the scoping opinion.

2. Introduction

2.1 Background to scoping opinion

2.1.1 We refer to your email of 10 July 2018 requesting a scoping opinion from the Scottish Ministers, under Regulation 14 of the 2017 MW Regulations. Your request included a scoping report, which contained a description of the location of the works, including a plan sufficient to identify the area in which the works are proposed to be sited, and a description of the nature and purpose of the proposed works and their likely impact on the environment. The Scottish Ministers consider that they have been provided with sufficient information to adopt a scoping opinion.

2.2 The requirement for Environmental Impact Assessment

2.2.1 Under the 2017 MW Regulations, the Scottish Ministers, as the consenting authority, must not grant a regulatory approval for an EIA project unless an environmental impact assessment has been carried out in respect of that project and in carrying out such assessment the Scottish Ministers must take the environmental information into account. The works described in your scoping report fall under Schedule 2, paragraphs 1(e) and 10(g) of the 2017 MW Regulations. A screening opinion was issued on 14 March 2018 which found that the works exceeded the corresponding threshold described in column 2 of schedule 2 of the MW Regulations. On consideration of the selection criteria set out in schedule 3 of the MW Regulations it was determined that the environmental effects of the works was likely to be significant and thus should be subjected to an EIA.

2.3 The content of the scoping opinion

2.3.1 In regards to your request for a scoping opinion on the proposed content of the required EIA report, the Scottish Ministers have, in accordance with the 2017 MW Regulations, considered the documentation provided to date and consulted with the appropriate consultation bodies (see Appendix I) in reaching their scoping opinion.

2.3.2 The EIA process is vital in generating an understanding of the biological, chemical and physical processes operating in and around the proposed works' location and those that may be impacted by the proposed activities. We would however state that references made within the scoping opinion with regard to the significance of impacts should not prejudice the outcome of the EIA process. It is therefore expected that these processes will be fully assessed in the EIA report unless scoped out.

3. Description of works

3.1 Background to the works

3.1.1 The proposal by the applicant is to construct a new quay wall, carry out land reclamation and associated dredging activities as part of the redevelopment of the St. Ola pier within Scrabster harbour. The project comprises of the following main components:

- Installation of new piled quay wall and pier deck to expand the existing pier.
- Capital dredging of approximately 145,000m^3 material to create the new berths.
- 0.65ha land reclamation at the root of the pier to provide storage space for cargo handling.
- 0.27ha land reclamation toward the existing Queen Elizabeth pier to provide an improved queueing area for ferry passengers.
- Installation of a water pipe and fuel pipe along the seabed from the Jubilee pier to the Ice pier and on land to the St. Ola pier.

4. Aim of this scoping opinion

4.1 The scoping process

4.1.1 Scoping provides the first identification, and likely significance, of the environmental impacts of the proposal and the information needed to enable their assessment. The scoping process is designed to identify which impacts will or will not need to be addressed in the EIA report. This includes the scope of impacts to be addressed and the method of assessment to be used. The scoping process also allows consultees to have early input into the EIA process, to specify their concerns and to supply information that could be pertinent to the EIA process. In association with any comments herein, full regard has been given to the information contained within the documentation submitted with the scoping opinion request.

4.1.2 The Scottish Ministers have also used this opportunity to provide advice in relation to the licensing requirements, in addition to the EIA requirements (see Appendix II).

5. Consultation

5.1 The consultation process

5.1.1 On receipt of the scoping opinion request documentation, the Scottish Ministers, in accordance with the 2017 MW Regulations, initiated a 30 day consultation process, which commenced on 18 July 2018. The following bodies were consulted:

- Caithness District Salmon Fishery Board
- Caithness West Community Council
- Fisheries Management Scotland
- *Health and Safety Executive ("HSE")*
- *Highland Council*
- *Historic Environment Scotland ("HES")*
- Marine Safety Forum
- Marine Planning and Policy
- *Maritime and Coastguard Agency ("MCA")*
- *Ministry of Defence ("MOD")*
- North and East Coast Inshore Fisheries Group
- *Northern Lighthouse Board ("NLB")*
- Royal Society for the Protection of Birds Scotland ("RSPB")
- *Royal Yachting Association Scotland ("RYA")*
- *Scottish Environment Protection Agency ("SEPA")*
- Scottish Fishermen's Federation
- Scottish Fishermen's Organisation
- *Scottish Natural Heritage ("SNH")*
- Scottish Water
- Scottish Wildlife Trust
- Scrabster Fishery Office
- The Crown Estate
- Thurso Community Council
- *Transport Scotland*
- *UK Chamber of Shipping*
- Visit Scotland

5.2 Responses received

5.2.1 From the list above a total of 11 responses were received from those listed in italics. The purpose of the consultation was to obtain advice and guidance from each consultee or advisor as to which potential effects should be scoped in or out of the EIA.

5.2.2 The Scottish Ministers are satisfied that the requirements for consultation have

been met in accordance with the 2017 MW Regulations. The sections below highlight issues which are of particular importance with regards to the EIA report and any marine licence application. Full consultation responses are attached in Appendix I and each should be read in full for detailed requirements from individual consultees. The Scottish Ministers expect all consultee concerns to be addressed in the EIA report unless otherwise stated.

6. Contents of the EIA report

6.1 Requirements of the 2017 MW Regulations

6.1.1 An EIA report must be prepared in accordance with regulation 6 of the 2017 MW Regulations.

6.1.2 The 2017 MW Regulations require that the EIA report is prepared by competent experts and must be accompanied by a statement from the applicant outlining the relevant expertise or qualifications of those experts.

6.1.3 The EIA report must be based on this scoping opinion and must include the information that may be reasonably required for reaching a reasoned conclusion, which is up to date, on the significant effects of the works on the environment, taking into account current knowledge and methods of assessment.

6.1.4 A gap analysis template is attached at Appendix III to record the environmental concerns identified during the scoping process. This template should be completed and used to inform the preparation of the EIA report.

6.2 Non-Technical Summary

6.2.1 The EIA report must contain a Non-Technical Summary ("NTS") which should be concise and written in a manner that is appealing to read and easily understood. The NTS should highlight key points set out in the EIA report and must include (at least) the following:

- a description of the works comprising information on the site, design, size and other relevant features of the works;
- a description of the likely significant effects of the works on the environment;
- a description of the features of the works and any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
- a description of the reasonable alternatives studied by the applicant, which are relevant to the works and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the works on the environment; and
- a summary of the information provided under paragraphs 1 to 9 of Schedule 4 of the 2017 MW Regulations.

6.3 EU Guidance

6.3.1 EU guidance on the preparation of an EIA Report identifies the following qualities of a good EIA report:

- A clear structure with a logical sequence, for example describing existing baseline conditions, predicted impacts (nature, extent and magnitude), scope for mitigation, agreed mitigation measures, significance of unavoidable/residual impacts for each environmental topic.
- A table of contents at the beginning of the document.
- A description of the consent procedure for the works and how EIA fits within it.
- Reads as a single document with appropriate cross-referencing.
- Is concise, comprehensive and objective.
- Is written in an impartial manner without bias.
- Includes a full description and comparison of the alternatives studied.
- Makes effective use of diagrams, illustrations, photographs and other graphics to support the text.
- Uses consistent terminology with a glossary.
- References all information sources used.
- Has a clear explanation of complex issues.
- Contains a good description of the methods used for the studies of each environmental topic.
- Covers each environmental topic in a way which is proportionate to its importance.
- Provides evidence of effective consultations (if some consultations have already taken place).
- Provides basis for effective consultations to come.
- Makes a commitment to mitigation (with a programme) and to monitoring.
- Has a NTS which does not contain technical jargon.
- Contains, where relevant, a reference list detailing the sources used for the description and assessments included in the report.

6.4 Mitigation

6.4.1 Within the EIA report it is important that all mitigating measures are:

- clearly stated;
- accurate;
- assessed for their environmental effects;
- assessed for their effectiveness;
- fully described with regards to their implementation and monitoring, and;
- described in relation to any consents or conditions.

6.4.2 The EIA report should contain a mitigation table providing details of all proposed mitigation discussed in the various chapters. Refer to Appendix I for consultee comments on specific baseline assessment and mitigation.

6.4.3 Where potential environmental impacts have been fully investigated but found to be of little or no significance, it is sufficient to validate that part of the assessment by detailing in the EIA report:

- the work that has been undertaken;
- what this has shown i.e. what impact, if any, has been identified; and
- why it is not significant.

6.5 Design Envelope

6.5.1 The exact nature of the work that is needed to inform the EIA may vary depending on the design choices. Where flexibility in the design envelope is required, this must be defined within the EIA report and the reasons for requiring such flexibility clearly stated. To address any uncertainty the EIA report must consider the potential impacts associated with each of the different scenarios. The criteria for selecting the worst case, and the most likely scenario, along with the potential impacts arising from these, must also be described. The Scottish Ministers will determine the application based on the worst case scenario. The EIA will reduce the degree of design flexibility required and the detail will be further refined in a Construction Method Statement ("CMS") to be submitted to the Scottish Ministers, for their approval, before works commence. Please note however, the information provided in Section 10 below regarding multi-stage regulatory consent. The CMS will freeze the design of the project and will be reviewed by the Scottish Ministers to ensure that the worst case scenario described in the EIA report is not exceeded.

7. Interests to be considered within the EIA report

7.1 Introduction

7.1.1 The scoping report considered the likely impacts on the environment under the headings and topics addressed below. This section also contains a summary of the main points raised by consultees and the Scottish Ministers' opinion on whether EIA topics should be scoped in or out. The consultation responses are contained in Appendix I and the applicant is advised to carefully consider these responses and use the advice and guidance contained within them to inform the EIA report.

7.2 Coastal Processes

7.2.1 The applicant proposes that changes to coastal processes at the operational phase are scoped out of the EIA however an assessment of effects on water quality from suspended sediment and possible contaminant dispersion as a result of the dredging and dredged material deposit should be scoped in.

7.2.2 Coastal processes were not discussed by any of the consultees in their consultation responses.

7.2.3 The Scottish Ministers conclude that coastal processes should be scoped out of the EIA report and the issues identified by the applicant in relation to water quality should be included in the chapter on water quality.

7.3 Flood Risk

7.3.1 The applicant proposes that flood risk be scoped in to the EIA report in line with Scottish Planning Policy as Scrabster harbour is identified as at risk of coastal and pluvial flooding by SEPA. The applicant also proposes the need to assess effects on surface water drainage.

7.3.2 In their consultation response, SEPA have stated that a flood risk assessment is not required because the development should not have an impact on local flood risk. They have recommended that at least 600mm of freeboard is added when setting pier levels.

7.3.3 The Scottish Ministers agree with the opinion of SEPA that a detailed flood risk assessment is not required and therefore flood risk can be scoped out of the EIA report providing the recommended freeboard is adhered to.

7.4 Marine Biodiversity

7.4.1 The applicant identifies a number of potential impacts on migratory fish, marine mammals and benthic ecology including temporary disturbance and loss of habitat, permanent habitat loss from the land reclamation, effects of increased suspended sediment concentration and potential contaminant release, effects of underwater noise and disturbance and collision risk to marine mammals from increased vessel traffic during construction. On the basis of the above, the applicant proposes that marine biodiversity is scoped in to the EIA report.

7.4.2 The Highland Council support the need for an assessment of the impacts of underwater noise on migratory fish and marine mammals. They also recommend an assessment of the contaminant levels in the dredged material and consideration of any likely impact on benthic species. In their consultation response, SNH also identify the need to consider mitigation measures to address potential impacts from noise and physical obstruction on migrating salmon. There is also the potential for noise generated by the construction works to impact European protected species and SNH have advised that this requires thorough consideration in the EIA report. SNH also recommend that a consideration of impacts on seal haulouts and basking sharks should be included in the EIA report.

7.4.3 The Scottish Ministers concur with the applicant and the views of the consultees that marine biodiversity including migratory fish, marine mammals and benthic ecology should be scoped in to the EIA report.

7.5 Water Quality

7.5.1 In the scoping report, the applicant has identified a number of potential impacts on water quality from the construction works and has proposed that further assessment is required in line with the Water Framework Directive. The source of these impacts has been identified as dredging, release of contaminated sediments, disposal of dredged material at sea and pollution events.

7.5.2 SEPA identified that the works are in proximity to the Thurso bathing beach which is an area that is also well used by surfers throughout the winter. They therefore suggest that mitigation measures are required to maintain water quality throughout the year.

7.5.3 The Scottish Ministers agree with the recommendation of the scoping report supported by the view of SEPA that water quality should be scoped in to the EIA report.

7.6 Terrestrial Biodiversity and Ornithology

7.6.1 The applicant proposes that ornithology and otters are scoped in to the EIA

report. This is due to the proximity of the North Caithness Cliffs SPA which is 200 metres from the proposed development which means that a HRA assessment will likely be required. The applicant also identifies that otters may use the shoreline and harbour area and thus need to be considered in the EIA report.

7.6.2 In their consultation response, SNH confirm that an HRA assessment will be required for the North Caithness Cliffs SPA and that ornithology should be included in the EIA report. They identify that impacts could be caused by the construction works from noise, lighting and pollution. SNH also support the need for an otter survey to be carried out as part of the EIA and the results used to produce a species protection plan if required.

7.6.3 The Scottish Ministers agree with the applicant and SNH that ornithology and terrestrial biodiversity, specifically otters, should be included within the EIA report.

7.7 Transportation

7.7.1 The applicant proposes that transport is scoped in to the EIA to address the concerns raised by the Highland Council in their screening opinion response. They propose the production of a transport statement to address any issues arising from increase in vehicular traffic from the development. It is proposed that this document is produce in consultation with the Highland Council and Transport Scotland, as the Road Authority for the A9 trunk road which serves the harbour.

7.7.2 In their consultation response, Transport Scotland support the view previously provided by the Highland Council that a transport assessment is not required however a transport statement should be produced to assess the potential environmental impacts associated with increased traffic from the development. The Highland Council did not make reference to transportation within their consultation response on the scoping report. SNH also raise the issue of increased vessel traffic and request that an assessment of this is included within the EIA report.

7.7.3 The Scottish Ministers support the request by Transport Scotland for a transport statement to be included as part of the EIA report and thus transportation is scoped in. In addition to the transport statement, the Scottish Ministers support the request by SNH for inclusion of an assessment of increased vessel traffic within the EIA report.

7.8 Air Quality and Climate

7.8.1 The applicant proposes that air quality and climate should be scoped in to the EIA to address emissions from plant and vehicles and dust levels from construction activities. The findings of the assessment will be used to develop appropriate mitigation plans.

7.8.2 In their consultation response, Transport Scotland support the need for air quality assessments to be carried out and any impacts that are identified to be addressed through mitigation plans.

7.8.3 The Scottish Ministers concur with the applicant and Transport Scotland that an air quality assessment should be carried out and thus air quality and climate should be scoped in to the EIA report.

7.9 Noise and Vibration

7.9.1 The applicant has identified potential impacts of noise from plant/equipment, vessels and road traffic from the development and thus concluded that noise and vibration should be scoped in to the EIA report.

7.9.2 In their consultation response, Transport Scotland support the view of the applicant with regards to the inclusion of in-air noise within the EIA report. However, both SNH and the Highland Council also raise concerns in their responses regarding underwater noise generated by the proposed works and the impact that this could have on ecological receptors.

7.9.3 The Scottish Ministers agree with the applicant and Transport Scotland that in-air noise and vibration should be scoped in to the EIA report. The Scottish Ministers also support the consultee view that an assessment of underwater noise is also required and that this should be included either in this chapter or in the relevant chapter(s) relating to ecological receptors.

7.10 Waste Management

7.10.1 The applicant has concluded that waste management during the construction phase of the works should be scoped in to the EIA report. The main focus will be on seabed sediments produced by the dredging works however the applicant also proposes to produce a site waste management plan to consider all waste arising from the site.

7.10.2 Although waste management was not specifically identified by the consultees in their responses, the Scottish Ministers support the need for a site waste management plan for inclusion within the Construction Environment Management Plan (CEMP). The Scottish Ministers are also of the view that the options for the disposal of seabed sediments from the dredging works will be addressed through the Best Practicable Environmental Option (“BPEO”) document required to support a dredging licence application. On the basis of the above recommendations, the Scottish Ministers have concluded that waste management should be scoped out of the EIA report.

7.11 Soils, Geology and Contamination

7.11.1 The applicant proposes that soils, geology and contamination should be scoped in to the EIA report to establish the suitability of dredged material for re-use within the reclamation or as backfill. They also propose that this chapter will consider the contamination status of the sediments to be dredged.

7.11.2 In their consultation response, SNH support the need to clarify the composition of the material to be deposited at sea within the EIA report.

7.11.3 The Scottish Ministers support the need for an assessment of the ground conditions to inform the deposit of dredge material and thus agree that soils, geology and contamination should be scoped in to the EIA report.

7.12 Cultural Heritage

7.12.1 The applicant proposes that cultural heritage should be scoped out of the EIA report on the basis of the known baseline situation and the nature of the development. The scoping report provides a consideration of designated and non-designated heritage assets within the vicinity of the proposed works and the potential impact pathways by which the works may affect these assets. However concludes that there is negligible potential for the proposed redevelopment to affect cultural heritage assets.

7.12.2 In their consultation response, Historic Environment Scotland confirmed that there are no marine or terrestrial heritage assets that fall within their statutory remit and are within the vicinity of the works. On this basis, they are content for heritage assets to be scoped out of the EIA report.

7.12.3 The Scottish Ministers are content with the assessment provided by the applicant in their scoping report and in light of the fact that no concerns were raised by the consultees, have concluded that cultural heritage can be scoped out of the EIA report.

7.13 Landscape and Visual

7.13.1 The applicant has stated in the scoping report that the proposed redevelopment is consistent with the existing landscape character at Scrabster Harbour and utilises existing features. Vessels will continue to come and go from the harbour in line with the current situation. On this basis, they conclude that landscape and visual can be scoped out of the EIA report.

7.13.2 Landscape and visual impacts were not raised by any of the consultees in

their responses. The Scottish Ministers have considered the evidence provided by the applicant in the scoping report including the siting of the harbour at the bottom of the Braes which means that any views of the harbour are only possible from a longer distance across Thurso bay from the south and east. On this basis, the Scottish Ministers have concluded that landscape and visual can be scoped out of the EIA report.

7.14 Population, Human Health and Socio-Economics

7.14.1 The applicant has proposed that a standalone chapter on population, human health and socio-economics is scoped out of the EIA report and that relevant impacts during the construction phase of the works are addressed in the specialist topics of air quality, noise and vibration, transportation, water quality and contamination. The scoping report predicts a positive impact on socio-economics and this will be included in the project description of the EIA report.

7.14.2 The UK Chamber of Shipping supports the applicants conclusion that the socio-economic impact of the development is likely to be positive and thus does not require inclusion in the EIA.

7.14.3 The Scottish Ministers are satisfied with the approach proposed by the applicant to address any issues relating to population and human health within the specialist topics elsewhere within the EIA report. On this basis, population, human health and socio-economics is scoped out.

7.15 Major Disasters and Accidents

7.15.1 The applicant has stated that impacts upon the natural environment, local land uses and human population could occur during the construction and operational phases due to accidental discharge of dangerous substances. Works will be carried out in adherence with existing harbour guidelines to minimise the risk of this occurring. The applicant proposes to address impact of any accidental discharge in the specific chapters relating to the affected receptors. The risk of accidental release from collision of vessels is also scoped out on the basis that existing navigational systems and controls within the harbour will be adhered to.

7.15.2 The consultation responses received did not make reference to major disasters and accidents, and no concerns were presented to the Scottish Ministers. The Scottish Ministers agree that impacts on receptors should be addressed in the relevant chapters and that major disasters and accidents can be scoped out of the EIA report.

7.16 Material Assets

7.16.1 The applicant divides material assets into the built environment and the natural environment. The scoping report considers these in turn and concludes that any potentially significant effects on material assets are covered elsewhere within the EIA and thus a specific chapter on material assets can be scoped out.

7.16.2 The Scottish Ministers agree with the conclusions of the applicant that material assets can be scoped out of the EIA report.

7.17 Cumulative Assessment

7.17.1 The applicant proposes that cumulative assessment will be considered between this project and other marine developments where concurrent environmental effects are apparent. However, they propose to address this under each of the relevant receptors and have determined that cumulative assessment should be scoped out of the EIA report.

7.17.2 In their consultation response, SNH specifically identified the Meygen project which should be assessed for cumulative impacts and offered to provide further advice regarding projects which should be considered.

7.17.3 The Scottish Ministers advise that the applicant contacts SNH, in addition to the approaches listed in the scoping report, to identify projects with potential cumulative effects. In general however, the Scottish Ministers are supportive of the applicants approach to assess cumulative impacts for each receptor in each chapter of the EIA and thus conclude that a standalone chapter on cumulative assessment can be scoped out of the EIA report.

7.18 Navigation

7.18.1 Navigation has not been explicitly considered by the applicant in their scoping report. Mention is made to the presence, movement and navigation of vessels and the potential for accidents however the applicant proposes that these will be managed by the existing systems and controls within the harbour.

7.18.2 In their consultation response the MCA have requested a navigational risk assessment which could take the form of a plan to revise the existing Safety Management System within the Harbour to take account of the development operation and cumulative effects on existing vessel traffic.

7.18.3 On the basis of the advice provide by the MCA, the Scottish Ministers have concluded that navigation should be scoped in to the EIA report.

8. Marine Planning

8.1 Background

8.1.1 The development of projects subject to EIA should be in accordance with the UK Marine Policy Statement and the National Marine Plan ("NMP").

8.2 The UK Marine Policy Statement 2011

8.2.1 The UK Administrations share a common vision of having clean, healthy, safe, productive and biologically diverse oceans and seas. Joint adoption of a UK-wide Marine Policy Statement provides a consistent high-level policy context for the development of marine plans across the UK to achieve this vision. It also sets out the interrelationship between marine and terrestrial planning regimes. It requires that when the Scottish Ministers make decisions that affect, or might affect, the marine area they must do so in accordance with the Statement.

8.3 Scotland's NMP 2015

8.3.1 Developed in accordance with the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 (as amended), the NMP provides a comprehensive statutory planning framework for all activities out to 200 nautical miles. This includes policies for the sustainable management of a wide range of marine industries. The Scottish Ministers must make authorisation and enforcement decisions, or any other decision that affects the marine environment, in accordance with the NMP. The NMP sets out a presumption in favour of sustainable development and use of the marine environment when consistent with the policies and objectives of the Plan.

8.4 Application and EIA Report

8.4.1 It should be noted that any changes produced after the EIA report is submitted may require further environmental assessment and public consultation.

9. Multi-Stage Regulatory Approval

9.1 Background

9.1.1 The 2017 MW Regulations contain provisions regulating the assessment of environmental impacts. A multi-stage approval process arises where an approval procedure comprises more than one stage, one stage involving a principal decision and one or more other stages involving an implementing decision(s) within the parameters set by the principal decision. While the effects which works may have on the environment must be identified and assessed at the time of the procedure relating to the principal decision, if those effects are not identified or identifiable at the time of the principle decision, assessment must be undertaken at the subsequent stage.

9.1.2 The definition in the 2017 MW Regulations is as follows: "*application for multi-stage regulatory approval" means an application for approval, consent or agreement required by a condition included in a regulatory approval where (in terms of the condition) that approval, consent or agreement must be obtained from the Scottish Ministers before all or part of the works permitted by the regulatory approval may be begun*".

9.1.3 A marine licence, if granted, by the Scottish Ministers for your works at St Ola Pier, Scrabster Harbour, may have several conditions attached requiring approvals etc. which fall under this definition, for example the approval of a CMS.

9.1.4 When making an application for multi-stage approval the applicant must satisfy the Scottish Ministers that no significant effects have been identified in addition to those already assessed in the EIA report. In doing so, the applicant must account for current (meaning at the time of the multi-stage application) knowledge and methods of assessment which address the likely significant effects of the works on the environment so to enable the Scottish Ministers to reach a reasoned conclusion which is up to date.

9.1.5 If during the consideration of information provided in support of an application for multi-stage regulatory approval the Scottish Ministers consider that the works may have significant environmental effects which have not previously been identified in the EIA report (perhaps due to revised construction methods or updated survey information), then information on such effects and their impacts will be required. This information will fall to be dealt with as additional information under the 2017 MW Regulations, and procedures for consultation, public participation, public notice and decision notice of additional information will apply.

10. Judicial review

All decisions may be subject to judicial review. A judicial review statement should be made available to the public.

11. Gaelic Language

If the proposed works are located in an area where Gaelic is spoken, the applicant is encouraged to adopt best practice by publicising details of the proposed works in both English and Gaelic.

Signed
[Redacted]

Louise Msika
21 September 2018
Authorised by the Scottish Ministers to sign in that behalf.

Appendix I: Consultee Responses

Historic Environment Scotland

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

By email to: MS.majorprojects@gov.scot

Marine Scotland (Aberdeen Office)
Marine Laboratory
375 Victoria Road
Aberdeen
AB11 9DB

Longmore House
Salisbury Place
Edinburgh
EH9 1SH

Enquiry Line: 0131-668-8716
HMConsultations@hes.scot

Our ref: AMN/16/H
Our case ID: 300026302

13 August 2018

Dear Ms Sermpezi

Marine Works (Environmental Impact Assessment) (Scotland) 2017
Scrabster Harbour - St. Ola Pier Redevelopment
Scoping Report

Thank you for your consultation which we received on 18 July 2018 about the above scoping report. We have reviewed the details in terms of our historic environment interests. This covers world heritage sites, scheduled monuments and their settings, category A-listed buildings and their settings, inventory gardens and designed landscapes, inventory battlefields and historic marine protected areas (HMPAs).

Your archaeological and cultural heritage advisors will also be able to offer advice on the scope of the cultural heritage assessment. This may include heritage assets not covered by our interests, such as unscheduled archaeology, and category B- and C-listed buildings.

Proposed Development
I understand that the proposed development relates to the reconstruction and expansion of the existing pier. The development will require both terrestrial and marine works.

Scope of assessment
I can confirm that there are no marine or terrestrial heritage assets within our statutory remit within the development site boundary or its vicinity. On this basis we would be content for heritage assets within our remit be scoped out of the assessment.

Further information
Guidance about national policy can be found in our 'Managing Change in the Historic Environment' series available online at www.historicenvironment.scot/advice-and-support/planning-and-guidance/legislation-and-guidance/managing-change-in-the-historic-environment-guidance-notes. Technical advice is available on our Technical Conservation website at http://conservation.historic-scotland.gov.uk/.
We hope this is helpful. Please contact us if you have any questions about this response. The officer managing this case is Sam Fox and they can be contacted by phone on 0131 668 8668 or by email on samuel.fox@hes.scot.

Yours sincerely

Historic Environment Scotland

Health & Safety Executive

From: Alison.Walters@hse.gov.uk
Sent: 06 August 2018 13:52
To: MS Major Projects
Subject: RE: Scrabster Harbour (per RPS) - St. Ola Pier Redevelopment, Scrabster - Scoping Report Consultation - Responses by 16 August 2018

Rania

ENVIRONMENTAL ASSESSMENT FOR PROPOSED DEVELOPMENT AT: St. Ola Pier Redevelopment, Scrabster.

Thank you for your email of 18th July 2018 asking what information should be provided in the environmental statement for the proposed development at Scrabster Harbour.

Environmental Impact Assessments are concerned with projects which are likely to have significant effects on the environment. HSE's principal concerns are the health and safety of people affected by work activities. HSE cannot usefully comment on what information should be included in the environmental statement of the proposed development. However, the environmental statements should not include measures which would conflict with the requirements of the Health and Safety at Work etc Act 1974 and it's relevant statutory provisions.

Kind Regards

Alison

Alison Walters – Admin Support for CEMHD1
Chemical Explosives and Microbiologists Hazards Division
020 3028 2424 | alison.walters@hse.gov.uk |
: Health and Safety Executive, 2nd Floor, Cornerstone, 107 West Regent Street, Glasgow, G2 2BA

Helping Great Britain work well

HSE is engaging with stakeholders to shape a new strategy for occupational safety and health in Great Britain, with seven roadshow events across the country. Find out more[3] and join the conversation #HelpGBWorkWell

Highland Council

From: Gillian Webster <Gillian.Webster@highland.gov.uk>
Sent: 17 August 2018 15:03
To: MS Major Projects
Subject: RE: FW: Scrabster Harbour (per RPS) - St. Ola Pier Redevelopment, Scrabster - Scoping Report Consultation - Responses by 16 August 2018 - 18/03379/PREAP

Hi Rania
Apologies – for some reason our system generated a target date of 30th August.

Please see comments from our coastal planner:

18/03379/preapp Scrabster Harbour: St. Ola Pier Redevelopment: MS-consultation

Coastal Planner response 24/07/2018

Note my comments only relate to the marine elements of the proposal.

As noted in the scoping document, an assessment of the likely impacts of p other construction noise on marine mammals and migratory fish species sh included in the EIA report. Porpoises in particular are found in close proxir proposal.

I suggest the applicants consult the Caithness District Salmon Fishery Boa (CDSFB) on likely impacts on wild salmonids. As the River Thurso is an S designated for Atlantic salmon (*Salmo salar*), the CDSFB may advise on construction times to be avoided in order to minimize impacts on migrating runs. An Appropriate Assessment is likely to be required; SNH can advise

The EIA report should consider the likely impacts on the area surrounding dredge site if the material dredged out of the pier site during the benthic su found to be contaminated and likely to impact benthic species.

The proposed work to address any impacts on the North Caithness Cliffs S appear to be sufficient but an Appropriate Assessment may be required giv close proximity to the development; SNH can advise.

Hope this is useful

Kind regards
Gillian

Gillian Webster BSc (Hons) MRTPI
Acting Principal Planner – Caithness, Sutherland and Easter Ross
Development & Infrastructure
Drummuie, Golspie, KW10 6TA
Tel: 01408 635219

This advice is given without prejudice to the future consideration of and decision on any application received by The Highland Council
Thathar a' toirt seachad na comhairle seo gun chlaon-bhreith do bheachdachadh air agus co-dhùnadh a thaobh tagradh sam bith a tha Comhairle na Gàidhealtachd a' faighinn san àm ri teachd

Follow up documentation for existing planning applications
Follow up documentation should no longer be submitted directly to Planning Officers or to Area Planning Offices. If you would like to submit revised plans or any other follow up/additional documentation in relation to an existing application, please do so by using the Post Submission Additional Document online form available on the ePlanning.scot Portal. Further guidance on how to do this can be found here on our Planning Web Pages. Please remember to quote the correct application reference number on the online form before submitting. Thank you for your co-operation.

Maritime and Coastguard Agency

Dear Marine Scotland,

Thank you for the opportunity to comment on this request for a Scoping Opinion for the redevelopment of St Ola Pier at Scrabster Harbour.

We expect that a Marine Licence under the Marine & Coastal Access Act 2009 would be required for the proposed works, at which time the MCA will be invited to comment on the application from a safety of navigation perspective.

We note that the works are being undertaken by Scrabster Harbour, who are a Statutory Harbour Authority and have declared compliance with the Port Marine Safety Code (PMSC) for 2018.

We also note the developers intention, stated in the report, to include a Chapter on navigation in their Environmental Impact Assessment. We would expect a full Navigation Risk Assessment to be included, with reference to impacts on the Harbour's operations and existing Safety Management System (SMS). This should also consider any cumulative impacts on shipping and navigation in the general area.

The sections that we feel cover Navigation safety under the PMSC and its Guide to Good Practice are as follows:

From the Guide to Good Practice, section 7 Conservancy, a Harbour Authority has a duty to conserve the harbour so that it is fit for use as a port, and a duty of reasonable care to see that the harbour is in a fit condition for a vessel to be able to use it safely. Section 7.7 Regulating harbour works covers this in more detail and have copied the extract below from the Guide to Good Practice.

7.7 Regulating harbour works

7.7.1 Some harbour authorities have the powers to license works where they extend below the high watermark, and are thus liable to have an effect on navigation. Such powers do not, however, usually extend to developments on the foreshore.

7.7.2 Some harbour authorities are statutory consultees for planning applications, as a function of owning the seabed, and thus being the adjacent landowner. Where this is not the case, harbour authorities should be alert to developments on shore that could adversely affect the safety of navigation. Where necessary, consideration should be given to requiring the planning applicants to conduct a risk assessment in order to establish that the safety of navigation is not about to be put at risk. Examples of where navigation could be so affected include:

- high constructions, which inhibit line of sight of microwave transmissions, or the performance of port radar, or interfere with the line of sight of aids to navigation;
- high constructions, which potentially affect wind patterns; and

- lighting of a shore development in such a manner that the night vision of mariners is impeded, or that navigation lights, either ashore and onboard vessels are masked, or made less conspicuous.

There is a British Standards Institution publication on Road Lighting, BS5489. Part 8 relates to a code of practice for lighting which may affect the safe use of aerodromes, railways, harbours and navigable Inland waterways.

Best Regards,

Thomas Bulpit

Marine Licencing Lead

MCA Navigation Safety Branch

From: Thomas Bulpit <Thomas.Bulpit@mcga.gov.uk>
Sent: 20 September 2018 14:45
To: MS Major Projects
Cc: navigation safety
Subject: RE: Scrabster Harbour (per RPS) - St. Ola Pier Redevelopment, Scrabster - Scoping Report Consultation - Responses by 16 August 2018

Good Afternoon,

Thank you for your telephone call today and earlier this week with regards to our response, and request for a Navigational Risk Assessment to be completed for the EIA.

I have reviewed our response and the original Scoping Request document by the developer, and feel that this request should still stand. Noting 16.10 in the Scoping Request, the developer recognises the potential safety impact from the development works through increase in vessel traffic as well as actual construction operations. We would reiterate that these works would require a Marine Licence and would anticipate to be consulted by Marine Scotland at that time; noting this potential safety impact and increased risk to marine users through collision risk, etc, we would like to see this addressed in the EIA in more detail to explore this.

“Navigational Risk Assessment” can be open to some interpretation, and we note that Scrabster Harbour is already PMSC compliant and has declared as such for 2018. As such Scrabster will already have an existing Safety Management System (SMS) as referenced in the Scoping Opinion; we would be happy at EIA stage if we simply saw the developer’s plan to revise the SMS to take account of the development operation, and cumulative effects on existing vessel traffic. Our area of interest as consultee is that the potential risks to navigation safety are accurately assessed with relevant mitigations and contingencies put into place.

I hope that this provides some clarification. Please feel free to give me a call if you would like to discuss this further.

Best Regards,

Tom

Thomas Bulpit, Marine Licencing Lead
Maritime & Coastguard Agency
Spring Place, 105 Commercial Road, Southampton, SO15 1EG
Direct: 020381 72418 | Mobile: 07825 792138
Email: Thomas.bulpit@mcga.gov.uk | GSI: Thomas.bulpit@mcga.gsi.gov.uk
Please note my GSI email is not routinely monitored.

Maritime & Coastguard Agency | HM Coastguard

Safer Lives, Safer Ships, Cleaner Seas

Ministry of Defence

From: DIO-Safeguarding-Offshore (MULTIUSER) <DIO-Safeguarding-Offshore@mod.gov.uk>
Sent: 24 July 2018 10:16
To: MS Major Projects
Subject: RE:20180724- Scrabster Harbour (per RPS) - St. Ola Pier Redevelopment, Scrabster - Scoping Report Consultation -DIO 10043859-O

Good Morning Rania,

Further to your e-mail below and after our investigation, I can confirm that the MOD has No Objection to this activity in the location specified. I hope this information is sufficient for your purposes.

Regards

Michael Billings

Safeguarding Assistant
Estates – Safeguarding

Defence Infrastructure Organisation

Building 49, DIO Sutton Coldfield, Kingston Road, B75 7RL

Tel: 0121 311 2025 | **Email:** michael.billings950@mod.gov.uk

Website: www.gov.uk/dio/ | **Twitter**: @mod_dio

Read DIO's blog: https://insidedio.blog.gov.uk/

Defence Infrastructure Organisation

Northern Lighthouse Board

Northern Lighthouse Board

84 George Street
Edinburgh EH2 3DA

Switchboard: 0131 473 3100
Fax: 0131 220 2093

Website: www.nlb.org.uk

Your Ref: EIA Scoping Email from MS
Our Ref: GB/ML/S13_02_034

Ms Rania Sermpezi
Marine Licensing Casework Officer
Marine Scotland – Marine Planning & Policy
Scottish Government
Marine Laboratory
375 Victoria Road
ABERDEEN
AB11 9DB

25 July 2018

Dear Rania

PART 4, REGULATION 14(2) OF THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 (AS AMENDED) ('THE MW REGULATIONS') – SCRABSTER HARBOUR TRUST (PER RPS GROUP) : ST OLA PIER REDEVELOPMENT – SCRABSTER HARBOUR, SCRABSTER

Thank you for your e-mail correspondence dated 18 July 2018, regarding the Environment Impact Assessment scoping opinion submitted by **Scrabster Harbour Trust (per RPS Group)** for the proposed redevelopment of St Ola Pier, Scrabster Harbour, Scrabster.

Northern Lighthouse Board has no objections to the proposed redevelopment and will advise marking and lighting requirements in response to a Marine Licence application.

Yours sincerely
[Redacted]

Peter Douglas
Navigation Manager

Royal Yachting Association Scotland

RYA Scotland

Royal Yachting Association Scotland

RYA Scotland

Caledonia House
1 Redheughs Rigg
South Gyle
Edinburgh
EH12 9DQ

T +44 (0)131 317 7388
E admin@ryascotland.org.uk
W www.ryascotland.org.uk

9 August 2018

Rania Sermpezi
Marine Licensing Casework Officer
Marine Scotland - Marine Planning & Policy
Scottish Government, Marine Laboratory,
375 Victoria Road,
Aberdeen, AB11 9DB

ms.majorprojects@gov.scot

Dear Ms Sermpezi,

Scrabster Harbour (per RPS) - St. Ola Pier Redevelopment, Scrabster - Scoping Report Consultation

I note that the scoping report makes no mention of recreational sailing at Scrabster. Although Scrabster has only a limited number of leisure berths in the Inner Basin it is nevertheless an important harbour for vessels cruising through the Pentland Firth. However, the only possible impact of the proposed development is the potential installation of a new fuel and water pipe from the Ice Quay to the Jubilee Quay, which might inhibit access temporarily. Any such closure would need to be well publicised and not just through a Notice to Mariners or Kingfisher as this is the only harbour between Strathy Point and Dunnet Head.

The Pentland Firth Yacht Club is based in the southeast corner of the port but members largely sail dinghies which are launched from the two slipways beside the clubhouse and are thus well away from the proposed development. Although they are unlikely to be affected directly, the club should be added to the list of consultees.

If the issue in the first paragraph can be resolved then recreational boating can be scoped out of the EIA.

[Redacted]

Dr G. Russell FRMetS MCIEEM
Planning and Environment Officer, RYA Scotland

Scottish Environment Protection Agency

SEPA
Scottish Environment Protection Agency
Buidheann Dìon Àrainneachd na h-Alba

Our ref: PCS/160289
Your ref: Email 18/7/18

Rania Sempezi
Marine Scotland
Aberdeen

If telephoning ask for:
Susan Haslam

31 July 2018

By email only to: ms.majorprojects@gov.scot

Dear Ms Sempezi

The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017
Pier Extension
Ola Pier, Scrabster

Thank you for consulting SEPA on the scoping opinion for the above development proposal by way of your email which we received on 18 July 2018.

Insofar as the development relates to our interests we are generally content with the scope of the assessment proposed but you and the developer should take into consideration the following site specific advice:

- The development is located in Thurso Bay which also contains Thurso Bathing Beach. While the official bathing water testing season is from June to September this beach and surrounding waters is also well used by surfers in the winter. It is therefore necessary to ensure that measures are put in place to protect water quality throughout the year.

- The development may have impacts on existing discharges to the area. The EIA Report should identify all discharges within the vicinity of the works and provide an assessment of likely impacts, and if required remediation proposals. Our records suggest that there is a combined sewer overflow in this area; so the developer should discuss their proposals with Scottish Water. If a new discharge location is required then the related existing Water Environment (Controlled activities) Regulations authorisation will need to be varied.

- In relation to flood risk then the 1 in 200 year coastal flood level for the area is 3.53mAOD. This is based on extreme still water level calculation using the Coastal Flood Boundary Method and does not take into account the potential effects of wave action, climate change, funnelling or local bathymetry and as a result we recommend at least 600mm of freeboard be added. The developer should take this into consideration when setting pier levels. We can confirm that we are content that the development should not have an impact on local flood risk and as a result a detailed Flood Risk Assessment is not required.

Scottish Living Wage Accreditation
UKAS MANAGEMENT SYSTEMS 001

Chairman
Bob Downes
Chief Executive
Terry A'Hearn

SEPA Dingwall Office
Graesser House, Fodderty Way,
Dingwall Business Park, Dingwall IV15 9XB
tel 01349 862021 fax 01349 863987
www.sepa.org.uk • customer enquiries 03000 99 66 99

For all other aspects, including in relation to dredging and its uses, we refer you and the developer to SEPA standing advice for The Department of Energy and Climate Change and Marine Scotland on marine consultations.

Should you wish to discuss this letter please do not hesitate to contact me on 01349 860359 or planning.dingwall@sepa.org.uk.

Yours sincerely

Susan Haslam
Senior Planning Officer
Planning Service

Disclaimer
This advice is given without prejudice to any decision made on elements of the proposal regulated by us, as such a decision may take into account factors not considered at this time. We prefer all the technical information required for any SEPA consents to be submitted at the same time as the planning or similar application. However, we consider it to be at the applicant's commercial risk if any significant changes required during the regulatory stage necessitate a further planning application or similar application and/or neighbour notification or advertising. We have relied on the accuracy and completeness of the information supplied to us in providing the above advice and can take no responsibility for incorrect data or interpretation, or omissions, in such information. If we have not referred to a particular issue in our response, it should not be assumed that there is no impact associated with that issue. For planning applications, if you did not specifically request advice on flood risk, then advice will not have been provided on this issue. Further information on our consultation arrangements generally can be found on our website planning pages.

Scottish Natural Heritage

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

By email only to: ms.marinelicensing@gov.scot

Our Ref: CEA15583
Date: 13th August 2018

For the attention of: Rania Sermpezi

Dear Ms Sermpezi,

Scoping opinion request for the St. Ola Pier redevelopment works at Scrabster Harbour, under Part 4, Regulation 14 (2) of the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) ('the MW Regulations').

Thank you for your consultation dated 18 July 2018, requesting a scoping opinion for the above proposal.

Background

We provided a screening opinion to you on 21 February 2018 and advised that this proposal should be subject to an EIA.

Scoping Advice

Protected Areas

We advise that the protected areas listed below are scoped into the EIA.

- Moray Firth Special Area of Conservation (SAC)
  - We advise that any bottlenose dolphins in the vicinity of this proposal are likely to be from the Moray Firth SAC population however they may be rarely sighted in this area.
- Sanday SAC
- Faray & Holm of Faray SAC
- The River Thurso SAC
  - With regard to the River Thurso SAC, we advise that the applicant will have to consider the potential impact that this proposal (and impacts during construction - such as piling noise and physical obstruction) may have on salmon travelling east towards the Thurso SAC. We would expect to standard mitigation measures to be included in a construction statement. The Marine Scotland Licensing Operations Team may already have tracking data which

show the movement of salmon in this area. It might be useful for the applicant to get in touch for this information.

Further details on the above sites can be found on our website at:
http://gateway.snh.gov.uk/sitelink/index.jsp

Ornithology

The proposed works are located within 200m of the North Caithness Cliffs SPA which is classified for its cliff nesting sea birds and peregrine falcon.

We are satisfied with the scope of the ornithological survey. There is potential for the SPA to be affected by the proposed works by noise, sedimentation and pollution risk, therefore we can conclude "Likely Significant Effect". Further information will be required in order to demonstrate that there is no adverse effect on the SPA's integrity. We do however consider that it should be possible to prevent an adverse effect on the SPA's integrity through mitigation measures to limit noise, lighting and pollution.

Further to this we consider that the issues outlined below will require further analysis and assessment within the ER:

- With regard to the dumping and disposal of material, the material volumes and its composition should be clarified within the ER.
- An assessment to the changes of the nature and type of vessel activity should be assessed within the ER. The report from Affric mentions larger cruise ships as well as North Sea hydrocarbon service vessels. This seems to be a significant addition to current shipping traffic and we would expect to see some assessment of the increase is vessel traffic as well as its type. There are two consequences: increased disturbance, and secondly, increased discharges, both of which have the potential to impact upon birds as well as other wildlife.
- Cumulative impacts on the SPA birds should be considered. We advise that developments other than port developments (e.g. MeyGen tidal stream energy project) should be included in the cumulative assessment. We would be happy to advise on the suitability of projects to be included in the cumulative assessment if the applicant wishes.

Marine Biodiversity

General Advice

We largely agree with the key issues and scope of the EIA as identified in sections 5.15 - 5.22 of the scoping report. We have some additional advice to offer below.

- We advise that Priority Marine Features (PMFs) should be included within the assessment of the "valued ecological receptors". Guidance on PMFs can be found on our website at: https://www.nature.scot/priority-marine-features-guidance
- Although not in close proximity to the development we advise that information on seal haulouts including designated seal haulouts should be presented within the ER. An assessment if any potential impacts on these sites should be undertaken.

- An assessment of underwater noise for EPS species should be undertaken. This should include underwater noise modelling using the NOAA guidelines: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance. This should cover piling (impact and vibrio), dredging and any blasting/explosives use. Mitigation should be proposed relating to the findings of this modelling.
- Confirmation of whether any blasting would be required prior to piling should be provided within the ER. Section 5.6 of the scoping report mentions hard substrata being present in area.
- Further details on the amount of dredging required, amount to be disposed of at sea and location of disposal site should be provided within the ER. From the plans the disposal site is marked as 'disused' so may not be suitable for disposal.
- Cumulative effects should be considered within the ER. We note that there is focus on developments in the nearby vicinity however we advise that those developments that are likely to affect the same features should be included. E.g. developments undertaking piling at the same time that could affect the same population of seals/cetaceans.

European Protected Species

Otters

We welcome the proposal to undertake an otter survey. If any impacts on otters are identified then mitigation measures should be provided in a Species Protection Plan.

Cetaceans

There are records of cetaceans in the area around Thurso Bay, we therefore advise that a full assessment of any potential impacts on cetaceans is undertaken as part of the EIA. If impacts are identified then mitigation measures should be identified and outlined in a Marine Mammal Protection Plan (MPP).

Nationally Protected Species

Basking Sharks

Basking sharks are known to use the Pentland Firth Area and have been recorded in the area around Thurso Bay. An assessment of the potential impacts on these species should be undertaken as part of the EIA and any mitigation should be detailed in a MPP. The applicant should be made aware that they may require a basking shark licence.

Concluding Remarks

Our comments are given without prejudice to the views which we may wish to express at a later stage in response to a formal consultation on the full proposal.

Please let me know if you need any further information or advice from us in relation to this proposal.

Yours sincerely,

Debbie Skinner

Operations Officer
Northern Isles and North Highland
Debbie.Skinner@nature.scot

Transport Scotland

Development Management and Strategic Road Safety
Trunk Road and Bus Operations

Buchanan House, 58 Port Dundas Road, Glasgow G4 0HF
Direct Line: 0141 272 7386, Fax: 0141 272 7350
John.McDonald@transport.gov.scot

TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

Your ref:

Our ref:
TS00538

Date:
01/08/2018

Rania Sermpezi
Marine Scotland
Marine Laboratory
375 Victoria Road
Aberdeen
AB11 9DB

ms.majorprojects@gov.scot

Dear Sirs,

MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017

SCOPING REQUEST FOR ST. OLA PIER REDEVELOPMENT, SCRABSTER

With reference to your recent correspondence on the above development, we acknowledge receipt of the Environmental Impact Assessment (EIA) Scoping Report (SR) prepared by RPS Group in support of the above development.

This information has been passed to SYSTRA Limited for review in their capacity as Term Consultants to Transport Scotland – Trunk Road and Bus Operations (TRBO). Based on the review undertaken, we would provide the following comments.

The proposed development comprises the redevelopment of St Ola Pier within Scrabster Harbour, located approximately 1.5 miles north-west of Thurso. The nearest trunk road to the site is the A9(T) which forms the northern boundary of the harbour, and from which access to the harbour is taken.

The SR indicates that the redevelopment will result in a renovated pier approximately 280m long with the ability to accommodate cruise ships up to 250m long, as well as service and cargo vessels.

It is noted that the works may also include the reclamation of 0.92ha around the pier to provide storage space for cargo handling and improved queuing area. The volume of dredge material generated by the works is approximately 145,000m^3 of sandy gravel and clay. This material may be reused within reclaimed areas of the site; disposed of at a sea disposal site; disposed of at a licensed waste facility or a combination of each of these options. In addition to the above, a water pipe and a fuel pipe will be laid on the seabed to service vessels.

We understand that no road network upgrades are proposed for the transit of goods to service supply vessels or cruise vessels.

The SR indicates within Chapter 8 - Transportation that Highland Council have determined that a Transport Assessment is not necessary to support the application. Instead, a Transport Statement will be provided.

While Transport Scotland is in agreement that a Transport Assessment is not required, we would request that an assessment of the potential environmental impacts associated with increased traffic be provided within the EIA.

Assessment of Potential Environmental Impacts

With regard to the potential environmental impact of the development on receptors adjacent to the trunk road network, there are a number of issues which should be taken into consideration when assessing the merits of the development. The EIA should provide information including the preferred route options for the movement of any heavy loads and an estimate of vehicle trip generation to and from the site. We would request that a worst-case scenario be considered, whereby all the dredged material is transported off-site. In addition, information must be supplied identifying potential environmental impacts on the trunk road once the development is operational, including, inter alia, the potential trips generated by cruise ships utilising the pier.

Potential trunk road related environmental impacts such as driver delay, pedestrian amenity, severance, safety etc should be considered and assessed where appropriate (i.e. where Institute of Environmental Management and Assessment Guidelines for further assessment are breached). These specify that road links should be taken forward for assessment if:

- Traffic flows will increase by more than 30%, or
- The number of HGVs will increase by more than 30%, or
- Traffic flows will increase by 10% or more in sensitive areas.

In the case of the Environmental Statement, the methods adopted to assess the likely traffic and transportation impacts on traffics flows and transportation infrastructure, should comprise:

- Determination of the baseline traffic and transportation conditions, and the sensitivity of the site and existence of any receptors likely to be affected in proximity of the trunk road network;
- Review of the development proposals to determine the predicted construction and operational requirements; and
- Assessment of the significance of predicted impacts from these transport requirements, taking into account impact magnitude (before and after mitigation) and baseline environmental sensitivity.

Where significant changes in traffic are not noted for any link, no further assessment needs to be undertaken. Where environmental impacts have been fully investigated but found to be of little or no significance, it is sufficient to validate that part of the assessment by stating in the report:

- The work that has been undertaken e.g. Transportation/ Noise / Air Quality Assessments etc;
- What this has shown i.e. what impact if any has been identified; and
- Why it is not significant.

It is not necessary to include all the information gathered during the assessment of these impacts although this information should be available if requested.

I trust that the above is satisfactory and should you wish to discuss any issues raised in greater detail, please do not hesitate to contact Alan DeVenny at SYSTRA's Glasgow Office on 0141 343 9636.

Yours faithfully

[Redacted]

John McDonald

Transport Scotland
Trunk Road and Bus Operations

cc Alan DeVenny – SYSTRA Ltd.

UK Chamber of Shipping

From: Robert Carington <RCarington@ukchamberofshipping.com>
Sent: 26 July 2018 13:55
To: MS Major Projects
Subject: RE: Scrabster Harbour (per RPS) - St. Ola Pier Redevelopment, Scrabster - Scoping Report Consultation - Responses by 16 August 2018

Dear Rania,

Thank you very much for your mail and the relevant information and documents regarding the scoping opinion request from Scrabster Harbour for their proposed St. Ola Pier redevelopment works.

The Chamber has reviewed the requests and supports the need for the pier redevelopment project due to a number of factors such as the age of the existing pier and the need for additional berthing to increase capacity at the port to accommodate the rising demand from a whole host of varying maritime sectors, specifically to cater to the steady growth in ferry passengers which has been reported. The Chamber also supports the development for the economical benefits it will bring the Oil and Gas industry by reducing transit times and the environmental and safety advantages of expanding the pier to allow cruise ships to dock thus avoiding anchoring in the Bay and being a potential collision risk.

Additionally the Chamber supports the dredging program which will accompany this project and will improve navigation channels which keeps in line with the key objectives of the Scottish National Marine Plan to safeguard access to ports and to encourage the sustainable growth of ports to maximise the potential of other sectors.

If you would like any further information from the Chamber on our observations, please do not hesitate to contact us.

Kind regards,

Robert

Robert Carington
Policy Advisor

UK Chamber of Shipping
30 Park Street, London, SE1 9EQ

DD +44 (0) 20 7417 2821
rcarington@ukchamberofshipping.com
www.ukchamberofshipping.com

Appendix II: Licensing Process

Application

The application letter must detail how many licences are being sought, what marine licensable activities are proposed and what legislation the application is being made under.

Applicants are required to submit two hard copies of the EIA report together with an electronic copy in a user-friendly PDF format which will be placed on the Scottish Government website. If requested to do so by the Scottish Ministers, the applicant must send to the Scottish Ministers such further hard copies of the EIA report as requested. Applicants may be asked to issue the EIA report directly to consultees and in which case consultee address lists should be obtained from the Scottish Ministers.

Requirement for Public Pre-Application Consultation ("PAC")

From 6th April 2014, applications received for certain activities are subject to a public pre-application consultation requirement. Activities affected will be large projects with the potential for significant impacts on the environment, local communities and other legitimate uses of the sea. This requirement allows local communities, environmental groups and other interested parties to comment on proposed works in their early stages and before an application for a marine licence is submitted.

The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 can be accessed via:

http://www.legislation.gov.uk/ssi/2013/286/made

Guidance on marine licensable activities subject to Pre-application Consultation can be obtained at:

http://www.gov.scot/Topics/marine/Licensing/marine/guidance/preappconsult

The licensing authority reserves the right not to accept an application in the absence of an acceptable PAC report.

Pre-Dredge Sampling

Please note that if it is intended to dispose of any dredged material at sea, adequate pre-dredge sample analysis must be submitted in support of the EIA report and marine licence dredging application. The licensing authority reserves the right not to accept an application in the absence of acceptable sediment analysis data.

Please refer to the pre-dredge sampling guidance provided in Appendix IV.

Ordinance Survey ("OS") Mapping Records

Applicants are requested at application stage to submit a detailed OS plan showing the site boundary and location of all deposits and onshore supporting infrastructure in a format compatible with The Scottish Government's Spatial Data Management Environment ("SDME"), along with appropriate metadata. The SDME is based around

Oracle RDBMS and ESRI ArcSDE and all incoming data should be supplied in ESRI shape file format. The SDME also contains a metadata recording system based on the ISO template within ESRI ArcCatalog (agreed standard used by The Scottish Government); all metadata should be provided in this format.

Advertisement

Where the applicant has provided the Scottish Ministers with an EIA report, the applicant must publish their proposals in accordance with Regulation 16 of the 2017 MW Regulations and ensure that a reasonable number of copies of the EIA report are available for inspection at any place named in the publication. Licensing information and guidance, including the specific details of the adverts to be placed in the press, can be obtained from the Scottish Ministers. If additional information is submitted further public notices will be required.

EPS licence

European Protected Species ("EPS") are animals and plants (species listed in Annex IV of the Habitats Directive) that are afforded protection under The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended). All cetacean species (whales, dolphins and porpoise) are European Protected Species. If any activity is likely to cause disturbance or injury to a European Protected Species a licence is required to undertake the activity legally.

A licence may be granted to undertake such activities if certain strict criteria are met:

- there is a licensable purpose;
- there are no satisfactory alternatives, and;
- the actions authorised will not be detrimental to the maintenance of the population of the species concerned at favourable conservation status in their natural range.

Applicants must give consideration to the three fundamental tests and should refer to the guidance on the protection of marine European Protected Species for more detailed information in relation to Scottish Inshore Waters. Applicants may choose to apply for an EPS licence following the determination of the EIA application and once construction methods have been finalised, however it is useful to include a shadow EPS assessment within the EIA report.

Please note that basking sharks are also afforded protection under the Wildlife & Countryside Act 1981 (as Amended by the Nature Conservation (Scotland) Act 2004).

Appendix III: Gap Analysis

Applicant to complete:

Consultee	No.	Point for inclusion	EIA report Section	Justification
	1			
	2			
	3			
	4			
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Appendix 1.2 Other Projects Considered for Cumulative Effects

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Table A1.1: Other Projects Considered for Cumulative Effects

Project	Reference	Distance from Scrabster Harbour	Details
Laydown Area at Scrabster Harbour	14/02706/SCOP	0 km	This was a SHT promoted project seeking to create expansion space for marine renewables O&M activities. The project did not progress to a stage where an application for consent has been submitted. SHT advise there is no current or likely short term demand for such space.
Capital Dredging	04062/11/1, 04062/12/1, 04062/12/2	0 km	Disposal of 224,600m^3 (436,230 tonnes) of material by bottom dumping at Scrabster Extension (FI008) sea disposal site. See below 'Old Fish Pier' for rationale behind dredging. Marine Disposal Licence valid from April 2012 until March 2013.
Redevelopment of Jubilee Pier (Old Fish Pier) and associated works	04063/12/0	0 km	This project was proposed to strengthen and enhance the Old Fish Pier into a modern multi-purpose facility offering a variety of berthing options on both the north and south of the sides of the pier; with the south side being unsuitable for berthing of any kind. The proposed works include dredging to form deep berthing pockets at the strengthened pier, together with additional dredging of the entrance to the fish basin to allow vessels to manoeuvre into the new berths. In addition, piling and driving works were required in order to encapsulate the existing Old Fish Pier and create a redeveloped wedge shaped pier. The Marine Construction Licence valid from July 2012 until July 2013.
Dounreay Tri floating Wind Demonstration Project	06174/17/0 and 06178/17/0	19km	This project was consented in 2016, and is currently on hold awaiting funding. It proposes to construct a two turbine offshore wind farm with an installed capacity of between 8-12 MW approximately 6 km off Dounreay, Caithness; electricity export cable to bring the power to shore immediately to the west of the Dounreay Restoration Site fence line; and associated onshore electrical infrastructure to connect the project at or near the existing Dounreay 132/33/11kV substation.
MeyGen Tidal Project	04577/14/0, 06234/17/0, 06182/16/0 and 06102/16/0	25km	The project was consented in January 2014. Construction stage is complete for Phase 1A (6MW), which is now operational. Remainder (c.80MW) not yet brought forward.
Ness of Duncansby Tidal Project	No Ref	30.5km	A proposed tidal array project located to the north of Duncansby Head, approximately 34km by sea from Scrabster Harbour. The proposals were deemed to comprise EIA development in the Scoping Opinion published on 22nd February 2013. Following this no further documentation has thus far been submitted. A proposed tidal array project located to the north of Duncansby Head, approximately 34km by sea from Scrabster Harbour. The proposals were deemed to comprise EIA development in the Scoping Opinion published on 22nd February 2013. Following this no further documentation has thus far been submitted.
Single Wind Turbine	14/03753/FUL	2.6km	This project was submitted and consented in 2014 at a location to the north-east of Thurso, at the other side of the bay from Scrabster Harbour.
Buckies Hill Wind Farm	15/00037/RBREF	5.5km	A wind farm application, submitted in 2014, refused and now under appeal. The development seeks consent for

1.1 The Caithness and Sutherland Local Development Plan was also examined to establish whether any allocations included within the Plan would have potential to give rise to cumulative effects.

1.2 The following allocations are included with respect to industry on Page 48 of the Plan:

- Scrabster Harbour (of which the proposals form a part)
- Land at Scrabster Mains Farm, for which planning for a business park was awarded in 2014; and
- Land north-west of Thurso Business Park, which has been identified as a long-term site for industrial development allocation within the next plan period.

1.3 The following allocations are included with respect to community use (page 47):

- Thurso Harbour; and
- Viewfirth Park.

1.4 A number of sites are identified as being allocated for housing (page 44), with the majority being located at the landward edges of the built environment, however one of these sites (TS01) is located within close proximity to the River Thurso, upstream of the Harbour.

1.5 A number of further mixed use allocations are proposed (page 45) of which the majority are located within the existing built environment or on the landward edge. However three of these sites are allocated on lands in close proximity to the River Thurso, upstream of the Harbour (TS06, TS07 and TS08).

Appendix 1.3 Pre-Application Consultation Report

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Scrabster Harbour
YOUR GATEWAY TO THE NORTH

Pre-Application Consultation (PAC) Report: St Ola Pier Redevelopment Project

Scrabster Harbour
YOUR GATEWAY TO THE NORTH

CONTENTS

1 Project Summary and Information

1.1 Port of Scrabster
1.2 Project Description

2 Consenting Procedures and Requirements

2.1 Marine Licence
2.2 Environmental Impact Assessment
2.3 Marine Pre-Application Consultation (PAC)

3 List of Stakeholders

4 Stakeholder Engagement Methodology

4.1 Statutory Requirements

5 Additional Stakeholder Engagement

5.1 Public Notices
5.2 Direct Stakeholder Contact
5.3 Media and Reach

6 The Pre-Application Consultation (PAC) Event

6.1 Key Points
6.2 Summary of Event Display Materials
6.3 Summary of Stakeholder Feedback
6.4 Consideration of Stakeholder Feedback

7 Reporting and Recording

7.1 Data Collection
7.2 Stakeholder Database
7.3 Recording Feedback

8 Post Application

8.1 Ongoing Engagement
8.2 Ongoing Project Contact

Appendices

Appendix 4.1 Marine Licence Notification Letters
Appendix 4.2 Public Consultation Statutory Notification
Appendix 4.3 Public Consultation Statutory Notification Letters
Appendix 5.1 Public Consultation Additional Notifications
Appendix 5.2 Direct Stakeholder Communications
Appendix 5.3 Event Flyer
Appendix 6.1 Event Display Materials
Appendix 6.2 Sample Feedback Questionnaire
Appendix 6.3 Feedback Questionnaire Analysis

1 Project Summary and Information

1.1 Port of Scrabster

Scrabster Harbour is a Trust Port established in 1841 and managed by Scrabster Harbour Trust. Scrabster is located on the north coast of Caithness and has a grid reference of ND10437 70310. Scrabster is situated 1.5 miles northwest of the town of Thurso.

Scrabster is the main commercial port on the north coast of the British Mainland. Scrabster is a multi-purpose port and current operations include:

- Lifeline ferry route to Orkney Islands
- Major UK landing port for Whitefish and Shellfish
- Support of Oil and Gas activity on Atlantic Margin
- Support of Marine renewables in the Pentland Firth and surrounding waters.
- Cargo operations including weekly fish cargo service from the Faroes
- Coastal tankers
- Cruise Vessels
- RNLI
- Leisure

1.2 Project Description

Scrabster Harbour Trust propose to redevelop the existing St Ola Pier. The development seeks to redevelop an existing pier, rather than created a new pier structure. A drawing showing the extent of the redevelopment works is shown below.

The proposed redevelopment in summary comprises of the following:

- Installation of new piled quay wall and pier deck to expand the existing pier. The renovated pier will be approximately 280 metres long with straight berthing faces. Some demolition works to the existing pier will be required to facilitate these works;
- The outer side of the pier will be dredged to achieve a depth of approximately -9.0 metres Chart Datum (CD). The volume of dredged material generated by these works will be approximately 145,000 cubic metres of sandy gravel and clay;
- The inner side of the pier will be dredged to provide a consistent berth depth of -7.5 metres CD. The volume of dredged material generated by these works will be approximately 8,000 cubic metres of sandy gravel and clay;
- Reclamation Area with Revetment facing: the reclamation and revetment area will be approximately 8,300 square meters at the root of the pier to provide storage for cargo handling; and

- Installation of a new fuel pipe and water pipeline along the seabed from the Jubilee Pier across the inner birth and on the St. Ola Pier; or installation of a new fuel pipe along land onto St Ola Pier to facilitate future development of a new fuel tank on the proposed reclamation area. The erection of a future fuel tank will be a separate project at a later date but for the purpose of EIA, the fuel tank will be approximately 15 metres diameter by 12 metres high.

2 Consenting Procedures and Requirements

2.1 Marine Licence

Under the Marine (Scotland) Act 2010 any activity involving the deposit or removing of substances or objects in the sea either on or under the seabed, construct/alter/improve any works in or over the sea or on or under the seabed or any kind of dredging activities, under the Mean High Water Spring (MHWS) line are all subject to marine licence according to the Act. Most of the redevelopment project falls below the MHWS and hence will require a marine licence. In addition, there will be a requirement for dredging and potentially dredging disposal which will also require a marine licence.

2.2 Environmental Impact Assessment (EIA)

The project was subject to an EIA Screening exercise in 2018 and subsequently determined to be EIA development by Marine Scotland.

An EIA Scoping exercise was subsequently undertaken in July 2018 with the submission of an EIA Scoping Report. Marine Scotland provided a scoping opinion in September which was used to inform project development and the associated EIA.

2.3 Marine Pre-Application Consultation (PAC)

The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013, prescribe the marine licensable activities that are subject to pre-application consultation and, in combination with the Marine (Scotland) Act 2010, set out the nature of the pre-application process. The legislation came into force on 1st January 2014 and applies to all relevant marine licence applications submitted to Marine Scotland's Licensing Operations Team (MSLOT) on or after 6 April 2014. The redevelopment project exceeds the trigger for public consultation as outlined within the aforementioned Regulations (i.e. *extension or improvement or any works which exceed 1000 square meters*) and therefore a formal pre-application consultation was considered necessary in advance of the submission of the marine licence application.

3 List of Stakeholders

Scrabster Harbour Trust has an existing list of stakeholders established through current engagement activities and those stakeholder groups listed in Transport Scotland's Modern Trust Ports for Scotland Guidance for good governance.

The following bodies and groups were identified as appropriate targets for pre-application consultation.

Statutory Consultees:

- Marine Scotland;
- The Commissioners of the Northern Lighthouses;
- Historic Environment Scotland;
- Maritime and Coastguard Agency (MCA);
- Scottish Environment Protection Agency (SEPA);
- Scottish Natural Heritage (SNH);

Port Users:

- Scrabster Harbour Port Users;
- Cruise Lines Operators and Ground Handlers;
- Oil and Gas Operators;
- Shipping Agents and Logistics companies;
- RNLI;
- Tenants.

Community and Economic Development Organisations:

- Highlands and Islands Enterprise;
- Nuclear Decommissioning Authority;
- Dounreay Site Restoration Limited;
- Caithness Chamber of Commerce;
- Caithness Transport Forum;
- Caithness and North Sutherland Regeneration Partnership;
- Dounreay Stakeholder Group;
- Crown Estate;
- Highland Council and local Councillors;
- Local MSPs and MP;
- Local residents/members of the public;
- Trade Union.

4 Stakeholder Engagement Methodology

4.1 Statutory Requirements

The Marine Licensing (Pre-Application Consultation) (Scotland) Regulations 2013, in combination with the Marine (Scotland) Act 2010, set out the nature of the pre-application consultation process.

The programme of Pre-Application consultation was undertaken in line with the aforementioned legislation with the following completed:

4.1.1 Requirements - *Notification to the following statutory consultees that an application for a marine licence for a prescribed activity is to be submitted to MS-LOT (Marine Scotland Licensing Operations Team):*

- *The Commissioners of Northern Lighthouses;*
- *The Maritime and Coastguard Agency;*
- *The Scottish Environment Protection Agency;*
- *Scottish Natural Heritage;*
- *and any delegate for the relevant marine region or regions, when such delegates have been established under Section 12(1) of the Marine (Scotland) Act 2010.*

The notifications were undertaken in line with the requirements; a copy of the associated notification letter(s) is included in Appendix 4.1 of this report.

4.1.2 Requirements - *Undertaking of at least one pre-application Public Consultation Event where local communities, environmental groups, NGOs, regulators and other interested parties are given the opportunity to consider and comment upon a prospective application for those marine licensable activities that are prescribed in the Regulations.*

No less than 6 weeks in advance of the pre-application consultation event, the prospective applicant must also publish in a local newspaper a notice containing:

- *A description, including location, of the marine licensable activity.*
- *Details as to where further details concerning the activity may be obtained.*
- *The date and place of the pre-application consultation event.*
- *A statement explaining how persons wishing to provide comments may do so and the date by which this must be done.*
- *A statement clarifying that comments are made to the prospective applicant and not to MS-LOT and that there will be an opportunity for representations to be made to MS-LOT on the application.*

The consultation event must be held in a suitably accessible venue. The venue must be suitably accessible both in terms of allowing physical access by persons of impaired mobility and being local to the proposed marine licensable activity. This is to allow the provision of information

to, and attendance by, persons who are most likely to have an active interest in the proposed activity. The venues in which these events are held are likely to vary in size and nature, dependent largely upon the availability of public buildings in those parts of Scotland close to where the proposed marine licensable activities are to take place. It is expected by MS-LOT that the typical venue which will be used will be a local town hall or hotel.

The newspaper notice was published in accordance with the requirements; a copy of the newspaper notice is provided in Appendix 4.2 of this report. The notice was placed in the John O'Groat Journal which has a circulation of approximately 4,600.

The public consultation event is summarised in greater detail in Section 6 of this report.

4.1.3 Requirements - N*otification of the aforementioned Public Consultation Event to the following statutory consultees:*

- *The Commissioners of Northern Lighthouses;*
- *The Maritime and Coastguard Agency;*
- *The Scottish Environment Protection Agency;*
- *Scottish Natural Heritage;*
- *and any delegate for the relevant marine region or regions, when such delegates have been established under Section 12(1) of the Marine (Scotland) Act 2010.*

The notification should include basic information relating to the application and include the time and location of the consultation event. The notification must be made at least 6 weeks in advance of the event.

The notifications were undertaken in line with the requirements; a copy of the associated notification letters are included in Appendix 4.3 of this report.

5 Additional Stakeholder Engagement

The project team undertook the statutory pre-application notifications as outlined in Section 4 of this report. Additionally, a number of further measures (outlined below) were undertaken to raise the profile of the project and engage with stakeholders, particularly in advance of the public consultation event; these measures were undertaken in exceedance of the statutory requirements.

5.1 Public Notices

In addition to the statutory public notice referenced in Section 4.1.2, further public notices were placed in both the John O'Groat Journal and Caithness Courier, the week of the public consultation event. These papers have a circulation figures of approximately 4,600 and 3,250 respectively. These public notices gave further project information and encouraged people to visit the event and give feedback.

A copy of the public notice is provided in Appendix 5.1 of this report.

5.2 Direct Stakeholder Contact

Those bodies listed in Section 3 of the report, were notified directly of the public consultation event via email and/or a letter drop.

Details of the public consultation event were also circulated via Caithness Chamber of Commerce (via both email and social media), and verbally through the Caithness Transport Forum held on 13th June 2019. Sample copies of these communications are provided in Appendix 5.2 of this report.

5.3 Further Event Advertisement

The public consultation event was advertised through placement of event flyers in locations within the Port and the surrounding vicinity. A copy of the flyer is provided in Appendix 5.3 of this report.

6 The Pre-Application Consultation (PAC) Event

The Pre-Application Consultation event was held in line with the statutory requirements of The Marine Licensing (Pre-Application Consultation) (Scotland) Regulations 2013.

6.1 Key Points

Timing – the event was held 6 weeks after the publication of the public notice detailed in Section 4.1.2 of this report;

Location – the event was held in the St.Ola House, Scrabster harbour, within the vicinity of the proposed project works;

Access and Availability – the event was held on the ground floor of St.Ola House in order to ensure accessibility for all stakeholders; the event was held from 2.00pm – 8.00pm to facilitate stakeholders to attend *after work*;

Provision of Project Information - project information was provided on large scale (A1) display boards with project team staff available to provide additional information and/or address stakeholder questions;

Collection of Stakeholder Comments – questionnaires were made available at the event to collect comments from stakeholders; opportunity was provided to respondents to return questionnaires during or after the event.

6.2 Summary of Event Display Materials

The following materials were provided at the public consultation event:

Six (A1/colour) exhibition boards were displayed at the event (as follows):

- **Board 1: Project Summary (1)**
  - Background to Scrabster Harbour Trust
  - Aims of the St Ola Pier Redevelopment Project
  - Anticipated Project
  - Project description

- **Board 2: Project Summary (2)**
  - Marine Licensing and Environmental Assessment
  - Environmental assessment
  - Current project timeline

- **Board 3: Location Plan**

- **Board 4: Extent of the Works**

- **Board 5: Illustrative General Arrangement**

- **Board 6: Illustrative Sections**

The exhibition boards (reduced to scale) are included in Appendix 6.1 of this report. In addition to the exhibition boards, a viewpoint map was provided showing the current harbour layout.

Plates 6.1 and 6.2 are provided as illustrations of the event in progress and the aforementioned materials in place.

Plate 6.1 Display Materials in Place at the Public Consultation Event

Plate 6.2 Attendees at the Public Consultation Event

6.3 Summary of Stakeholder Feedback

Forty-five people attended the public consultation event.

A total of twenty feedback questionnaires were returned; nineteen on the day of the event and one submitted after the event.

A sample questionnaire is provided in Appendix 6.2 of this report; the full results are of the feedback questionnaires are included in Appendix 6.3 of this report.

In summary the feedback indicated the following:

- The variety of communication channels used to publicise the event had been successful.
- All respondents said that they had been provided with enough information regarding the project.
- Noise and Vibration plus traffic were the main environmental issues associated with the project.
- Nineteen of the respondents said that the project will be beneficial for the economy. Only one person considered that the project would not be beneficial. One respondent gave a positive response but additionally an unsure response as they had doubts regarding the cruise aspect.

- Considering the information provided 19 people indicated support for the project with only one individual not. With regards to specific reasons for their answer, most respondents (12 returns) gave no comments. Of those who did comment, the economic benefits of the project were highlighted.
- Regarding specific comments on the project, most respondents (10 returns) did not leave a comment. Of the remainder the bulk of comments were concerns from the residents of the nearby former lighthouse expressing concern regarding visual issue, traffic, noise, piling and vibration causing landslides and property damage plus potential coastal erosion.
- The respondents were predominantly male (13 returns) and in the age group 40-59 years old.
- In terms of stakeholder groups represented, there was a good cross section of the SHT stakeholder groups who responded with the breakdown as follows:

    - Local Business 5 (*persons*)
    - Local Community 8
    - Port Employee 1
    - Port User 5
    - No information given 2

6.4 Consideration of Stakeholder Feedback

The Trust along with the project team has considered the comments received during the pre-application consultation phase.

Whilst the majority of respondents indicated support for the project, some concerns were raised with regards to associated environmental issues relating to visual impacts, traffic, noise, piling and vibration (land stability) and coastal erosion.

Such matters have been considered within the context of the project design process but significantly, these matters have also been addressed both during the project EIA scoping and reporting phase.

It is considered that these matters have been addressed adequately and sufficient information (baseline, impact assessment and mitigation proposals) is provided within the project marine licence applications and environmental statement.

7 Reporting and Recording

7.1 Data Collection

Data was collected via a formal feedback form. It has been recorded in a consistent form to allow comparisons and quantitative summaries to be made.

7.2 Stakeholder Database

A stakeholder database has been established to record the contact details of those wishing to be kept appraised of the progress of the project. This will be maintained and employed in accordance with the General Data Protection Regulation (GDPR) and will solely be used to provide information about the proposed development in accordance with the requests from specific respondents.

7.3 Recording Feedback

Formal feedback was obtained in the form of standardised questionnaires provided at the public consultation event.

8 Post Application

8.1 Ongoing Engagement

This document has focussed on the pre-application consultation phase, specific to that required under the Marine Licensing application process for the St Ola Pier Redevelopment Project.

However, it should be noted that as a Trust port, Scrabster Harbour Trust has multiple stakeholder and associated communication methods which will continue to be used to communicate the progress of the project both through the statutory approvals phase (post application) but also during construction and operational phases.

8.2 Ongoing Project Contact

Should further information be required in respect of the project, the following project team member should be contacted:

- Sandy Mackie – (Project Manager) Scrabster Harbour Trust – sandy.mackie@scrabster.co.uk
- Alastair McKinley – (Marine Licence and EIA) RPS – alastair.mckinley@rpsgroup.com
- Sarah Gibson – (Engineering and Design) RPS – sarah.gibson@rpsgroup.com

Scrabster Harbour
YOUR GATEWAY TO THE NORTH

APPENDICES

Appendix 4.1 Marine Licence Notification Letters

Our ref: NI1940

Date: 03 April 2019

Elmwood House
74 Boucher Road
BELFAST
BT12 6RZ
T: +44 2890 667 914

Scottish Natural Heritage
Great Glen House
Leachkin Road
Inverness
IV3 8NW

Dear Sir/Madam,

PROPOSED REDEVELOPMENT OF ST. OLA PIER, SCRABSTER HARBOUR – NOTICE OF INTENTION TO SUBMIT

I am writing on behalf of Scrabster Harbour Trust (SHT) to give you notice as required by and in accordance with Section 23 of The Marine (Scotland) Act 2010, that an application for a marine licence is to be submitted to Marine Scotland in relation to the proposed redevelopment of St. Ola Pier, Scrabster Harbour, Thurso, KW12 7UJ.

Project Description

The proposed works are located within Scrabster Harbour, approximately 1.5 miles north-west of Thurso. The existing St Ola Pier is situated within the centre of the harbour and incorporates a 100 metre long berth to the south-west, a linkspan and a further 115 metre berth which was used by the Orkney Ferry prior to the Queen Elizabeth Pier being constructed in 2003. The location of St Ola Pier is shown in enclosed Drawing M0727-RPS-00-XX-DR-C-0101 (Rev P03) '*Location Plan*'.

The detailed design of the proposed redevelopment is still being finalised. However, it is anticipated that the proposed works will comprise:

(1) Installation of new piled quay wall and pier deck to expand the existing pier. The renovated pier will be approximately 280 metres long with straight berthing faces. Some demolition works to the existing pier will be required to facilitate these works.

(2) The outer side of the pier will be dredged to achieve a depth of approximately -9.0 metres Chart Datum (CD). The volume of dredged material generated by these works will be approximately 145,000 cubic metres of sandy gravel and clay.

(3) The inner side of the pier will be dredged to provide a consistent berth depth of -7.5 metres CD. The volume of dredged material generated by these works will be approximately 8,000 cubic metres of sandy gravel and clay.

(4) Reclamation Area with Revetment facing: the reclamation & revetment area will be approximately 8,300 square meters at the root of the pier to provide storage for cargo handling.

(5) Either:

Installation of a new fuel pipe and water pipeline along the seabed from the Jubilee Pier across the inner birth and on the St. Ola Pier; or

Installation of a new fuel tank on the proposed reclamation area. The fuel tank will be approximately 15 metres diameter by 12 metres high. A new fuel pipe will be installed along land onto St Ola

Pier, the initial route for which has not yet been determined. If the fuel supply is coming from the proposed tank, the water supply will be routed from the existing supply on the adjacent Queen Elizabeth Pier instead of from Jubilee Pier.

If the new fuel tank option was pursued the scope of the SHT's works is restricted to ensuring the reclamation area can accommodate the tank, and installing the necessary pipework and associated infrastructure to allow the import / export of fuel on the redeveloped quay. The actual tank would be erected and operated by a third party at a later date. The tank would be for the storage and supply of marine gas oil and no petrol would be involved.

The layout of these proposed works is shown on enclosed Drawing M0727-RPS-00-XX-DR-C-0102 (Rev P03) '*Site Layout Plan*' and M0727-RPS-00-DD-DR-C-1500 *'Definition Drawing General Arrangement.'*

Two further drawings are also enclosed, delineating the extent of the proposed marine elements of the works below MHWS (Drawing M0727-RPS-00-XX-DR-C-0103 (Rev P03) '*Extent of Works Above and Below MHWS*') and the extent of the terrestrial elements of the works above MLWS (Drawing M0727 RPS-00-XX-DR-C-0104 '*Extent of Works Above and Below MLWS*').

This notification is read in the context of the following;

- A screening opinion was issued by Marine Scotland on 14th March 2018 which found that the works exceeded the corresponding threshold described in column 2 of schedule 2 of the MW Regulations. On consideration of the selection criteria set out in schedule 3 of the MW Regulations it was determined that the environmental effects of the works was likely to be significant and thus should be subjected to an EIA; and
- In addition, on 25th September 2018, Marine Scotland, having considered the documentation provided in a request for a scoping opinion issued by RPS on behalf of the applicant Scrabster Harbour and consulted with the appropriate consultation bodies, issued a scoping opinion adopted by the Scottish Ministers, under Regulation 14 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) ("the 2017 MW Regulations"), as to the scope and level of detail of information to be provided in the Environmental Impact Assessment report for the proposed re-development of St. Ola Pier, Scrabster.

In line with the aforementioned requirements of The Marine (Scotland) Act 2010, the project Marine Licence will be submitted no sooner than 12 weeks from the date of this letter.

Yours sincerely,
for RPS
[Redacted]

Alastair McKinley.

cc:

Sandie Mackie, SHT (sandy.mackie@scrabster.co.uk)

Our ref: NI1940

Date: 03 April 2019

Elmwood House
74 Boucher Road
BELFAST
BT12 6RZ
T: +44 2890 667 914

Maritime and Coastguard Agency
Spring Place
105 Commercial Road
Southampton
SO15 1EG
United Kingdom

Dear Sir/Madam,

PROPOSED REDEVELOPMENT OF ST. OLA PIER, SCRABSTER HARBOUR – NOTICE OF INTENTION TO SUBMIT

I am writing on behalf of Scrabster Harbour Trust (SHT) to give you notice as required by and in accordance with Section 23 of The Marine (Scotland) Act 2010, that an application for a marine licence is to be submitted to Marine Scotland in relation to the proposed redevelopment of St. Ola Pier, Scrabster Harbour, Thurso, KW12 7UJ.

Project Description

The proposed works are located within Scrabster Harbour, approximately 1.5 miles north-west of Thurso. The existing St Ola Pier is situated within the centre of the harbour and incorporates a 100 metre long berth to the south-west, a linkspan and a further 115 metre berth which was used by the Orkney Ferry prior to the Queen Elizabeth Pier being constructed in 2003. The location of St Ola Pier is shown in enclosed Drawing M0727-RPS-00-XX-DR-C-0101 (Rev P03) *'Location Plan'*.

The detailed design of the proposed redevelopment is still being finalised. However, it is anticipated that the proposed works will comprise:

(1) Installation of new piled quay wall and pier deck to expand the existing pier. The renovated pier will be approximately 280 metres long with straight berthing faces. Some demolition works to the existing pier will be required to facilitate these works.

(2) The outer side of the pier will be dredged to achieve a depth of approximately -9.0 metres Chart Datum (CD). The volume of dredged material generated by these works will be approximately 145,000 cubic metres of sandy gravel and clay.

(3) The inner side of the pier will be dredged to provide a consistent berth depth of -7.5 metres CD. The volume of dredged material generated by these works will be approximately 8,000 cubic metres of sandy gravel and clay.

(4) Reclamation Area with Revetment facing: the reclamation & revetment area will be approximately 8,300 square meters at the root of the pier to provide storage for cargo handling.

(5) Either:

Installation of a new fuel pipe and water pipeline along the seabed from the Jubilee Pier across the inner birth and on the St. Ola Pier; or

Installation of a new fuel tank on the proposed reclamation area. The fuel tank will be approximately 15 metres diameter by 12 metres high. A new fuel pipe will be installed along land onto St Ola Pier, the initial route for which has not yet been determined. If the fuel supply is coming from the proposed tank, the water supply will be routed from the existing supply on the adjacent Queen Elizabeth Pier instead of from Jubilee Pier.

If the new fuel tank option was pursued the scope of the SHT's works is restricted to ensuring the reclamation area can accommodate the tank, and installing the necessary pipework and associated infrastructure to allow the import / export of fuel on the redeveloped quay. The actual tank would be erected and operated by a third party at a later date. The tank would be for the storage and supply of marine gas oil and no petrol would be involved.

The layout of these proposed works is shown on enclosed Drawing M0727-RPS-00-XX-DR-C-0102 (Rev P03) '*Site Layout Plan*' and M0727-RPS-00-DD-DR-C-1500 *'Definition Drawing General Arrangement.'*

Two further drawings are also enclosed, delineating the extent of the proposed marine elements of the works below MHWS (Drawing M0727-RPS-00-XX-DR-C-0103 (Rev P03) '*Extent of Works Above and Below MHWS*') and the extent of the terrestrial elements of the works above MLWS (Drawing M0727 RPS-00-XX-DR-C-0104 '*Extent of Works Above and Below MLWS*').

This notification is read in the context of the following:

- A screening opinion was issued by Marine Scotland on 14th March 2018 which found that the works exceeded the corresponding threshold described in column 2 of schedule 2 of the MW Regulations. On consideration of the selection criteria set out in schedule 3 of the MW Regulations it was determined that the environmental effects of the works was likely to be significant and thus should be subjected to an EIA; and
- In addition, on 25th September 2018, Marine Scotland, having considered the documentation provided in a request for a scoping opinion issued by RPS on behalf of the applicant Scrabster Harbour and consulted with the appropriate consultation bodies, issued a scoping opinion adopted by the Scottish Ministers, under Regulation 14 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) ("the 2017 MW Regulations"), as to the scope and level of detail of information to be provided in the Environmental Impact Assessment report for the proposed re-development of St. Ola Pier, Scrabster.

In line with the aforementioned requirements of The Marine (Scotland) Act 2010, the project Marine Licence will be submitted no sooner than 12 weeks from the date of this letter.

Yours sincerely,
for RPS
[Redacted]

Alastair McKinley.

cc:
Sandie Mackie, SHT (sandy.mackie@scrabster.co.uk)

Our ref: NI1940

Date: 03 April 2019

Elmwood House
74 Boucher Road
BELFAST
BT12 6RZ
T: +44 2890 667 914

Scottish Environment Protection Agency
Thurso Office
Strathbeg House
Clarence Street
Thurso
Caithness
KW14 7JS

Dear Sir/Madam,

PROPOSED REDEVELOPMENT OF ST. OLA PIER, SCRABSTER HARBOUR – NOTICE OF INTENTION TO SUBMIT

I am writing on behalf of Scrabster Harbour Trust (SHT) to give you notice as required by and in accordance with Section 23 of The Marine (Scotland) Act 2010, that an application for a marine licence is to be submitted to Marine Scotland in relation to the proposed redevelopment of St. Ola Pier, Scrabster Harbour, Thurso, KW12 7UJ.

Project Description

The proposed works are located within Scrabster Harbour, approximately 1.5 miles north-west of Thurso. The existing St Ola Pier is situated within the centre of the harbour and incorporates a 100 metre long berth to the south-west, a linkspan and a further 115 metre berth which was used by the Orkney Ferry prior to the Queen Elizabeth Pier being constructed in 2003. The location of St Ola Pier is shown in enclosed Drawing M0727-RPS-00-XX-DR-C-0101 (Rev P03) *'Location Plan'*.

The detailed design of the proposed redevelopment is still being finalised. However, it is anticipated that the proposed works will comprise:

(1) Installation of new piled quay wall and pier deck to expand the existing pier. The renovated pier will be approximately 280 metres long with straight berthing faces. Some demolition works to the existing pier will be required to facilitate these works.

(2) The outer side of the pier will be dredged to achieve a depth of approximately -9.0 metres Chart Datum (CD). The volume of dredged material generated by these works will be approximately 145,000 cubic metres of sandy gravel and clay.

(3) The inner side of the pier will be dredged to provide a consistent berth depth of -7.5 metres CD. The volume of dredged material generated by these works will be approximately 8,000 cubic metres of sandy gravel and clay.

(4) Reclamation Area with Revetment facing: the reclamation & revetment area will be approximately 8,300 square meters at the root of the pier to provide storage for cargo handling.

(5) Either:

Installation of a new fuel pipe and water pipeline along the seabed from the Jubilee Pier across the inner birth and on the St. Ola Pier; or

Installation of a new fuel tank on the proposed reclamation area. The fuel tank will be approximately 15 metres diameter by 12 metres high. A new fuel pipe will be installed along land onto St Ola Pier, the initial route for which has not yet been determined. If the fuel supply is coming from the proposed tank, the water supply will be routed from the existing supply on the adjacent Queen Elizabeth Pier instead of from Jubilee Pier.

If the new fuel tank option was pursued the scope of the SHT's works is restricted to ensuring the reclamation area can accommodate the tank, and installing the necessary pipework and associated infrastructure to allow the import / export of fuel on the redeveloped quay. The actual tank would be erected and operated by a third party at a later date. The tank would be for the storage and supply of marine gas oil and no petrol would be involved.

The layout of these proposed works is shown on enclosed Drawing M0727-RPS-00-XX-DR-C-0102 (Rev P03) '*Site Layout Plan*' and M0727-RPS-00-DD-DR-C-1500 *'Definition Drawing General Arrangement.'*

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- A screening opinion was issued by Marine Scotland on 14th March 2018 which found that the works exceeded the corresponding threshold described in column 2 of schedule 2 of the MW Regulations. On consideration of the selection criteria set out in schedule 3 of the MW Regulations it was determined that the environmental effects of the works was likely to be significant and thus should be subjected to an EIA; and
- In addition, on 25th September 2018, Marine Scotland, having considered the documentation provided in a request for a scoping opinion issued by RPS on behalf of the applicant Scrabster Harbour and consulted with the appropriate consultation bodies, issued a scoping opinion adopted by the Scottish Ministers, under Regulation 14 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) ("the 2017 MW Regulations"), as to the scope and level of detail of information to be provided in the Environmental Impact Assessment report for the proposed re-development of St. Ola Pier, Scrabster.

In line with the aforementioned requirements of The Marine (Scotland) Act 2010, the project Marine Licence will be submitted no sooner than 12 weeks from the date of this letter.

Yours sincerely,
for RPS
[Redacted]

Alastair McKinley.

cc:
Sandie Mackie, SHT (sandy.mackie@scrabster.co.uk)

Our ref: NI1940

Date: 03 April 2019

Elmwood House
74 Boucher Road
BELFAST
BT12 6RZ
T: +44 2890 667 914

Northern Lighthouse Board
84 George Street
Edinburgh
EH2 3DA

Dear Sir/Madam,

PROPOSED REDEVELOPMENT OF ST. OLA PIER, SCRABSTER HARBOUR – NOTICE OF INTENTION TO SUBMIT

I am writing on behalf of Scrabster Harbour Trust (SHT) to give you notice as required by and in accordance with Section 23 of The Marine (Scotland) Act 2010, that an application for a marine licence is to be submitted to Marine Scotland in relation to the proposed redevelopment of St. Ola Pier, Scrabster Harbour, Thurso, KW12 7UJ.

Project Description

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The detailed design of the proposed redevelopment is still being finalised. However, it is anticipated that the proposed works will comprise:

(1) Installation of new piled quay wall and pier deck to expand the existing pier. The renovated pier will be approximately 280 metres long with straight berthing faces. Some demolition works to the existing pier will be required to facilitate these works.

(2) The outer side of the pier will be dredged to achieve a depth of approximately -9.0 metres Chart Datum (CD). The volume of dredged material generated by these works will be approximately 145,000 cubic metres of sandy gravel and clay.

(3) The inner side of the pier will be dredged to provide a consistent berth depth of -7.5 metres CD. The volume of dredged material generated by these works will be approximately 8,000 cubic metres of sandy gravel and clay.

(4) Reclamation Area with Revetment facing: the reclamation & revetment area will be approximately 8,300 square meters at the root of the pier to provide storage for cargo handling.

(5) Either:

Installation of a new fuel pipe and water pipeline along the seabed from the Jubilee Pier across the inner birth and on the St. Ola Pier; or

Installation of a new fuel tank on the proposed reclamation area. The fuel tank will be approximately 15 metres diameter by 12 metres high. A new fuel pipe will be installed along land onto St Ola

Pier, the initial route for which has not yet been determined. If the fuel supply is coming from the proposed tank, the water supply will be routed from the existing supply on the adjacent Queen Elizabeth Pier instead of from Jubilee Pier.

If the new fuel tank option was pursued the scope of the SHT's works is restricted to ensuring the reclamation area can accommodate the tank, and installing the necessary pipework and associated infrastructure to allow the import / export of fuel on the redeveloped quay. The actual tank would be erected and operated by a third party at a later date. The tank would be for the storage and supply of marine gas oil and no petrol would be involved.

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In line with the aforementioned requirements of The Marine (Scotland) Act 2010, the project Marine Licence will be submitted no sooner than 12 weeks from the date of this letter.

Yours sincerely,
for RPS
[Redacted]

Alastair McKinley.

cc:
Sandie Mackie, SHT (sandy.mackie@scrabster.co.uk)

Our ref: NI1940

Date: 03 April 2019

Elmwood House
74 Boucher Road
BELFAST
BT12 6RZ
T: +44 2890 667 914

Marine Scotland
Licensing Operations Team
Marine Scotland
Marine Laboratory
375 Victoria Road
ABERDEEN
AB11 9DB

Dear Sir/Madam,

PROPOSED REDEVELOPMENT OF ST. OLA PIER, SCRABSTER HARBOUR – NOTICE OF INTENTION TO SUBMIT

I am writing on behalf of Scrabster Harbour Trust (SHT) to give you notice as required by and in accordance with Section 23 of The Marine (Scotland) Act 2010, that an application for a marine licence is to be submitted to Marine Scotland in relation to the proposed redevelopment of St. Ola Pier, Scrabster Harbour, Thurso, KW12 7UJ.

Project Description

The proposed works are located within Scrabster Harbour, approximately 1.5 miles north-west of Thurso. The existing St Ola Pier is situated within the centre of the harbour and incorporates a 100 metre long berth to the south-west, a linkspan and a further 115 metre berth which was used by the Orkney Ferry prior to the Queen Elizabeth Pier being constructed in 2003. The location of St Ola Pier is shown in enclosed Drawing M0727-RPS-00-XX-DR-C-0101 (Rev P03) '*Location Plan*'.

The detailed design of the proposed redevelopment is still being finalised. However, it is anticipated that the proposed works will comprise:

(1) Installation of new piled quay wall and pier deck to expand the existing pier. The renovated pier will be approximately 280 metres long with straight berthing faces. Some demolition works to the existing pier will be required to facilitate these works.

(2) The outer side of the pier will be dredged to achieve a depth of approximately -9.0 metres Chart Datum (CD). The volume of dredged material generated by these works will be approximately 145,000 cubic metres of sandy gravel and clay.

(3) The inner side of the pier will be dredged to provide a consistent berth depth of -7.5 metres CD. The volume of dredged material generated by these works will be approximately 8,000 cubic metres of sandy gravel and clay.

(4) Reclamation Area with Revetment facing: the reclamation & revetment area will be approximately 8,300 square meters at the root of the pier to provide storage for cargo handling.

(5) Either:

Installation of a new fuel pipe and water pipeline along the seabed from the Jubilee Pier across the inner birth and on the St. Ola Pier; or

Installation of a new fuel tank on the proposed reclamation area. The fuel tank will be approximately 15 metres diameter by 12 metres high. A new fuel pipe will be installed along land onto St Ola Pier, the initial route for which has not yet been determined. If the fuel supply is coming from the proposed tank, the water supply will be routed from the existing supply on the adjacent Queen Elizabeth Pier instead of from Jubilee Pier.

If the new fuel tank option was pursued the scope of the SHT's works is restricted to ensuring the reclamation area can accommodate the tank, and installing the necessary pipework and associated infrastructure to allow the import / export of fuel on the redeveloped quay. The actual tank would be erected and operated by a third party at a later date. The tank would be for the storage and supply of marine gas oil and no petrol would be involved.

The layout of these proposed works is shown on enclosed Drawing M0727-RPS-00-XX-DR-C-0102 (Rev P03) '*Site Layout Plan*' and M0727-RPS-00-DD-DR-C-1500 *'Definition Drawing General Arrangement.'*

Two further drawings are also enclosed, delineating the extent of the proposed marine elements of the works below MHWS (Drawing M0727-RPS-00-XX-DR-C-0103 (Rev P03) '*Extent of Works Above and Below MHWS*') and the extent of the terrestrial elements of the works above MLWS (Drawing M0727 RPS-00-XX-DR-C-0104 '*Extent of Works Above and Below MLWS*').

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- A screening opinion was issued by Marine Scotland on 14th March 2018 which found that the works exceeded the corresponding threshold described in column 2 of schedule 2 of the MW Regulations. On consideration of the selection criteria set out in schedule 3 of the MW Regulations it was determined that the environmental effects of the works was likely to be significant and thus should be subjected to an EIA; and
- In addition, on 25th September 2018, Marine Scotland, having considered the documentation provided in a request for a scoping opinion issued by RPS on behalf of the applicant Scrabster Harbour and consulted with the appropriate consultation bodies, issued a scoping opinion adopted by the Scottish Ministers, under Regulation 14 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) ("the 2017 MW Regulations"), as to the scope and level of detail of information to be provided in the Environmental Impact Assessment report for the proposed re-development of St. Ola Pier, Scrabster.

In line with the aforementioned requirements of The Marine (Scotland) Act 2010, the project Marine Licence will be submitted no sooner than 12 weeks from the date of this letter.

Yours sincerely,
for RPS
[Redacted]

Alastair McKinley.

cc:
Sandie Mackie, SHT (sandy.mackie@scrabster.co.uk)

Scrabster Harbour
YOUR GATEWAY TO THE NORTH

Appendix 4.2 Public Consultation Statutory Notification

North and West Division

NHS Highland

Caithness General Hospital, Wick
Ambulatory Care Unit
Staff Nurse – Band 5

£24,670 - £30,742 pro-rata

An exciting opportunity has arisen for a registered nurse to work within the developing Ambulatory Care Unit in Caithness General Hospital. As part of the Caithness General Redesign Programme, this new model of care provides day-case services to improve care and reduce the need for prolonged hospital stay, thus treating the population on an outpatient basis.

We are looking for a candidate who is proactive and enthusiastic to further support the development of the Ambulatory Care Unit. As part of a satellite integrated team, you will provide assessment and subsequent treatment of patients attending the unit within the services covered: daily renal dialysis, blood transfusions, various IV infusions for chronic conditions, and chemotherapy.

Previous experience in either Systemic Anti-Cancer Therapy or Haemodialysis is desirable but not essential as a comprehensive training package will be provided. It is anticipated that the successful candidate will predominately be based within the Chemotherapy & IV Infusions room, with potential Haemodialysis experience to follow at a later date.

As a valued member of the team you will be supported by a personal development plan/appraisal, extensive training and competencies achievement, and development opportunities within NHS Highland.

This is a part-time post of 30 hours per week, to be worked in accordance with service requirements. Possible negotiation of reduced hours (no less than 23 hours per week) would be considered with evidence of current skill set.

Informal enquiries and arranged drop-in visits are welcomed and encouraged by Bruce Honeyman (Senior Charge Nurse) and Muriel Baroja-Rodriguez (Senior Staff Nurse) – Ambulatory Care Unit, Caithness General Hospital, Wick, Tel: 01955 880201.

Application forms/full information packs are available (quoting Job Ref: 008/19.20ES1) from the Employment Services Team, by e-mailing northarea.recruitment@nhs.net or telephoning 01955 880403.

Closing date for completed applications: 12 noon, Monday 13th May 2019.

disability confident EMPLOYER

www.nhshighland.scot.nhs.uk

University of the Highlands and Islands
North Highland College

Secretary to the Board of Management

£27,940 - £30,715 (pro-rata)

An exciting opportunity has arisen to contribute to the development of North Highland College UHI. Recent changes to legislation have transformed Scotland's Colleges into a new regional structure which works strategically to help learners and employers to achieve their aspirations. The Board of Management are seeking to appoint an individual who will support and advise its members in maintaining the highest standards of governance and ensure that the College continues to deliver an outstanding service.

The post is permanent, part time and will *average* 21 hours per week.

Applicants should be educated to degree level or equivalent or with relevant background experience, possess excellent communication and report writing skills and have experience of supporting a diverse range of needs in a committee structure and of working within a compliance environment.

Interested in applying? Please go to **www.northhighland.uhi.ac.uk/staff/vacancies** to download an application pack. CVs will not be accepted but may accompany your application form.

Closing date for completed applications: **Friday, 17 May 2019**

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FINDING A JOB COULDN'T BE EASIER

publicnotices

Scrabster Harbour

SCRABSTER HARBOUR TRUST – REDEVELOPMENT OF ST. OLA PIER MARINE LICENSING PUBLIC PRE-APPLICATION CONSULTATION EVENT

Notice is hereby given that Scrabster Harbour Trust intends to hold a pre-application consultation event regarding a proposed licensable marine activity at Scrabster Harbour (Thurso, Caithness, KW14 7UJ - OS Grid Ref: ND 10437 70310).

The proposed works comprise of the following key features:

- Installation of new piled quay wall and pier deck to expand the existing St. Ola Pier;
- Dredging of both the inner and outer side of the pier to achieve necessary depths;
- Reclamation area with revetment at the root of the pier to provide storage for cargo handling.

The pre-application consultation event will be held at St Ola House, Scrabster on **14th June 2019** between 2pm and 8pm. Persons requesting further information or wishing to provide comments on the proposal will be able to do so at the aforementioned public event. Alternatively, persons may submit their request for further information or provide comments by writing to the prospective applicant at st.olapier@rpsgroup.com
or by post to:
Scrabster Harbour Trust
c/o RPS
Elmwood House
74 Boucher Road
Belfast
BT12 6RZ
Submissions should be received not later than **21st June 2019.**
Any comments made are to Scrabster Harbour Trust and not to Marine Scotland. In the event of the submission of a marine licence application by Scrabster Harbour Trust, an opportunity will be given for representations to be made to the Scottish Ministers on the application.

www.highland.gov.uk

The Highland Council Comhairle na Gàidhealtachd

TOWN AND COUNTRY PLANNING (SCOTLAND) ACT 1997
PLANNING (LISTED BUILDING AND CONSERVATION AREAS) (SCOTLAND) ACT 1997

The applications listed below, along with plans and other documents submitted with them, may be examined online at http://wam.highland.gov.uk; electronically at the **AREA PLANNING AND BUILDING STANDARDS OFFICE, HIGHLAND COUNCIL, CAITHNESS HOUSE, MARKET PLACE, WICK, KW1 4AB;** or electronically at your nearest Council Service Point. You can find your nearest Service Point via the following link https://www.highland.gov.uk/directory/16/a_to_z

Written comments should be made to the EPC at the contact details below within the time period indicated from the date of this notice. Anyone making a representation about this proposal should note that their letter or email will be disclosed to any individual or body who requests sight of representations in respect of this proposal.

Reference Number	Development Address	Proposal Description	Alternative locations where application may be inspected and time period for comments
19/01317/FUL	West Church, Latheron KW5 6DL	Conversion & change of use of existing church to domestic dwelling	(14 days)

PLEASE NOTE OUR NEW ADDRESS
ePlanning Centre, The Highland Council, Glenurquhart Road, INVERNESS IV3 5NX
Email: eplanning@highland.gov.uk

In the Wick Sheriff Court
No WCK-L1 of 2019
FRANCIS STREET CLUB AND INSTITUTE LIMITED
(Company Number SP002107)
I, Alexander Iain Fraser, of FRP Advisory LLP, Suite 2B Johnstone House, 52-54 Rose Street, Aberdeen, AB10 1UD, give notice that I was appointed Liquidator of the above named company by the meeting of Creditors held on 18 April 2019. Further details contact: Alexander Fraser, Tel: 0330 055 5455, Email: cp.aberdeen@frpadvisory.com. Alternative contact: David Birnie, email:David.Birnie@frpadvisory.com
Alexander Iain Fraser, Liquidator

John O'Groat Journal Telephone **01955 602424**

Classified Websites

www.johnogroat-journal.co.uk/FamilyNotices
www.johnogroat-journal.co.uk/Services
www.johnogroat-journal.co.uk/Whats-On
www.classifieds-north.co.uk
www.jobs-north.co.uk
www.motors.co.uk/north
www.property-north.co.uk

Scrabster Harbour
YOUR GATEWAY TO THE NORTH

Appendix 4.3 Public Consultation Statutory Notification Letters

Our ref: NI1940

Date: 30th April 2019

Elmwood House
74 Boucher Road
BELFAST
BT12 6RZ
T: +44 2890 667 914

Northern Lighthouse Board
84 George Street
Edinburgh
EH2 3DA

Dear Sir/Madam,

PROPOSED REDEVELOPMENT OF ST. OLA PIER, SCRABSTER HARBOUR – NOTICE OF PUBLIC CONSULTATION

Notice is hereby given that Scrabster Harbour Trust intends to hold a pre-application consultation event regarding a proposed licensable marine activity at Scrabster Harbour (Thurso, Caithness, KW14 7UJ - OS Grid Ref: ND 10437 70310).

As noted in previous correspondence, the proposed works comprise of the following key features:

- Installation of new piled quay wall and pier deck to expand the existing St. Ola Pier;
- Dredging of both the inner and outer side of the pier to achieve necessary depths;
- Reclamation area with revetment at the root of the pier to provide storage for cargo handling.

The pre-application consultation event will be held at St Ola House, Scrabster on **14th June 2019** between 2pm and 8pm.

Persons requesting further information or wishing to provide comments on the proposal will be able to do so at the aforementioned public event. Alternatively, persons may submit their request for further information or provide comments by writing to the prospective applicant at st.olapier@rpsgroup.com or by post to:

Scrabster Harbour Trust
c/o RPS
Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

Yours sincerely,
for RPS
[Redacted]

Alastair McKinley.

Our ref: NI1940

Date: 30th April 2019

Elmwood House
74 Boucher Road
BELFAST
BT12 6RZ
T: +44 2890 667 914

Scottish Environment Protection Agency
Thurso Office
Strathbeg House
Clarence Street
Thurso
Caithness
KW14 7JS

Dear Sir/Madam,

PROPOSED REDEVELOPMENT OF ST. OLA PIER, SCRABSTER HARBOUR – NOTICE OF PUBLIC CONSULTATION

Notice is hereby given that Scrabster Harbour Trust intends to hold a pre-application consultation event regarding a proposed licensable marine activity at Scrabster Harbour (Thurso, Caithness, KW14 7UJ - OS Grid Ref: ND 10437 70310).

As noted in previous correspondence, the proposed works comprise of the following key features:

- Installation of new piled quay wall and pier deck to expand the existing St. Ola Pier;
- Dredging of both the inner and outer side of the pier to achieve necessary depths;
- Reclamation area with revetment at the root of the pier to provide storage for cargo handling.

The pre-application consultation event will be held at St Ola House, Scrabster on **14th June 2019** between 2pm and 8pm.

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BT12 6RZ

Yours sincerely,
for RPS
[Redacted]

Alastair McKinley.

Our ref: NI1940

Date: 30th April 2019

Elmwood House
74 Boucher Road
BELFAST
BT12 6RZ
T: +44 2890 667 914

Scottish Natural Heritage
Great Glen House
Leachkin Road
Inverness
IV3 8NW

Dear Sir/Madam,

PROPOSED REDEVELOPMENT OF ST. OLA PIER, SCRABSTER HARBOUR – NOTICE OF PUBLIC CONSULTATION

Notice is hereby given that Scrabster Harbour Trust intends to hold a pre-application consultation event regarding a proposed licensable marine activity at Scrabster Harbour (Thurso, Caithness, KW14 7UJ - OS Grid Ref: ND 10437 70310).

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Scrabster Harbour Trust
c/o RPS
Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

Yours sincerely,
for RPS
[Redacted]

Alastair McKinley.

Our ref: NI1940

Date: 30th April 2019

Elmwood House
74 Boucher Road
BELFAST
BT12 6RZ
T: +44 2890 667 914

Maritime and Coastguard Agency
Spring Place
105 Commercial Road
Southampton
SO15 1EG
United Kingdom

Dear Sir/Madam,

PROPOSED REDEVELOPMENT OF ST. OLA PIER, SCRABSTER HARBOUR – NOTICE OF PUBLIC CONSULTATION

Notice is hereby given that Scrabster Harbour Trust intends to hold a pre-application consultation event regarding a proposed licensable marine activity at Scrabster Harbour (Thurso, Caithness, KW14 7UJ - OS Grid Ref: ND 10437 70310).

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Scrabster Harbour Trust
c/o RPS
Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

Yours sincerely,
for RPS
[Redacted]

Alastair McKinley.

Appendix 5.1 Public Consultation Additional Notifications

Scrabster Harbour

YOUR GATEWAY TO THE NORTH

SCRABSTER HARBOUR TRUST
ST OLA PIER REDEVELOPMENT

Scrabster Harbour Trust intends to redevelop the existing St Ola Pier at Scrabster Harbour.

A drop in public consultation event will be held within the Board Room, St Ola House, Scrabster between 2.00pm and 8.00pm on Friday 14th June 2019.

Everyone is welcome to attend and the Trust would value your feedback on the project proposals.

Scrabster Harbour
YOUR GATEWAY TO THE NORTH

Appendix 5.2 Direct Stakeholder Communications

Sandy Mackie

From: Lorraine Ryan
Sent: 12 June 2019 11:32
To: [redacted]
Cc:
Subject: SHT - Redevelopment of St Ola Pier Public Consultation
Attachments: OPR-CON-003_1 Signed Letter to Stakeholders.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Dear All

Please see attached an invite to attend the Public Consultation for the redevelopment of the St Ola Pier, which will be held in the Scrabster Harbour Trust Boardroom, St Ola House , Scrabster on Friday 14th June 2019 between 1400hrs and 2000hrs.

Everyone is welcome and the Trust would value your feedback on the project proposals.

Kind Regards

Lorraine

Lorraine Ryan
Temporary Admin
Scrabster Harbour, Harbour Office, Scrabster,Caithness, KW14 7UJ
t: +44(0)1847892779 f: +44(0)1847892353 e: temp@scrabster.co.uk w: www.scrabster.co.uk

Scrabster Harbour
YOUR GATEWAY TO THE NORTH

7th June 2019
Ref: OPR/CON/003

To All Scrabster Harbour Users/Stakeholders and Residents

REDEVELOPMENT OF ST OLA PIER

As you may be aware Scrabster Harbour Trust has been advancing plans to redevelop the existing St Ola Pier.

Detailed design is nearing completion and an environmental impact study for the project has been prepared. The Trust intends to apply to Scottish Ministers for consent to the development.

As part of the consenting process, a drop in consultation event will be held between 1400 hours and 2000hrs in the Scrabster Harbour Trust Boardroom, St Ola House, Scrabster on Friday 14th June 2019.

Everyone is welcome and the Trust would value your feedback on the project proposals.
Yours sincerely

[Redacted]

SANDY MACKIE
Trust Manager

Harbour Office, Scrabster, Caithness, KW14 7UJ
T +44 (0) 1847 892779 F +44 (0) 1847 896680 E harbour@scrabster.co.uk
www.scrabster.co.uk

Sandy Mackie

From: Caithness Chamber of Commerce <info@caithnesschamber.com>
Sent: 11 June 2019 11:23
To: Sandy Mackie
Subject: MEMBER EVENT: Scrabster St. Ola Pier Redevelopment - Public Consultation, 14 June 2019

Follow Up Flag: Follow up
Flag Status: Completed

MEMBER EVENT: Scrabster St. Ola Pier Redevelopment - Public Consultation, 14 June 2019

Dear Member,

Scrabster Harbour Trust would like to invite you to a drop-in consultation event on their plans to redevelop the existing St. Ola Pier. This will take place from **14:00-20:00 in the Scrabster Harbour Trust Boardroom, St. Ola House on Friday 14th June 2019**. An information notice can be downloaded by **clicking here**.

Outline design of the plans is nearing completion, and an environmental impact study has been prepared, with the Trust intending to apply to Scottish Ministers for consent to the development.

All are welcome to attend and the Trust welcomes feedback on the project proposals.

Kind regards,
David

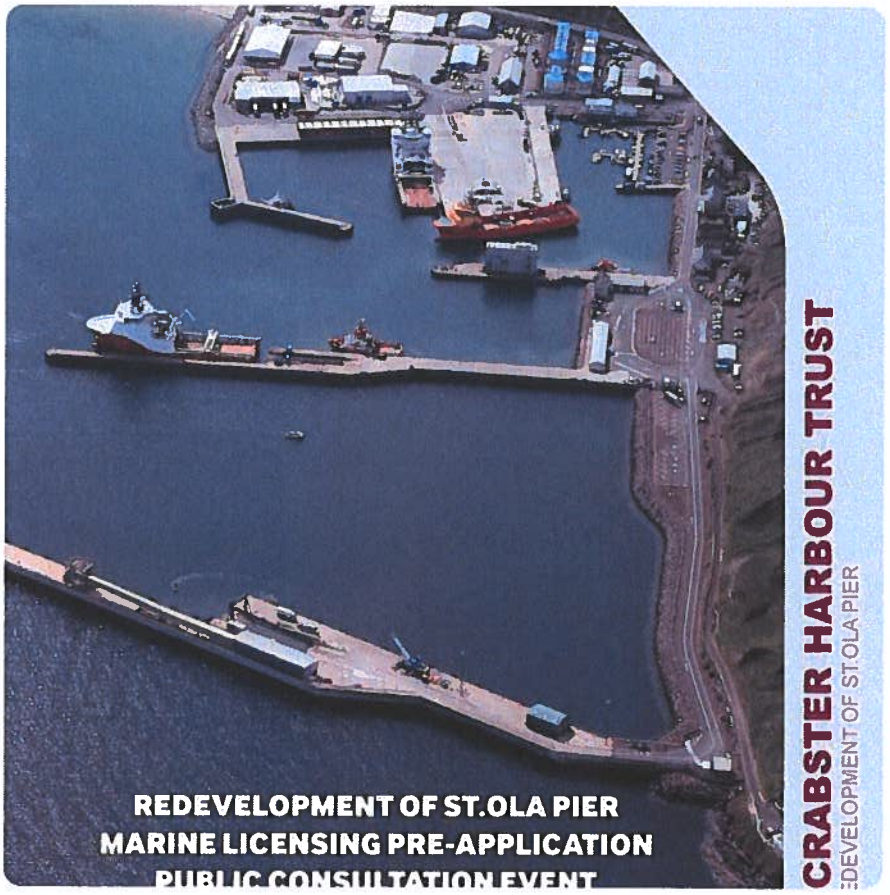
David Swanson *Marketing & Communications Manager*
Caithness Chamber of Commerce
Naver Business Centre, Naver House, Naver Road, Thurso, Caithness, KW14 7QA
T: 01847 890076; E: david@caithnesschamber.com; W: www.caithnesschamber.com

Caithness Chamber gratefully acknowledges the support of its Premier Partners
Cavendish Dounreay Partnership| Cavendish Nuclear | Dounreay Site Restoration Ltd | Nuclear Decommissioning Authority | Wood
Subsea 7
SNC-Lavalin - Atkins

Caithness Chamber
@CaithnessCoC

Following

.@scrabsterport are hosting a public consultation event & would love to see you there. Go along to on Friday 14th June to learn about the #redevelopment plans of the St Ola Pier & ask any questions or share any opinions you might have. #Caithness



2:35 AM - 11 Jun 2019

2 Retweets **6** Likes

2 6

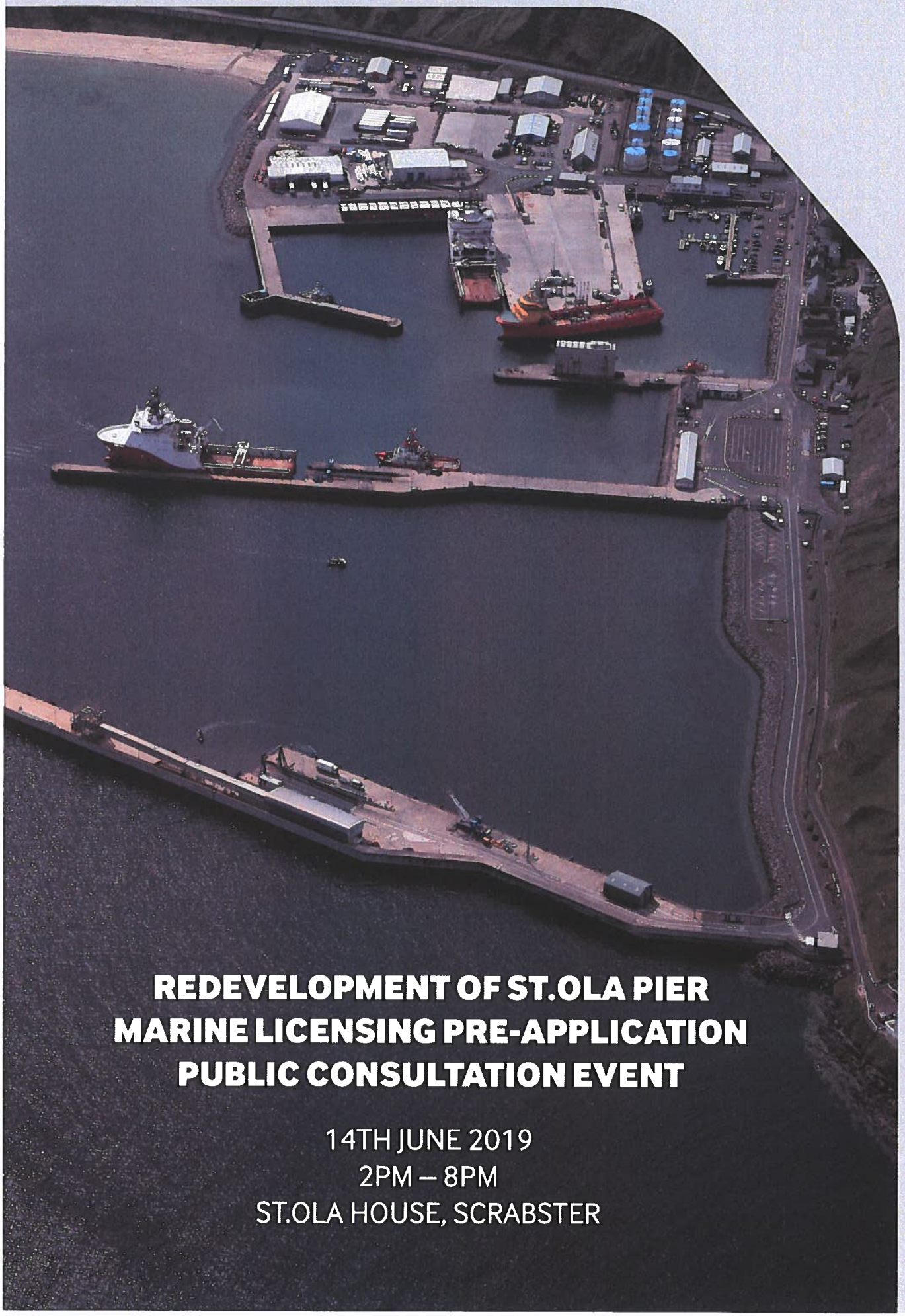
Tweet your reply

Scrabster Harbour
YOUR GATEWAY TO THE NORTH

Appendix 5.3 Event Flyer

rps MAKING COMPLEX EASY

Scrabster Harbour



REDEVELOPMENT OF ST.OLA PIER MARINE LICENSING PRE-APPLICATION PUBLIC CONSULTATION EVENT

14TH JUNE 2019
2PM – 8PM
ST.OLA HOUSE, SCRABSTER

SCRABSTER HARBOUR TRUST
REDEVELOPMENT OF ST.OLA PIER

Appendix 6.1 Event Display Materials

PROJECT SUMMARY

Background to Scrabster Harbour Trust

–Scrabster Harbour is a Trust port.

–The Trust exists for the benefit of stakeholders, which includes port users, employees, the local community and businesses and local / national government.

–The Trust is responsible for maintaining the balance between generating economic activity and safeguarding the environment.

–Scrabster Harbour Trust's vision is to develop Scrabster Harbour into one of the major generators of economic growth in Caithness by positioning the harbour as a port of choice for vessels operating in the seas to the North of Scotland.

–The Trust has an established track record of successfully delivering large scale infrastructure projects.

–The Trust has invested in the region of £20 million in the past 7 years–As a result Port revenues have grown by 58% between 2012 and 2018; 100% of any surpluses are reinvested in the Port.

–The importance of Scrabster, to the Caithness and North Sutherland, has been independently assessed; 403 FTE jobs are supported at present both directly and indirectly by the port.

Aims of the St.Ola Pier Redevelopment Project

To prepare for the future, safeguard jobs and create more business opportunities.

Maximise the contribution of port to the local economy and community. This is particularly important as the area prepares for a future without Dounreay.

Anticipated Project

The project outputs (assessed at Year 5 following construction, FY 2025-26) are as follows:

Short term employment and local business benefits over construction period

6% increase in total vessel arrivals at Scrabster

20% increase in total vessel tonnage at Scrabster

18% increase in port revenues

Generation of 46.3 FTE jobs, with associated increase in Gross Value Added (GVA) and total economic output of the Harbour

Additional 30,000 cruise passengers arriving at Scrabster, on vessels carrying a total of 10,500 crew

Cruise passenger and crew spend in Caithness of £1.830 million per annum.

Further opportunities for local supply chain development in the energy and tourism sectors

Project Description

The existing St Ola Pier is situated within the centre of the harbour and incorporates a 100 metre long berth to the southwest, a linkspan and a further 115 metre berth which was used by the Orkney Ferry prior to the Queen Elizabeth Pier being constructed in 2003.

The detailed design is nearing completion; at present the proposed works are anticipated to comprise of the following:

–Installation of new piled quay wall and pier deck to expand the existing pier. The renovated pier will be approximately 280 metres long with straight berthing faces. Some demolition works to the existing pier will be required to facilitate these works.

– The outer side of the pier will be dredged to achieve a depth of approximately -9.0 metres Chart Datum (CD). The volume of dredged material generated by these works will be approximately 145,000 cubic metres of sandy gravel and clay.

– The inner side of the pier will be dredged to provide a consistent berth depth of -7.5 metres CD. The volume of dredged material generated by these works will be approximately 8,000 cubic metres of sandy gravel and clay.

– Reclamation Area with Revetment facing: the reclamation & revetment area will be approximately 8,300 square meters at the root of the pier to provide storage for cargo handling.

– Installation of either a new fuel pipe and water pipe along the seabed from the Jubilee Pier across the inner birth and on the St. Ola Pier or installation of a new fuel tank on the proposed reclamation area.

SCRABSTER HARBOUR TRUST
REDEVELOPMENT OF ST.OLA PIER

PROJECT SUMMARY

Marine Licencing and Environmental Assessment

The project has been determined by Marine Scotland as being a licensable activity which is subject to an Environmental Impact Assessment and requiring an Environmental Statement.

Scrabster Harbour Trust have engaged their consultants RPS to undertake all necessary studies to inform both the Environmental Impact Assessment and the project design.

Environmental Assessment

In line with the scoping opinion provided by Marine Scotland, the project EIA considers a wide range of environmental matters including the following:

- ALTERNATIVES
- WATER QUALITY
- WASTE MANAGEMENT
- MARINE BIODIVERSITY
- TRAFFIC AND TRANSPORTATION
- TERRESTRIAL BIODIVERSITY AND ORNITHOLOGY
- NOISE AND VIBRATION
- NAVIGATION
- GEOLOGY, HYDROGEOLOGY AND CONTAMINATION
- AIR QUALITY
- COASTAL PROCESSES
- CUMULATIVE EFFECTS

Current Project Timeline

March 2018 – Following submission of an EIA Screening Request by Scrabster Harbour Trust the Project was determined to be EIA development by Marine Scotland

July 2018 – An EIA Scoping Report was issued to Marine Scotland to identify potentially significant issues for detailed examination and those that can be 'scoped out' of future assessments

September 2018 – Marine Scotland provided a detailed Scoping Opinion outlining the matters which were to be scoped in or out of the project EIA

October 2018 – June 2019 - Project design progressed in parallel with completion of the EIA and write up of Environmental Statement

June/July 2019 – Submission of project marine licence application

December 2019 – Appointment of Contractor

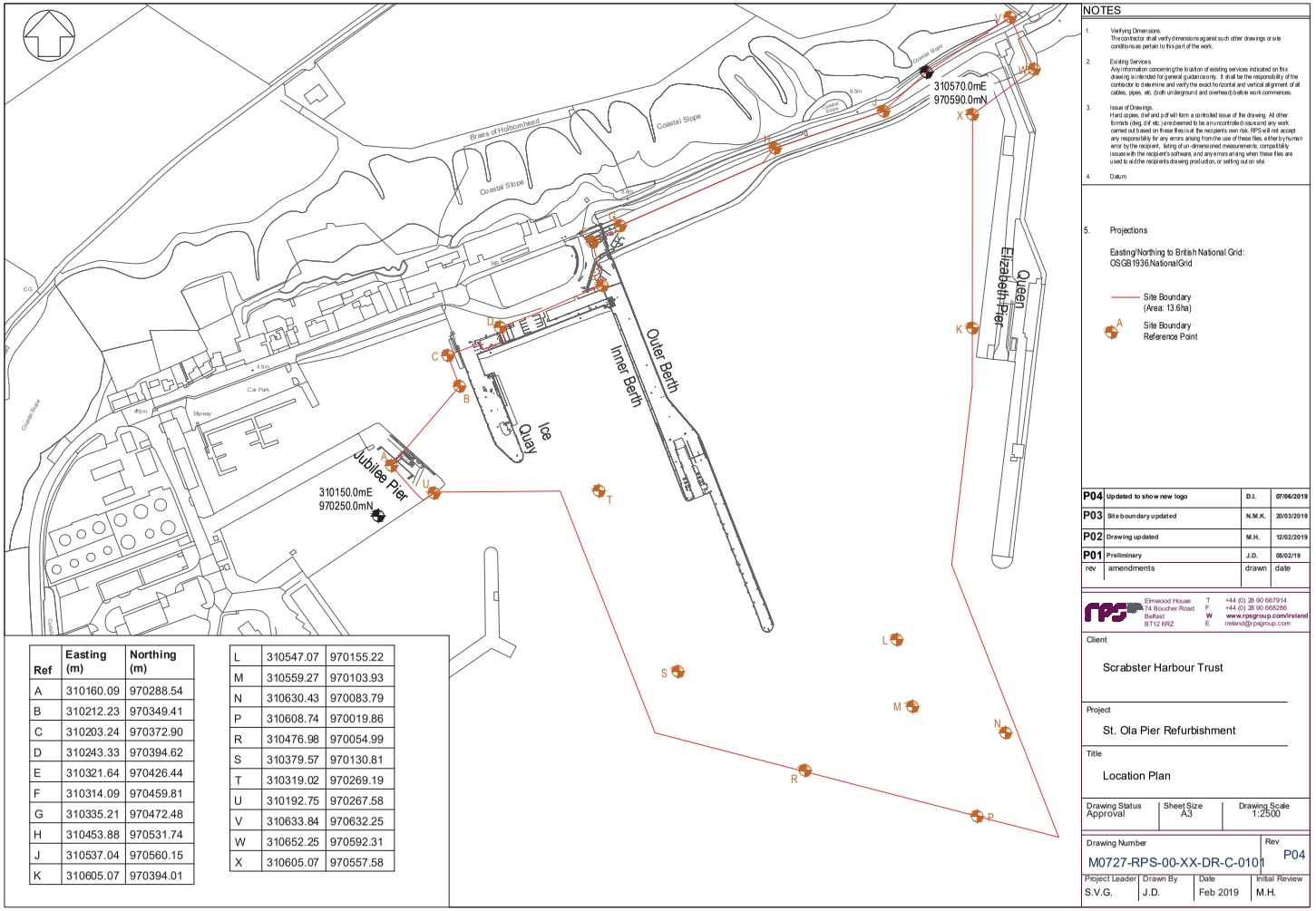
January 2020 – Commencement of construction works (dependent upon licensing)

June 2021 – Completion of construction works

SCRABSTER HARBOUR TRUST
REDEVELOPMENT OF ST.OLA PIER

LOCATION PLAN

Draft for Consultation



Ref	Easting (m)	Northing (m)
A	310160.09	970288.54
B	310212.23	970349.41
C	310203.24	970372.90
D	310243.33	970394.62
E	310321.64	970426.44
F	310314.09	970459.81
G	310335.21	970472.48
H	310453.88	970531.74
J	310537.04	970560.15
K	310605.07	970394.01

L	310547.07	970155.22
M	310559.27	970103.93
N	310630.43	970083.79
P	310608.74	970019.86
R	310476.98	970054.99
S	310379.57	970130.81
T	310319.02	970269.19
U	310192.75	970267.58
V	310633.84	970632.25
W	310652.25	970592.31
X	310605.07	970557.58

NOTES

1. Verifying Dimensions.
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
2. Existing Services
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
3. Issue of Drawings.
Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.
4. Datum
5. Projections

Easting/Northing to British National Grid:
OSGB1936.NationalGrid

Site Boundary (Area: 13.6ha)

Site Boundary Reference Point

rev	amendments	drawn	date
P04	Updated to show new logo	D.I.	07/06/2019
P03	Site boundary updated	N.M.K.	20/03/2019
P02	Drawing updated	M.H.	12/02/2019
P01	Preliminary	J.D.	05/02/19

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ
T +44 (0) 28 90 667914
F +44 (0) 28 90 668286
W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

Client: Scrabster Harbour Trust

Project: St. Ola Pier Refurbishment

Title: Location Plan

Drawing Status	Sheet Size	Drawing Scale
Approval	A3	1:2500

Drawing Number: M0727-RPS-00-XX-DR-C-0101 Rev: P04

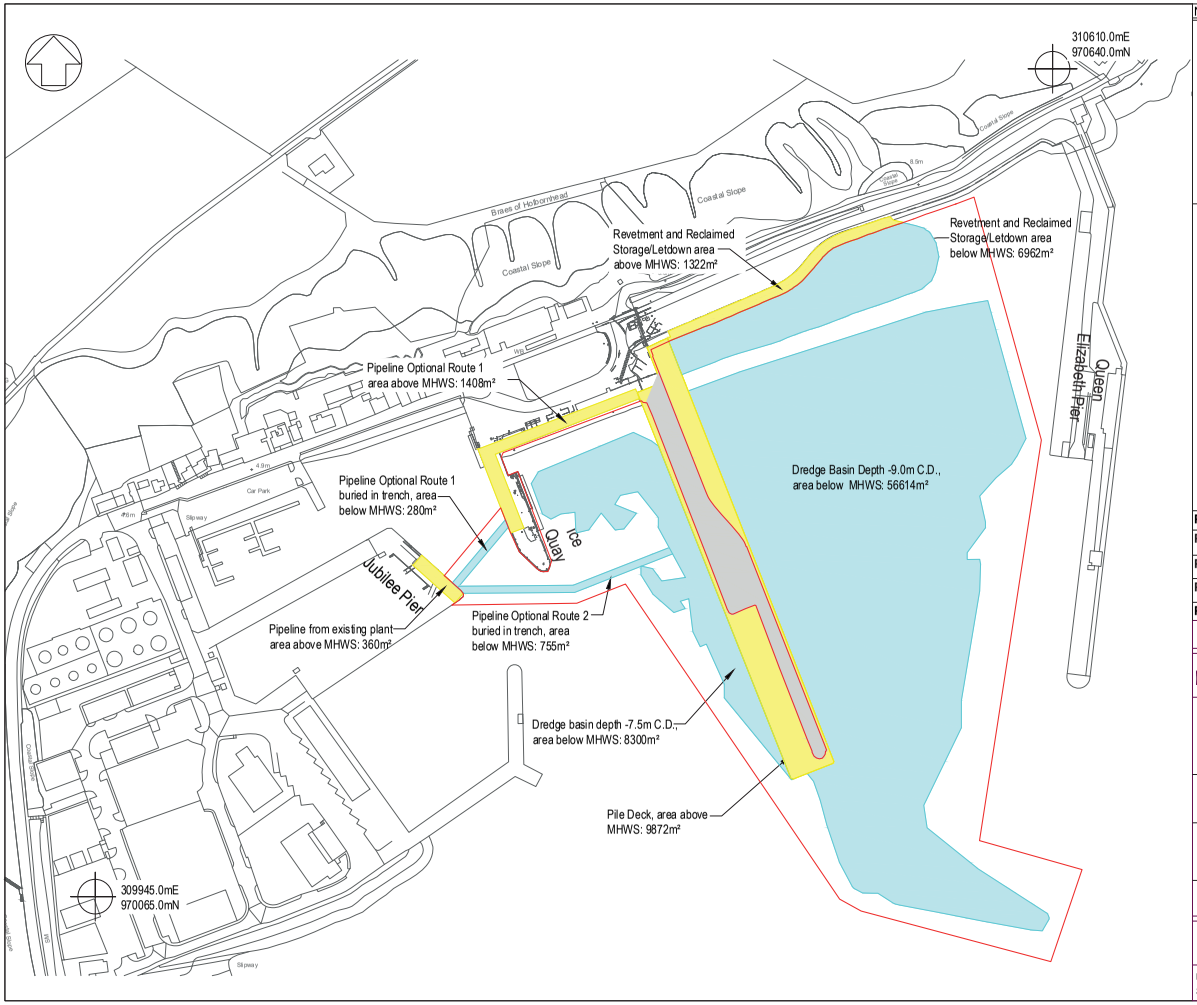
Project Leader	Drawn By	Date	Initial Review
S.V.G.	J.D.	Feb 2019	M.H.

SCRABSTER HARBOUR TRUST

REDEVELOPMENT OF ST.OLA PIER

EXTENTS OF WORKS

Draft for Consultation



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4. Datum

Extents of Proposed Works Below MHWS: Total area: 7291m²

Extents of Proposed Works Above MHWS: Total area: 12962m²

Marine Licence Boundary below MHWS (MHWS: +5.50m C.D.)

Existing structure

P05	Updated to show new logo	D.I.	07/06/2019
P04	Areas at revetment updated. Totals updated to suit	M.H.	02/04/2019
P03	Drawing updated to suit layout	N.M.K.	25/03/2019
P02	Pipe Route 2 amended. Areas adjusted to suit.	M.H.	11/02/2019
P01	Preliminary	J.D.	05/02/19
rev	amendments	drawn	date

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ
T +44 (0) 28 90 667914
F +44 (0) 28 90 668286
W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

Client: Scrabster Harbour Trust

Project: St. Ola Pier Refurbishment

Title: Extents of Works Above and Below MHWS

Drawing Status	Sheet Size	Drawing Scale
Approval	A3	1:2500

Drawing Number: M0727-RPS-00-XX-DR-C-0103 Rev: P05

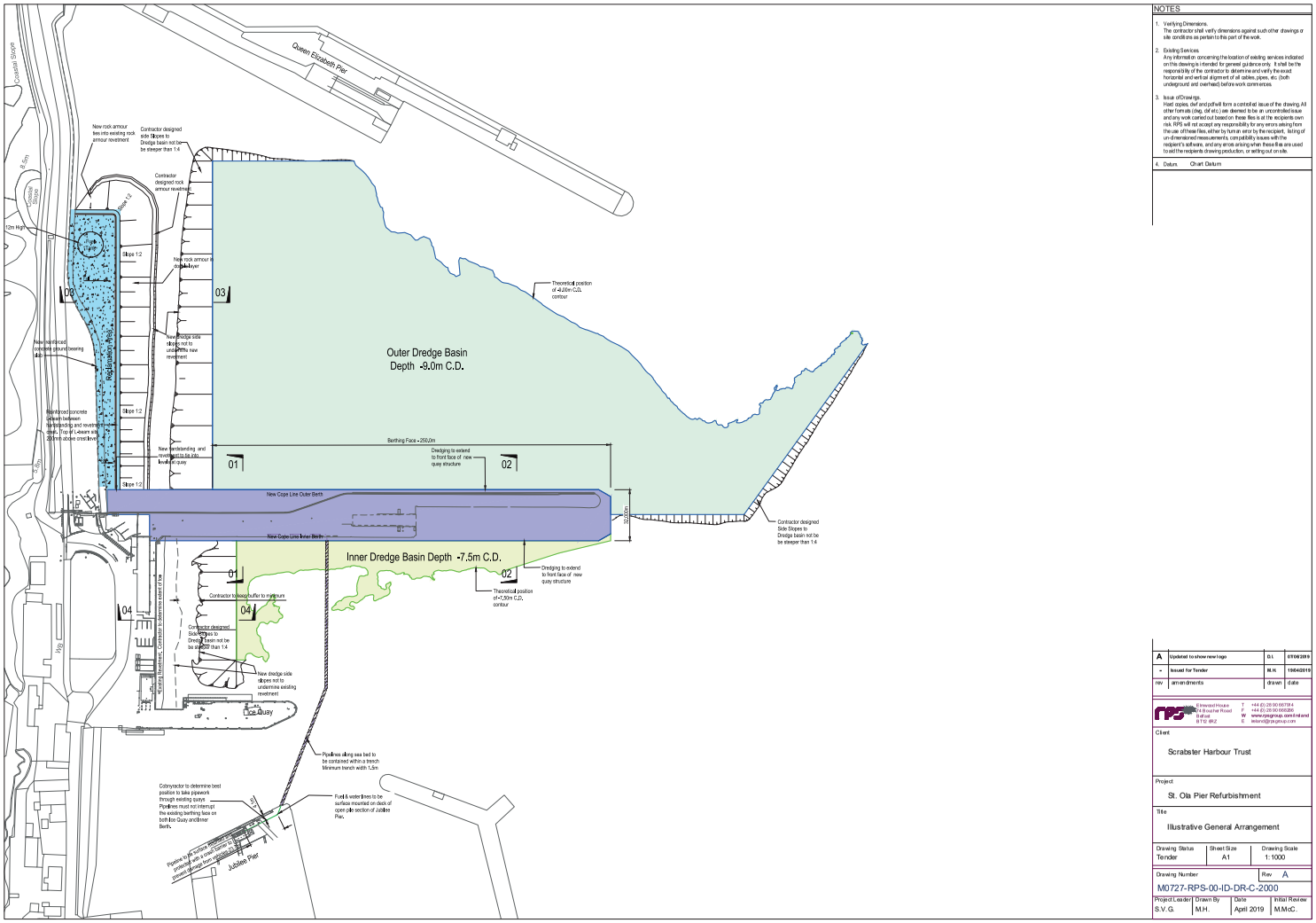
Project Leader	Drawn By	Date	Initial Review
S.V.G	J.D.	01/02/2019	S.V.G

SCRABSTER HARBOUR TRUST

REDEVELOPMENT OF ST.OLA PIER

ILLUSTRATIVE GENERAL ARRANGEMENT

Draft for Consultation

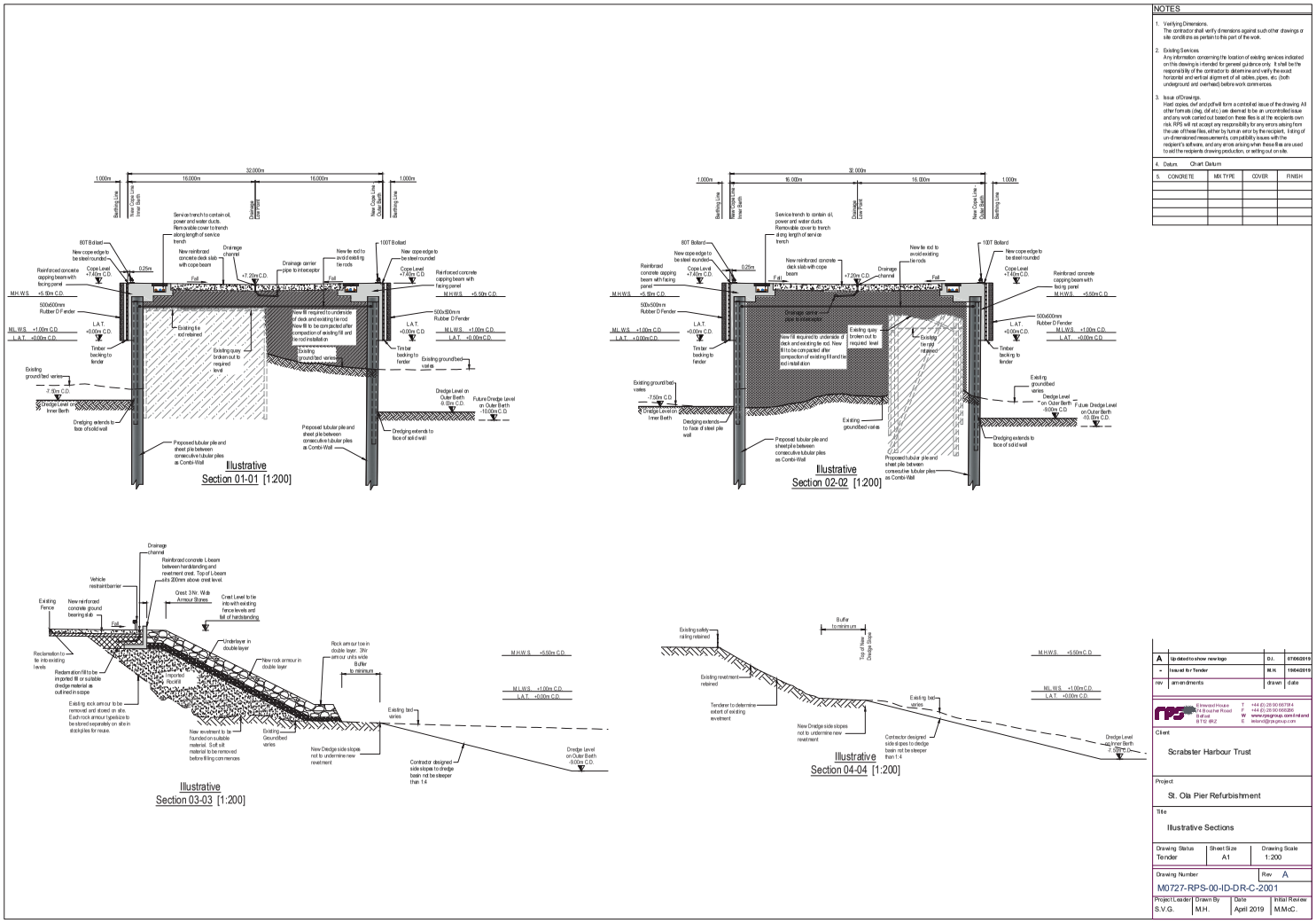


SCRABSTER HARBOUR TRUST

REDEVELOPMENT OF ST.OLA PIER

ILLUSTRATIVE SECTIONS

Draft for Consultation



NOTES

1. Verifying Dimensions.
   The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
2. Existing Services.
   Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
3. Issue of Drawings.
   Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, fitting of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.
4. Datum. Chart Datum

5. CONCRETE	MIX TYPE	COVER	FINISH

rev	amendments	drawn	date
A	Updated to show new logo	D.I.	07/06/2019
-	Issued for Tender	M.H.	19/04/2019

RPS Group, Edward House, 59 Malone Road, Belfast, BT9 6RZ
T +44 (0) 28 90 667914
F +44 (0) 28 90 660395
W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

Client: Scrabster Harbour Trust

Project: St. Ola Pier Refurbishment

Title: Illustrative Sections

Drawing Status	Sheet Size	Drawing Scale
Tender	A1	1:200

Drawing Number: M0727-RPS-00-ID-DR-C-2001 Rev A

Project Leader	Drawn By	Date	Initial Review
S.V.G.	M.H.	April 2019	M.McC.

SCRABSTER HARBOUR TRUST

REDEVELOPMENT OF ST.OLA PIER

Scrabster Harbour
YOUR GATEWAY TO THE NORTH

Appendix 6.2 Sample Feedback Questionnaire

Public Consultation Feedback Form

As part of our consultation process, we want to hear your views on the St. Ola Pier Redevelopment project; based on what you have learned at today's event please complete the following questions:

1. How did you learn about today's event?

Newspaper/Public Notice [ ] Online/Social Media [ ]
Word of Mouth [ ] Direct Correspondence [ ]

Other (please specify)
.....

2. Do you feel you have been provided with sufficient information regarding the project?

Yes [ ] No [ ]

If you answer is No, please tell us how we can improve this in the future?
.....
.....
.....

3. What do you regard as being the main environmental issues associated with the project? (Tick all that apply)

Air Quality [ ] Traffic [ ]
Ecology [ ] Cultural/Built Heritage [ ]
Noise & Vibration [ ] Coastal Processes/Erosion [ ]
Water Quality [ ] Waste Management [ ]
Visual Impact [ ]

Other (please specify)
.....
.....
.....

4. Do you think the proposed St. Ola Pier Redevelopment Project will be beneficial for the economy?

Yes [ ] No [ ] Unsure [ ]

5. Taking account of the information provided, do you support the proposed St. Ola Pier Redevelopment Project?

Yes [ ] No [ ] Unsure [ ]

Please provide reasoning for your answer:
.....
.....
.....
.....
.....
.....

SCRABSTER HARBOUR TRUST
REDEVELOPMENT OF ST.OLA PIER

6. Do you have any specific comments or questions regarding the project?

.....
.....
.....
.....
.....
.....

7. In order to determine that we have consulted with a wide stakeholder group, please complete the following sections:

Gender: Male [ ] Female [ ]

Age: <16 [ ] 17-24 [ ] 25-39 [ ] 40-59 [ ] 60+ [ ]

Stakeholder Group: Local Community [ ] Local Business [ ]
Local Authority [ ] Port Employee [ ]
Port User [ ] National Authority [ ] Other Group [ ]

8. Should you wish to be kept informed of the progress of the project, please provide your contact details as follows:

Name: .....

Address: .....
.....

Telephone Number: .....

Email: .....

Data Protection Information:

This form is in respect of the proposed St. Ola Pier Redevelopment Project; this information will be held by Scrabster Harbour Trust (SHT) personnel only for the purpose of engagement in the public consultation process.

The General Data Protection Regulation (GDPR) came into force across the EU on the 25th May 2018. At SHT we take our obligations under data protection law seriously and we're committed to keeping your personal data private and secure. SHT ensures that your personal information is stored strictly in accordance with data protection law including the GDPR. Our privacy policy is available on the SHT website - www.scrabster.co.uk

Scrabster Harbour
YOUR GATEWAY TO THE NORTH

Appendix 6.3 Feedback Questionnaire Analysis

Public Consultation 14th June 2019
Feedback Analysis

The consultation event was well attended with a total of 45 people attending.
A total of 20 feedback forms were completed, the summary of responses is as follows

Question 1. - How did you learn about today's event? (In some cases the individuals ticked more than one box).

Direct Correspondence	11
Newspaper/Public Notice	3
Social Media/Online	4
Word of Mouth	4
Other – Chamber of Commerce	1
Total Responses	**23**

Question 2. – Do you feel you have been provided with sufficient information regarding the project?

Y	20
N	0
Total Responses	**20**

Question 3. - What do you regard as being the main environmental issues associated with the project? (Individuals were allowed to tick all that applied).

Air Quality	**2**
Coastal Processes/Erosion	**5**
Cultural/Built Heritage	**1**
Ecology	**1**
Noise & Vibration	**10**
Traffic	**11**
Visual Impact	**4**
Waste Management	**4**
Water Quality	**2**
Other - Further erosion off shore on other side of bay	**1**
Other - None, do not see any significant environmental issues whatsoever	**1**
Total Responses	**42**

Question 4. - Do you think the proposed St Ola Pier Redevelopment Project will be beneficial for the economy?

No	**1**
Unsure	**1**
Yes	**19**
Total Responses	**21**

One respondent thought increased oil and gas activity would benefit the economy but was unsure about cruise activity so ticked two boxes.

Question 5 - Taking account of the information provided, do you support the proposed St Ola Pier Redevelopment Project?

No	1
Yes	19
Total Responses	**20**

Please provide reasoning for your answer

Additional income for both harbour and local businesses as well as Caithness in general	1
Could make better use of the pier as already got two deep water piers which are not being used to full potential	1
Cruise Liners	1
For oil and gas and additional jobs is always good news	1
Great for area by generating new jobs and bringing more people to the area. More appeal for companies to use the harbour	1
I believe that the expansion will benefit the local community and businesses and boost the local economy	1
If this development generates the increased cruise ship and related vessel uptake then it can only be good for this local economy.	1
Job Prospects, Tourism, Import/Exportation	1
No comments	12
Similar project in Kirkwall has had a very positive impact on the economy of that town	1
Will bring an economic boost to the area and be good for tourism	1
More Cruise Ships = more economic growth in Thurso	1
Wider Range of Vessels using the harbour = more soundly based economic model	1
Total Responses	**24**

Some respondents gave more than one reason

Question 6 – Do you have any specific comments or questions regarding the project?

Don't like idea of fuel tank visually as will be ugly for us and all passengers of ferries. It's also a hazard for nuclear movements	1
Good Information. Please contact me for Aerial footage and progress time-lapse, thanks	1
I don't think using (possibly) the dredging spoil as pier infill would be a good idea, should you get a pier wall breach.	1
I fully support the project and am delighted to see the harbour prosper	1
I think this will be good for the local area	1
Increased Traffic to pier will cause queuing traffic, blocking my drive	1
It makes a change to see a project allowing a facility expand and progress rather than cutting back on what can be offered.	1
Did not give feedback	10
Piling will cause more damage to my house	1
Piling will trigger landslide of steep surrounding banks	1
Please keep lifeboat station informed of impact on service if any	1
Selfishly we are concerned about noise and erosion of fields above our drive (landslips) - Lighthouse	1
Why have you not had a meeting asking Harbour users their opinion	1
It's an excellent addition to the local infrastructure and I support it wholeheartedly	1
Total Responses	**23**

Question 7. – In order to determine that we consulted with a wide stakeholder group, please complete the following sections:

Gender

Female	5
Male	13
Did not give information	2
Total Responses	**20**

Age

25-39	3
40-59	10
60+	6
Did not give information	1
Total Responses	**20**

Stakeholder Group

LB	5
LC	8
PE	1
PU	5
No Information given	2
Total Responses	**21**

Some respondents picked more than one group.

8. – Should you wish to be kept informed of the progress of the project, please provide your contact details as follows:

17 people left their details

Appendix 1.4 Competency of Experts

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Competency of Experts

1.1 Experts involved in the preparation of environmental impact assessment reports should be qualified and competent. Sufficient expertise, in the relevant field of the project concerned, is required for the purpose of its examination by the competent authorities in order to ensure that the information provided by the developer is complete and of a high level of quality.

Table 1.1: Contributors to the EIAR

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Appendix 2.1 Best Practicable Environmental Options Assessment Report

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BEST PRACTICABLE ENVIRONMENTAL OPTIONS ASSESSMENT REPORT

St. Ola Pier Redevelopment

IBM0727 - St. Ola Pier Redevelopment
Best Practicable Environmental Options Assessment Report
V02
27 June 2019

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
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Approval for issue

Mark McConnell	3 June 2019

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Contents

1 GENERAL 5
1.1 Introduction 5
1.2 Report Aims and Objectives 6
1.3 Relevant Information 6
1.4 Limitations 7

2 BACKGROUND INTRODUCTION 8
2.1 Description of Materials 8
2.2 Previous Dredge Campaigns 10

3 BPEO METHOD 11
3.1 Introduction 11
3.2 Identification of Options Available 11
3.3 Screening 11
3.4 Assessment of Options – Criteria 11
3.4.1 Practical Considerations 11
3.4.2 Environmental Considerations 12
3.4.3 Cost Considerations 12

4 AVAILABLE OPTIONS FOR DREDGE MATERIAL 13
4.1 Introduction 13
4.2 Land Based Reuse/Disposal Options 13
4.2.1 Beach Nourishment 14
4.2.2 Spreading on Agricultural Land 14
4.2.3 Disposal to Landfill 14
4.3 Marine Based Reuse/Disposal Options 14
4.3.1 Reuse within Redevelopment 14
4.3.2 Sea Disposal 14

5 SCREENING 15

6 OPTIONS ASSESSMENT 16
6.1 Introduction 16
6.2 Land Based Disposal 16
6.2.1 Disposal to Landfill: Practical & Legislative Considerations 16
6.2.2 Disposal to Landfill: Environmental Considerations 18
6.2.3 Disposal to Landfill: Cost Considerations 19
6.3 Marine Based Disposal 19
6.3.1 Disposal at Sea: Practical & Legislative Considerations 19
6.3.2 Disposal at Sea: Environmental Considerations 20
6.3.3 Disposal at Sea: Cost Considerations 20

7 COMPARISON OF OPTIONS 21
7.1 Reuse within Redevelopment 21
7.2 Disposal to Landfill 21
7.3 Disposal to Sea 21

8 CONCLUSION 22

Tables

Table 1 Lab analysis results for relevant cAL exceedances 10
Table 2 Options Screening 15
Table 3 Cost Estimate to Dispose of Dredge to Landfill 19
Table 4 Cost Estimate to Dispose of Dredge Spoil at Sea 20

Figures

Figure 1 Location of Ola Pier (Source: SHT 2018) 6
Figure 2 Borehole Location Plan 9
Figure 3 Location of Scrabster Spoil Ground 10
Figure 4 Landfill Sites near Scrabster Harbour 17

1 GENERAL

1.1 Introduction

This document relates to the proposed redevelopment of St. Ola Pier within Scrabster Harbour, Caithness. The pier previously serviced the Orkney Ferry service which has since relocated to the Queen Elizabeth Pier. The location of the works can be seen below in Figure 1.

Significant portions of the existing St. Ola Pier have corroded heavily thus restricting the functionality and operational capacity of the pier. Due to the advanced level of pile deterioration, operational restrictions have been placed on quayside activities. Whilst the outer pier is in significantly better condition, the pier as a whole cannot be utilised to its full potential without remedial works/refurbishment.

The decision has been taken by Scrabster Harbour Trust (SHT) to refurbish the pier to reinstate the previous level of functionality, and to extend the capabilities of the pier to accommodate cruise vessels on the outer berth. In addition to redeveloping the existing St. Ola Pier, Scrabster Harbour Trust wish to dredge the outer basin between St. Ola and Queen Elizabeth Pier to a level of -9m Chart Datum (CD). The design of the outer pier walls will permit future dredging of -10m Chart Datum (CD) should any future vessels require this draught capability.

Dredging is also proposed on the inner berth to a level of -7.5m Chart Datum (CD). This additional dredge depth within each berth will allow for larger vessels to berth within Scrabster Harbour such as cruise vessels on the outer berth.

The capital dredging works will require the removal of approximately 164,500m^3 (including over-dredge and some contingency) on the outer berth between St. Ola Pier & Queen Elizabeth Pier. The capital dredging works on the inner berth between the Ice Quay and the St. Ola Pier will require the removal of approximately 7,400m^3 (including over-dredge and some contingency).

In line with the Marine (Scotland) Act 2010, a license must be sought for any dredging activities where disposal of material is proposed. This report is presented in support of an application for a dredging license.

This report identifies the potential land based and marine based disposal options for the dredged material and compared them in order to identify the best practical environmental option (BPEO).

An Environmental Impact Assessment Report (EIAR) have been produced for the St Ola Pier Redevelopment Project including the dredging works, as such the wider environmental issues associated with the project shall not be considered here.

Figure 1 Location of Ola Pier (Source: SHT 2018)

1.2 Report Aims and Objectives

The main aim of this report is to assess the available disposal options for the dredged materials to support the submission of the marine license applications.

The key objectives of this report are to:

- Provide an overview of the requirement for dredging;
- Identify the location and estimated quantity of materials that are required to be dredged and provide a brief description of the methods likely to be involved to complete the works;
- Identify and assess the potential options for the disposal of dredged materials; and
- Provide recommendations with regards to the BPEO for the disposal.

1.3 Relevant Information

A land based & marine site investigation were undertaken in 2018 to specifically inform the redevelopment works including the dredging. The marine site investigation has been reviewed in relation to the anticipated nature of the dredge spoil.

1.4 Limitations

At present SHT are in the process of appointing a Principal Contractor for the works, who in turn will appoint a Dredging Contractor(s) under sub-contract to carry out the dredging works required as part of the redevelopment.

As the project is design & build in nature, the exact methodologies employed by the Principal Contractor, and Dredging Contractor(s) are not yet known.

Therefore for the basis of the EIA, license applications and this BPEO the techniques and production rates used are based on previous projects, technical expertise and where necessary assumptions are stated.

2 BACKGROUND INTRODUCTION

Scrabster is located on the north coast of Caithness and has a grid reference centre point of ND10437 70310. Scrabster is situated 1.5 miles northwest of Thurso, the largest town in Caithness, provides a ferry link to Orkney and is ideally located for access to the North Sea and Atlantic Ocean.

The proposed redevelopment is driven by the need to ensure the ongoing structural integrity of the existing pier. Due to the advanced level of pile deterioration, restrictions have been applied to quayside activities on the inner pier. Whilst the outer pier is in significantly better condition, the pier as a whole cannot be utilised to its full potential without remedial works/refurbishment.

Whilst ensuring the ongoing structure integrity of the existing pier, the opportunity has been taken to provide additional berthage for use by oil and gas supply vessels and cruise ships. In addition to providing additional berthage, dredging is required to allow for adequate draught for the larger vessels on both the inner and outer berths.

It is estimated that dredging will remove approximately 164,500m^3 (considering over-dredge and some contingency) of material between the outer berth between St. Ola Pier & Queen Elizabeth Pier. The dredging works on the inner berth between the Ice Quay and the St. Ola Pier will require the removal of approximately 7,400m^3 (considering over-dredge and some contingency). The dredging of both areas will be completed in one dredge campaign. The redevelopment will require in the region of 110,000m^3 of fill material and as such there is an opportunity for reuse should the material prove to be suitable.

Given the nature of the design & build contract the exact methodology for dredging is at this stage unknown. As a large degree of fill is required within the proposed new pier and reclamation it is possible that the Principal Contractor may wish to reuse this material within the new structures. In this scenario the dredging will likely be completed at a relatively slow rate using a backhoe dredger working on a barge, with the material recovered and then placed within the structures. Given that there is a greater volume of material generated by the dredging than is required for the works disposal options also need to be considered. It is also worth considering that it may not prove economical for the Principal Contractor to have such a long dredge campaign and they may choose to undertake a quicker dredging operation using a trailing suction hopper dredger, dumping the majority of the dredge spoil at sea. The programming of the dredging works will be determined by the Principal Contractor and would be subject to the contractor's programme of works, weather condition and any other restrictions that may be in place relating to harbour operations.

2.1 Description of Materials

An intrusive marine ground investigation was carried out by Fugro GeoServices Limited (Fugro) between October and November 2018. The ground investigation include 16 overwater boreholes with sampling and field testing, geotechnical and contamination laboratory testing. During the survey environmental samples were obtained from the top, middle and bottom of the strata and areas that were anticipated to require to be dredged.

The site work comprised the following:

- 5 cable percussion boreholes (BH05 to BH08 and BH11), to depths of 5.00 m below seabed level (BSL) and 7.50 m BSL;
- 11 combined cable percussion and rotary cored boreholes (BH01 to BH04, BH09, BH20 to BH23, BH24a and BH30) to depths between 7.65 m BSL and 26.00 m BSL;
- Standard penetration tests;
- Geotechnical logging, subsampling and core photography;
- Position surveying.

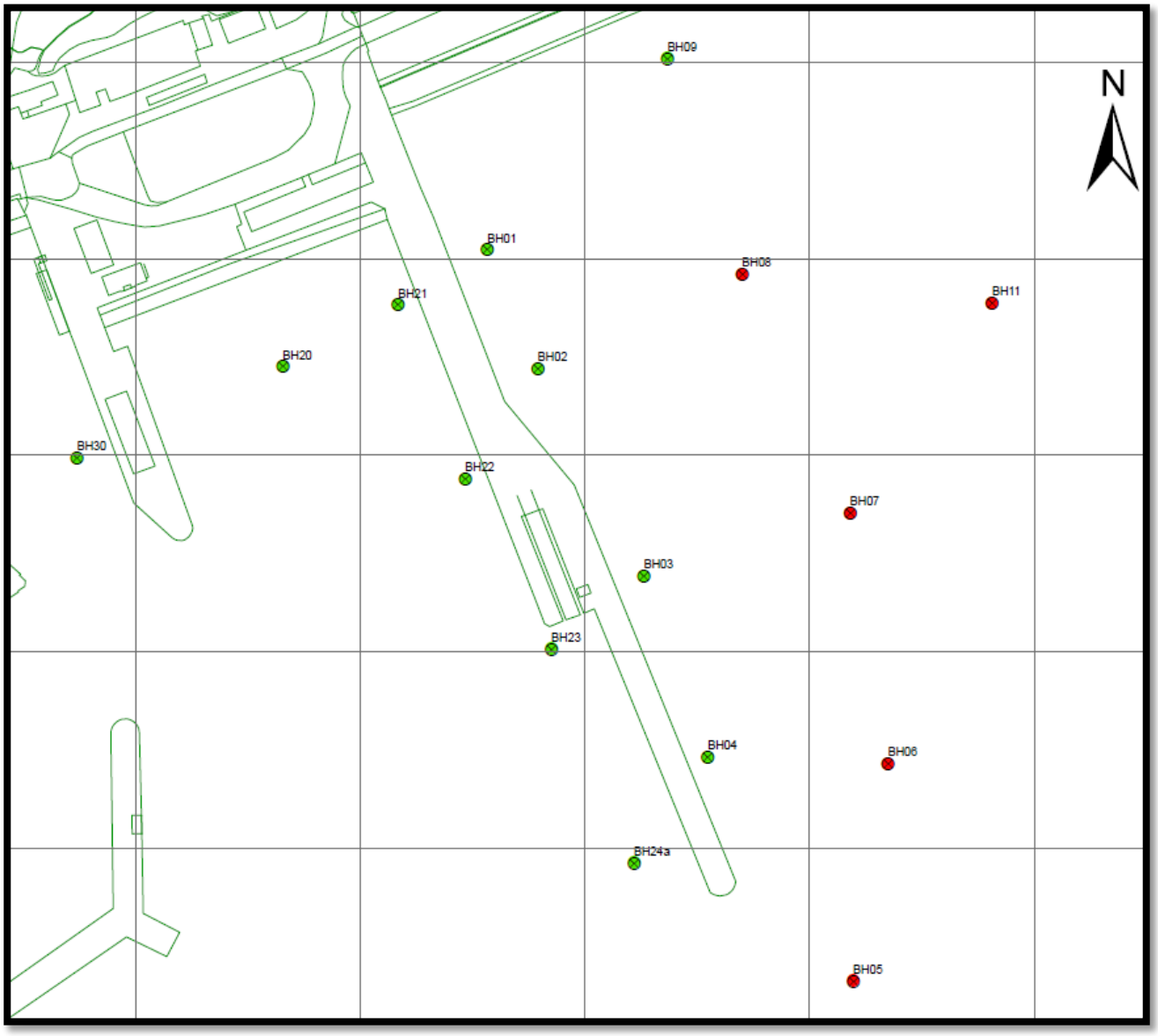

Figure 2 Borehole Location Plan

Data from the sediment samples completed as part of a recent Ground Investigation is presented within the Marine License Application for Dredging and Sea Disposal form and the Pre-Disposal Sampling Results Form. 26 No. samples were obtained from the boreholes in the upper strata during the marine ground investigation. The testing was conducted by Concept Life Sciences on behalf of Fugro as part of the Ground Investigation. The particle size distribution indicates the sediment generally consists of gravelly silty sands.

The sediments were also analysed for a suite of chemical parameters and screened against Marine Scotland Revised Action Levels (AL) 1 and 2 in order to identify any contamination which may be present. A number of samples within the dredge areas indicated levels above the lower chemical action level (AL1) for Copper, Nickel & Chromium. A summary of the results above AL1 can be seen in Table 1, it is highlighted that whilst each of the levels are marginally above AL1, they are well below AL2.

It is also noted that BH30 (highlighted in Table 1) has been completed to inform the possible routing of a fuel line from Jubilee Quay onto the Ice Pier, this area is not specified for dredging.

For the purposes of the BPEO the material is considered not to be contaminated.

Table 1 Lab analysis results for relevant cAL exceedances

Contaminant	Sample ID	Sample depth (m)	Sample concentration (mg/kg)	cAL1 (mg/kg)	cAL2 (mg/kg)
Copper	BH23	0.5-1.0	37	30	300
Nickel	BH20	0.5-1.0	41	30	150
	BH30	0.1-0.5	34	30	150
	BH30	0.6-1.15	37	30	150
Chromium	BH20	0.0-0.5	60	50	370
	BH20	0.5-1.0	95	50	370

2.2 Previous Dredge Campaigns

During the construction of the Jubilee Pier in 2012, 197,970m^3 of dredging was completed as part of the works. All of the dredge spoil generated from the dredging campaign was disposed of at the Scrabster Extension Disposal Site, which is located approx. 5km from Scrabster Harbour. The location of the dumpsite relative to St. Ola Pier is shown in Figure 3.

Figure 3 Location of Scrabster Spoil Ground

3 BPEO METHOD

3.1 Introduction

In order to identify the BPEO, the following method has been employed.

- Identification of options available;
- Assessment of these options based on the criteria detailed below; and
- Comparison of the advantages and disadvantages of the options.

3.2 Identification of Options Available

As several of the options share common logistical steps to disposal all options have been divided in to land based disposal or marine based reuse / disposal categories (See Section 4).

3.3 Screening

A screening process has been carried out to remove options which are technically unfeasible from the assessment process. Where options have been screened out a reason is provided.

3.4 Assessment of Options – Criteria

3.4.1 Practical Considerations

3.4.1.1 Established Practice

Consideration regarding the techniques and technologies proposed. Is this an established method for disposal of dredge material? If so, the performance of the option can be assessed, and any potential obstacles anticipated.

3.4.1.2 Operational Aspects

Consideration if the method is operationally and technically feasible for implementation at Scrabster Harbour. This includes information on handling, spatial considerations, transport etc.

3.4.1.3 Availability of Sites / Facilities

Determination if the facilities and / or sites required for the reuse or disposal of material are available in the vicinity of Scrabster Harbour.

3.4.1.4 Legislative Implications

Determining if any licenses / permissions are required in accordance with the relevant legislation and potential management control required.

3.4.1.5 Extent of Control

Determining whether SHT will have control over each stage of the operation from dredging to disposal as required by the Environmental Protection (Duty of Care) Regulations 1991.

3.4.1.6 Third Party Considerations

A summary of the outcome of any consultations will relevant authorities or agencies. Assessing the public opinion on the works based on relevant information available and previous consultations.

3.4.2 Environmental Considerations

- Safety Considerations – Identifying any potential sources of hazard and the probability of risk to the public, site users or workers.
- Public Health Implications – Identifying any risks to public health based on predicted contaminant pathways and receptors.
- Pollution / Contamination and Waste Implications – Assessing if there is potential for contamination / pollution exceedances above Marine Scotland Action Levels.
- Interference with Other Activities – Other potential disruptions including but not limited to activities including interference with traffic and users of the site and associated access roads.
- Amenity / Aesthetic Implications – Determining if there is likely to be any adverse impact on amenities in the area. Assessing if there is likely to be a visual impact as a result of reuse /disposal of the dredged materials.

3.4.3 Cost Considerations

It should be noted that cost estimates are based on typical industry rates, previous projects and / or professional judgement and no consultation has been carried out to determine specific costs for this site detailed in this document.

4 AVAILABLE OPTIONS FOR DREDGE MATERIAL

4.1 Introduction

As several of the options share common logistical steps to disposal, all options have been divided into land based disposal or marine based disposal categories.

The options identified for land based reuse/disposal include:

- Beach nourishment/coastal reclamation;
- Spreading on agricultural land;
- Aggregate production; and
- Disposal to landfill.

The options identified for marine based reuse/disposal are:

- Reuse within the redeveloped pier and new reclamation; and
- Sea disposal.

4.2 Land Based Reuse/Disposal Options

The dredge materials which are deemed suitable for use within the works by the Principal Contractor should be placed directly within the land reclamation or stored on land until placement within the reclamation is possible.

If the dredge materials are unsuitable for reuse and the materials are to be reused elsewhere or disposed of on land there are a number of stages involved in conveying the materials to the site / facility for disposal. These involve landing, storage, dewatering, loading, and transporting the material and are further detailed below.

1. Landing the Dredged Material

The material must be transferred to an onshore facility. Methods available include using an excavator, pumped discharge or grab. It is assumed that the material would be landed using an excavator to a site near Scrabster Harbour.

2. Dewatering of the Dredged Material

If the dredged material is to be disposed of on land, dewatering of materials (to approximately 10% water content depending on the water content requirements to transfer and place the final material) is necessary in order to transport the material and / or create a material which is suitable for land based disposal. The methods used for dewatering dredge materials include the construction of settling lagoons and / or the use of a mobile centrifuge or hydro cyclone systems. Due to space constraints it is assumed that centrifuge or hydro cyclone system would be utilised to dewater the material.

3. Storage of Dredged Material

When the dredged material has been landed and dewatered it will require a storage facility prior to transport for final disposal. Assuming a weight of 2 tonnes per $1m^3$ of dredge spoil, a space would be required to store approximately 172,000 m^3 of material. Based on a 5m high storage mound, an area of approximately 185m x 185m (34,225m^2) would be required. It is highly unlikely that this size of area would be available within Scrabster Harbour to store the entirety of the material.

Such a storage area would also require an extended area around it to maintain safe working in the area and avoid issues with any adjacent works, roads etc due to slippage of materials. Dust mitigation and management would also require consideration within the method statement for the storage of the dredged material.

4. Loading

To transport the material to disposal sites or facilities, construction of a loading facility adjacent to the storage and dewatering area is necessary. Hard standing areas would be necessary to allow HGVs to receive material loaded by mechanical excavators.

5. Transport

It would be necessary to use sealed HGVs for the transport of material due to the potential for spillage nuisance. The time and cost of this transport is dependent on the location of the reuse / disposal site and is detailed further in Section 5.

4.2.1 Beach Nourishment

Beach nourishment involves the deposit of the dredged material on a beach. Considered as a land based reuse option, this process would involve all the steps detailed above as well as possible desalination. This option specifically requires material of a similar colour and composition to the receiving beach.

4.2.2 Spreading on Agricultural Land

Certain agricultural wastes qualify for an exemption from waste management licensing for treatment to land. Disposal of marine spoil to agricultural land is likely to involve the additional step of desalinisation. This would require space for lagoons and construction of a suitable treatment facility to allow leaching of salt back into Scrabster Harbour.

4.2.3 Disposal to Landfill

Dispose of dewatered material to landfill.

4.3 Marine Based Reuse/Disposal Options

4.3.1 Reuse within Redevelopment

Reusing the dredge spoil within the redevelopment would involve placing the dredged material directly onto the reclamation area or within the new pier structure.

4.3.2 Sea Disposal

Disposal of the dredged material to sea involves the transport of material to a licensed marine disposal site by vessel.

5 SCREENING

Options have been assessed with regards the technical feasibility for this given project to identify whether or not they should be taken forward for detailed assessment.

Option	Is it Technically Feasible?	Remarks
Land Based	**Questionable**	**All land based solutions will require space near the development site to allow them to be implemented. Potential space constraints will make all land based options difficult to implement.**
Beach Nourishment	Questionable	Whilst there are no SACs or MPAs within Scrabster Harbour, consideration has been given to the designated bathing waters of Thurso Bay. The dredge material has been classified as gravelly silty sands, and as such it is expected that these are more cohesive (and potentially more poorly oxygenated) potentially hosting slightly different ecological communities than those characterising the coastal habitats outside the harbour. Additionally, the cost of transporting the material to another area will attract a cost which makes this an unattractive option.
Spreading on Land	No	The use of a natural low-cost material for enhancing the growing qualities of agricultural land at first sight appears to be attractive. However, the material has the following properties: - There is a high concentration of chlorine present from the sea salts encompassing the silt particles. Chlorine is a horticultural poison. This will be present whether dry or wet silt is used. There are costs involved in the transport and application of the material to fields. There is a lack of suitable sites capable of accepting the dredged material. Given these factors this option should be discounted.
Disposal to Landfill	Yes	Various land disposal sites have been identified. This operation will be given further consideration in Section 6 of the assessment and is considered to be a potentially viable disposal option.
Marine Based	**Likely**	**Both marine based solutions appear to be viable.**
Reuse with Redevelopment	Likely	Information on particle size distribution obtained during the Ground Investigation works indicated that the material is likely to be suitable for reuse in the works either in the pier or the new reclamation. However, it will be the responsibility of the Principal Contractor to determine whether or not the material is suitable to meet the design life requirements of each structure.
Sea Disposal	Yes	There is a disposal site in close proximity to Scrabster Harbour, the Scrabster Extension Spoil Ground which is approx. 5 km from Scrabster Harbour. Option taken forward for detailed assessment in Section 6.

Table 2 Options Screening

6 OPTIONS ASSESSMENT

6.1 Introduction

In this section the potential land based reuse and disposal, and marine based disposal options are described and the constraints for each option are outlined. For both land and marine based disposal there are several stages from dredging to the ultimate destination of the material. These are described in Section 4. The potential disposal options are then assessed against criteria detailed in Section 3.4 and the advantages/disadvantages of each are discussed.

6.2 Land Based Disposal

6.2.1 Disposal to Landfill: Practical & Legislative Considerations

6.2.1.1 Established Practice

Dredged material is sometimes disposed of at landfill. However, these are normally small volumes as larger amounts of material use valuable landfill space.

6.2.1.2 Operational Aspects

This option presents logistical difficulties with regard to landing, dewatering, storage and transport of the dredged material, however the material sampled during the Ground Investigations was generally deemed chemically suitable for disposal at landfill.

A mobile dewatering unit such as a centrifuge would be required to dewater sediment.

6.2.1.3 Availability of Sites / Facilities

Following the waste classification of soil results, the material is potentially hazardous with HP3 (Flammable) due to TPH concentrations. However, as the material is dredged sediment (wet), it is not considered to be flammable as a result of this contamination and can therefore be classed as Non-hazardous for disposal.

There is one SEPA authorised operational Non-hazardous landfill site within 30minutes travelling time of Scrabster Harbour at Seater. Three more sites are within four hours travel (Granish, Nether Dallachy, Duisky) and an additional four landfill sites within five hours travelling time. These sites are shown in Figure 4.

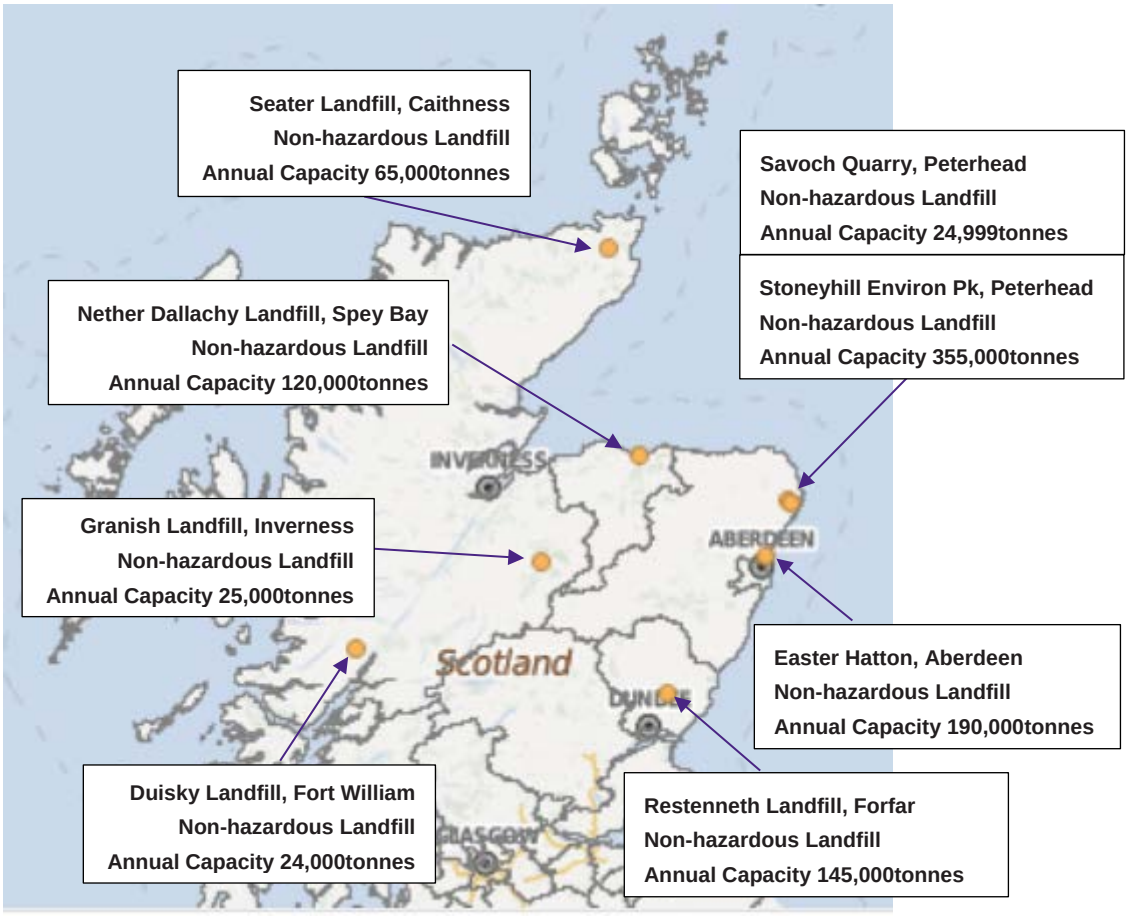

Figure 4 Landfill Sites near Scrabster Harbour

Ideally the total volume of material would be sent to one landfill site, however due to the total volume anticipated this would be more than the annual capacity of the nearest landfills. Thus, additional time and vehicles would be required to split the volume across several sites or to transport it a larger distance therefore increasing costs. Additionally, the Nether Dallachy landfill site is nearing overall capacity with only 84,000 tonnes currently available in total meaning it may not be able to receive much if any material. Based on an estimated total weight of approximately 344,000 tonnes of material, some of the material will require transport for 5 hours to landfill sites.

6.2.1.4 Legislative Implications

The material would be classified as controlled waste for the purposes of transport, storage, and disposal. The Waste Management Regulations 1994 require a waste management license for disposal. Section 34(7) of the Environmental Protection Act 1990 and Section 1 of the Control of Pollution Act 1974 will apply and it is likely compliance is possible.

6.2.1.5 Extent of Control

SHT would not have direct control over the transport of the material, however they would carry out audits to demonstrate 'Duty of Care'. Additionally, it would be necessary to agree a final contract with the landfill site operator for the disposal of the waste.

6.2.1.6 Third Party Considerations

The National Waste Strategy for Scotland 1999 (Reference 5) prefers a reduction in the quantity of waste sent to landfill and therefore there may be objections from the Scottish Environment Protection Agency (SEPA) as waste regulators regarding the loss of landfill capacity to dredge material.

6.2.2 Disposal to Landfill: Environmental Considerations

6.2.2.1 Safety Considerations

Road safety risks associated with the transport of dredged materials have the potential to increase particularly if HGV's are travelling through settlements.

6.2.2.2 Public Health Implications

If HGV's are used to transport the materials through settlements there may be a limited, short term decrease in air quality due to exhaust fumes. There may also be increases in noise and vibration levels associated with the HGV's.

6.2.2.3 Pollution / Contamination and Waste Implications

The landfill site operator is responsible for accepting waste. The Ground Investigation indicated the material consists mainly of gravelly silty sands which is potentially problematic as it could interfere with drainage and leaching from the landfill site. Potentially hazardous levels of contaminants were present in many of the samples during the Ground Investigation. This contamination was classified as HP3 (Flammable) due to the Total Petroleum Hydrocarbon concentrations. However, as the samples are dredged sediment and therefore wet, they will not be flammable as a result of the contamination and the 'Flammable' properties are forced to Non-hazardous. Therefore, the material was generally deemed to be suitable for disposal at a non-hazardous waste landfill from a contamination perspective.

6.2.2.4 Interference With Other Activities

If this option was accepted it would result in a reduced space availability at the Scrabster Harbour which could impact existing and future contracts due to reduced space, and loss of revenue.

6.2.2.5 Amenity / Aesthetic Implications

There is potential for a visual impact during the material treatment operations, and a limited impact on amenities through the noise, and vibration of the HGV transport to the landfill.

6.2.3 Disposal to Landfill: Cost Considerations

Cost estimates have been based on typical industry values, and previous experience. The number of tippers required for disposal and time for disposal has assumed transport to Seater landfill, which is the nearest of the suitable landfill sites. It has been assumed that each tipper will be able to make 9 round trips per day, allowing for the proposed 11 hour working day. Given the volume of material for disposal is much greater than the annual capacity of this site it is likely that other landfill sites will also be required and tippers will be limited to one or two round trips per day. The actual cost could therefore be significantly higher than estimated depending on the available sites.

For the purposes of the cost estimate it has been assumed that space would be available within the harbour estate to land the dredge spoil, in reality this may not be the case.

Process	Details	Approx. Cost
Bringing material to shore	Vessel hire, equipment to pump to shore	£250,000
Dewatering of dredge spoil	Dewatering machine to allow for material to be transported to landfill	£125,000
Transport to landfill	Hire of 12 nr tippers, 3 nr excavators plus required staff for 150 days	£500,000
Disposal at landfill	Landfill tax at £2.80/t plus an approximated gate fee of £10/t	£4,400,000
TOTAL		**£5,275,000**

Table 3 Cost Estimate to Dispose of Dredge to Landfill

6.3 Marine Based Disposal

6.3.1 Disposal at Sea: Practical & Legislative Considerations

6.3.1.1 Established Practice

Disposal of dredge spoil to sea is established practice.

The proposed dumpsite for the works, the Scrabster Extension Spoil Ground was the areas used for disposal during previous dredge campaigns at Scrabster Harbour.

6.3.1.2 Operational Aspects

The disposal to sea will have to consider the movements of the Northlink Ferry and other vessel movements in completing trips to and from the proposed dumpsite.

6.3.1.3 Availability of Sites/Facilities

The Scrabster Extension Spoil Ground proposed for the dredge spoil is approx. 5km from Scrabster Harbour and is the dumpsite which was used during previous dredge campaigns.

6.3.1.4 Legislative Implications

Under the provisions of Marine Scotland, a dredging license is required. This requires the acceptance of the BPEO by the statutory consultees.

Plume modelling completed as part of the Environmental Impact Assessment (EIA) confirmed that the disposal of the dredge material at the proposed dumpsite had minimal detrimental effect on the coastal processes within the harbour.

6.3.1.5 Extent of Control

The proposed disposal site falls partially within the Scrabster Harbour Limit, and as such SHT have control over passage to and from the site.

6.3.1.6 Third Party Considerations

The Scrabster Spoil Ground is a licenced disposal ground, and given that the dredge material has shown relatively low levels of contamination it is unlikely that there will be objections to disposal.

6.3.2 Disposal at Sea: Environmental Considerations

6.3.2.1 Safety

Given that the disposal operations are proposed for at sea there is minimal risk to public safety.

6.3.2.2 Public Health

Given that the disposal operations are proposed for at sea there is minimal risk to public health.

6.3.2.3 Interference with Other Activities

The dredging works will be completed as part of the construction activity associated with the St. Ola Pier Redevelopment and as such there will already be some level of disturbance to ordinary harbour operations.

SHT anticipate some level of disruption and can take appropriate action to minimise the impact on the harbour operations.

6.3.2.4 Amenity / Aesthetic Implications

There are unlikely to be any adverse visual impacts because of the dredging operation due to the location of the Scrabster disposal ground. The vessel will be visible from shore, however currently many vessels enter and exit the harbour daily therefore one additional vessel is unlikely to have significant adverse visual impact.

6.3.3 Disposal at Sea: Cost Considerations

Cost considerations for disposal at sea include for the hire of a split hopper barge, fuel, and staff costs.

Process	Details	Approx. Cost
Mobilisation/Demobilisation of TSHD, split hopper barges, and surveys		£200,000
Transportation of dredge spoil from outer berth to disposal site	Vessel hire, labour, etc	£1,000,000
Transportation of dredge spoil from outer berth to disposal site	Vessel hire, labour, etc	£45,00
TOTAL		**£1,245,000**

Table 4 Cost Estimate to Dispose of Dredge Spoil at Sea

7 COMPARISON OF OPTIONS

7.1 Reuse within Redevelopment

It is proposed that as much of the dredge spoil should be reused within the redevelopment as possible (if economically viable). However, in the case that all the dredge spoil is reused there will be an excess, which is anticipated as approx. 50,000-60,000m^3. As part of the consultation process, Scottish Environment Protection Agency (SEPA) have been contacted in relation to the redevelopment. SEPA inquired about the possibility of the dredge spoil being reused at the Dounreay site, which is in close proximity to Scrabster. Whilst reuse at another site is an attractive option, this would still require a significant area within the harbour to store the material and dewater prior to transport offsite. It is likely this would also attract some cost, in terms of transport to Dounreay by a number of HGVs. Furthermore, consideration must be given to the likely time required to dewater and transport a significant volume of material offsite.

Reusing as much dredge spoil as possible within the works will reduce the level of disposal required in addition to reducing the volume of imported fill required for the works.

7.2 Disposal to Landfill

Disposal to landfill is an unattractive option from a number of viewpoints. Although this is an established practice, the National Waste Strategy for Scotland (1999) favours a reduction in the amount of waste disposed of to landfill therefore there is potential for objections from waste regulators. Additionally, from correspondence received during the consultation process SEPA have stated their ambition to improve environmental performance by encouraging the reuse of waste where possible rather than disposal.

It is not entirely known at this stage if space would be available within Scrabster Harbour to allow for the landing of the dredge material. This would have a significant impact on harbour operations and is undesirable from a practicality aspect. There are also considerations relating to the effects on public health and safety arising from the volume of traffic associated with transporting such large volumes of material.

The cost associated with disposing the entirety of the dredge spoil to landfill is exorbitant and would make the project unaffordable rendering this option unsuitable.

7.3 Disposal to Sea

The disposal of the dredge spoil to sea is a relatively attractive option based on a number of considerations.

Disposal at sea offers a lower cost disposal option in comparison disposal to landfill. Additionally, as the dumpsite lies partially within the extents of Scrabster Harbour, SHT will have greater control over the disposal process.

Plume modelling completed as part of the EIAR has shown that the disposal of dredge material will have little effect on the coastal processes.

There are minimal risks posed to the public in regard to health and safety. Whilst some interruption to harbour operations would be expected, the dredging will take place during the construction phase and as such SHT will have anticipated and mitigated disruption as far as possible.

As discussed in Section 7.1, in the case that all the spoil can be reused in the works there will be some excess which will require disposal. Dumping at sea would be a cost effective option for disposal in this case where partial reuse and disposal was required.

8 CONCLUSION

On the basis of the waste hierarchy, the reuse of materials as part of the St. Ola Pier Redevelopment would be considered the Best Practicable Environmental Option for the dredge spoil. However, given that there is a greater volume of material generated by the dredging than is required for the works disposal options also need to be considered. Additionally, given the nature of the contract and that the Principal Contractor has yet to be appointed, the proposed dredge methodology has yet to be confirmed. The choice of dredging methodology will tie in with the Contractor's proposed works and will likely be driven by the most economically advantageous option.

Taking this into consideration the BPEO for the dredge material is considered to be:

- Reuse material within the works as far as possible & disposal of surplus.

On assessing the various options for disposal, it is considered that the Best Practicable Environmental Option for disposal is sea disposal to the Scrabster Dump Site. Land based disposal options impose many additional special, time and cost constraints in comparison with sea-based disposal options and are therefore not considered a viable option for the disposal of the material especially given the storage area restrictions at Scrabster Harbour.

Whilst reusing the material at another site is a potential option for the surplus material, it presents a number of difficulties from a practicality point of view. Prior to reuse, any material will require the same treatment as material being disposed of on land, i.e. storage on land and dewatering. Additionally, there will be both time and cost constraints associated with transport offsite and landing and dewatering the material. There are further complications in regard to finding a site in close proximity with volume capabilities matching those of the project, and also ensuring the project timescale aligns with the timing of the requirement for material.

Disposal of the material to the Scrabster site is recommended as it will allow the SHT to maintain control over most aspects of the operation and it is unlikely to pose significant risks to public health and safety. Cost estimates are expected to be significantly lower for this method of disposal and no additional space will be required at the harbour. Additionally, plume modelling completed as part of the Environmental Impact Assessment indicated that dumping at sea would have little effect on the coastal processes within the harbour.

Appendix 2.2 Scrabster Harbour Oil Spill Contingency Plan

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SCRABSTER HARBOUR TRUST
OIL SPILL CONTINGENCY PLAN

CONTROLLED COPY 1

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BESL REF: 5577 ISSUE: 3 REVISION: 1 JANUARY 2015

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TABLE OF CONTENTS

TABLE OF CONTENTS **3**
DISTRIBUTION LIST **5**
DOCUMENT CONTROL AND PLAN REVISION **5**
REVISION PAGE **6**
STATEMENTS FROM CONSULTEES **7**
CERTIFICATE OF APPROVAL FROM THE MCA **8**
ENVIRONMENTAL POLICY **9**
SCRABSTER HARBOUR TRUST 9
GLOSSARY **10**

PART 1: ACTIONS & OPERATIONS **1**
SECTION 1: INTRODUCTION **3**
1.1 PURPOSE OF THE PLAN 3
1.2 LEVELS OF CALL OUT 3
SECTION 2: FAST FACTS **5**
SECTION 3: AREA OF OPERATION SCRABSTER **6**
SECTION 4: ROLES AND RESPONSIBILITIES **7**
4.1 ROLES AND RESPONSIBILITIES OF PARTIES ASSOCIATED WITH THIS PLAN 7
4.2 INTERFACES WITH OTHER PLANS 9
4.3 INCIDENT RESPONSE ORGANISATION 9
4.4 RESPONSIBILITIES AND INCIDENT CONTROL ARRANGEMENTS 10
SECTION 5: ACTION SHEETS **11**
SECTION 6: INCIDENT SHEETS **13**
6.1 INFORMATION TO BE OBTAINED AS INITIAL SPILL REPORT (CG 77 POLREP) 13
6.2 INCIDENT LOG SHEET 14
SECTION 7: NOTIFICATIONS **15**
7.1 NOTIFICATION MATRIX 15
7.2 COMMUNICATIONS AND REPORTING 16
7.3 CONTACTS DIRECTORY 17
7.4 STATUTORY NOTIFICATION 18
7.5 CONTACT DETAILS FOR OTHER ORGANISATIONS 19
SECTION 8: RESOURCES DIRECTORY **20**
8.1 RESPONSE EQUIPMENT 20
8.2 TIER 2 21
8.3 TIER 3 21

PART 2: STRATEGY **1**

SECTION 10: RISK ASSESSMENT **2**
10.1 RISK ASSESSMENT 2
10.2 ASSESSMENT SCOPE 2
10.3 METHODOLOGY 4
10.4 HISTORICAL DATA 5
10.5 FACTORS OF ASSESSMENT 5
10.6 AVAILABILITY OF TUGS 5

SECTION 11: HARBOUR CHARACTERISTICS **6**

SECTION 12: RESPONSE STRATEGY **9**
12.1 HEALTH AND SAFETY 9
12.2 OIL SPILLS 13

SECTION 13: TRAINING AND EXERCISE POLICY **14**
13.1 TRAINING POLICY 14
13.2 EXERCISE PROGRAMME 14
13.3 FORMS TO BE COMPLETED – POST EXERCISE 15
13.4 FORMS TO BE COMPLETED ON AN ANNUAL BASIS 17

PART 3: DATA DIRECTORY **1**

SECTION 14: MCA STOp NOTICE 4/2001 ..... **3**

SECTION 15: SPILL SAMPLING **7**
15.1 OIL POLLUTION SAMPLE – STANDARD LABEL 7
15.2: OIL POLLUTION SAMPLE: STANDARD FORM 8
15.3: SAMPLE LABEL FORMAT FOR PROCURATOR FISCAL 9

SECTION 16: BONN AGREEMENT COLOUR CODES **10**
16.1: ESTIMATING THE SIZE OF A SPILL 12
16.2: SLICK TRACKING AND SURVEILLANCE 13

SECTION 17: POLREP (POLLUTION REPORT) FORM **15**
SECTION 18: MCA OPRC EXERCISE GUIDELINES **17**

SECTION 19: SENSITIVE AREAS INFORMATION **19**
19.1 ENVIRONMENT GROUP 19
19.2 THE ROLE OF THE SOSREP 20

SECTION 20: ENVIRONMENTAL SENSITIVITIES AND PRIORITIES FOR PROTECTION **21**
20.1 GENERAL STRATEGY 21
20.2 SENSITIVE AREAS 21
20.3 DISPERSANT USE 23

SECTION 21: BOOMING AND WASTE DISPOSAL **24**
21.1 BOOMING 24
21.2 WASTE DISPOSAL OPERATION 24
21.3 WASTE DISPOSAL ACTION CHECKLIST 28

DISTRIBUTION LIST

DISTRIBUTION LIST	
COMPANY	**COPY NUMBER**
Scrabster Harbour Office	1
Scrabster Harbour Trust	2
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MCA Counter Pollution & Salvage Officer Scotland & Northern Ireland	4
MCA Marine Emergency Information Room (MEIR), Southampton	5
Scottish Environment Protection Agency	6
Scottish Natural Heritage	7
The Highland Council	8
Marine Scotland	9
Scrabster Oil Depot	10
Response Contractor – Braemar Howells	11
RSPB	12

DOCUMENT CONTROL AND PLAN REVISION

The Scrabster Harbour Trust's Oil Spill Contingency Plan is a controlled document. All document holders, detailed in the distribution list, are assigned a specific copy number. Scrabster Harbour Trust Harbour Master is responsible for maintenance of the document.

Any changes to the situation at the harbour, changes to be made to the plan or any other updates will be issued as amendments to all holders of the plan within 3 months of such change. Irrespective, the plan will be revised on an annual basis so as to incorporate changes occurring during the year plus lessons learned from the annual exercise.

This document has an approved life span of 5 years from the date of approval by MCA and it shall be submitted in its entirety for re-approval after that time.

REVISION PAGE

REVISION PAGE ISSUE 1 REVISION 0				
DATE PLAN ISSUED:			**RECEIVED BY:**	**COPY NUMBER: 1**
Section No.	**Remove Pages**	**Insert Pages**	**Date amended**	**Received & inserted into plan by:**
Entire Plan	N/A	N/A	July 1999	N/A
REVISION PAGE ISSUE 1 REVISION 1				
Entire Plan	All	All	May 2005	N/A
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REVISION PAGE ISSUE 3, REVISION 0				
Entire Plan	All	All	January 2015	N/A

STATEMENTS FROM CONSULTEES

CERTIFICATE OF APPROVAL FROM THE MCA

ENVIRONMENTAL POLICY

SCRABSTER HARBOUR TRUST

The Scrabster Harbour Trust under its responsibility as a Harbour Authority endeavours to minimise environmental pollution in all of its activities and, through its influence over others. The Harbour Authority will review all of its policies, programmes and services and undertakes to act, wherever necessary, to meet the highest environmental standards.

Policy Development

The Harbour Authority will develop policies to support this commitment; such policies are to include but are not limited to:

(a) Energy Policy - based on energy conservation and clean technology, and to establish departmental energy management:

(b) A strategy for monitoring and minimising pollution – within the Harbour Authority Area, including pollution caused by the Harbour Authority's own activity;

(c) A health strategy – which recognises the links between the environment and public health to include the implementation of an amended Health and Safety Policy which has full regard to environmental hazards.

Implementation

The Harbour Authority uses numerous mechanisms to implement its policies effectively namely:

(a) To commission regular environmental audits covering the state of the marine environment, and the impact of existing policies and practices;

(b) Encourage and enable public participation in Harbour Authority activities through freedom of information, consultation and publicity;

(c) Provide environmental requirements as part of its purchasing and procurement policy;

(d) Make environmental requirements part of its purchasing and procurement policy;

(e) Implement its policies in Harbour Authority Contract Tender Specifications.

GLOSSARY

Abbreviation	Definition
ALARP	As Low As Reasonably Practicable
BESL	Briggs Environmental Services Ltd
BPEO	Best Practical Environmental Option
DfT	Department for Transport
HFO	Heavy Fuel Oil
HMRC	Her Majesty's Revenue and Customs
HSG	Health and Safety Guidance
IFO	Intermediate Fuel Oil
IMO	International Maritime Organisation
ISGOTT	International Safety Guide for Oil Tankers and Terminals
ITOPF	International Tanker Owners Pollution Federation
JNCC	Joint Nature Conservation Committee
LA	Local Authority
LAN	Local Area Network
LFO	Light Fuel Oil
LOA	Length Overall
MCA	Maritime and Coastguard Agency
MFO	Marine Fuel Oil
MGO	Marine Gas Oil
MMD	Marine Management Division
MoD	Ministry of Defence
MRC	Marine Response Centre
MRCC	Marine Response Co-ordination Centre
MS	Marine Scotland
NCP	National Contingency Plan
OPRC	Oil Pollution Preparedness, Response and Co-operation Convention
OSCP	Oil Spill Contingency Plan
POB	Persons On Board
POLREP	Pollution Report
PPE	Personal Protective Equipment
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCU	Salvage Control Unit
SEPA	Scottish Environment Protection Agency
SNH	Scottish Natural Heritage
SOSREP	Secretary of State's Representative
SPA	Special Protection Area
SRC	Shoreline Response Centre
SSSI	Site of Special Scientific Interest
UK	United Kingdom
UKBAP	United Kingdom Biodiversity Action Plan
UKPIA	United Kingdom Petroleum Industry Association

PART 1: ACTIONS & OPERATIONS

CONTENTS

PART 1: ACTIONS & OPERATIONS 1

SECTION 1: INTRODUCTION 3
1.1 PURPOSE OF THE PLAN 3
1.2 LEVELS OF CALL OUT 3

SECTION 2: FAST FACTS 5

SECTION 3: AREA OF OPERATION SCRABSTER 6

SECTION 4: ROLES AND RESPONSIBILITIES 7
4.1 ROLES AND RESPONSIBILITIES OF PARTIES ASSOCIATED WITH THIS PLAN 7
4.2 INTERFACES WITH OTHER PLANS 9
4.3 INCIDENT RESPONSE ORGANISATION 9
4.4 RESPONSIBILITIES AND INCIDENT CONTROL ARRANGEMENTS 10

SECTION 5: ACTION SHEETS 11

SECTION 6: INCIDENT SHEETS 13
6.1 INFORMATION TO BE OBTAINED AS INITIAL SPILL REPORT (CG 77 POLREP) 13
6.2 INCIDENT LOG SHEET 14

SECTION 7: NOTIFICATIONS 15
7.1 NOTIFICATION MATRIX 15
7.2 COMMUNICATIONS AND REPORTING 16
7.3 CONTACTS DIRECTORY 17
7.4 STATUTORY NOTIFICATION 18
7.5 CONTACT DETAILS FOR OTHER ORGANISATIONS 19

SECTION 8: RESOURCES DIRECTORY 20
8.1 RESPONSE EQUIPMENT 20
8.2 TIER 2 21
8.3 TIER 3 21

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SECTION 1: INTRODUCTION

1.1 PURPOSE OF THE PLAN

This Oil Spill Contingency Plan is designed to guide Scrabster Harbour Trust's response personnel through the processes required to manage an oil spill originating from operations within their jurisdiction.
The requirement to have an Oil Spill Contingency Plan for Harbours, Ports and Oil Handling Terminals around UK waters has been formalised by the Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation Convention) Regulations 1998, which implements the International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC, 1990). The convention, adopted by the International Maritime Organisation (IMO) is aimed to "mitigate the consequences of major oil pollution incidents involving, in particular, ships, offshore units, sea ports and oil handling facilities".
This plan has been prepared in accordance with the 'Oil Spill Contingency Plan Guidelines for Ports, Harbours & Oil Handling Facilities' issued by the Maritime and Coastguard Agency, which is responsible for applying the regulations to all harbours, ports and oil- handling facilities in the UK.

1.1.1 CONSULTATION

This document has been compiled in consultation with the following statutory bodies and Authorities:

- Scottish Environment Protection Agency (SEPA)
- Scottish Natural Heritage – North Region Area (SNH)
- Marine Scotland
- The Highland Council
- Scrabster Harbour Trust
- North Highland RSPB
- Harbour users

1.1.2 USE OF THE PLAN

This plan is specifically for operations within Scrabster Harbour, the associated pilotage area and for vessels passing through the Scrabster Harbour Trust's boundaries. The plan is designed to initiate an appropriate oil spill response in the event of an incident. It details a tiered response strategy that is in accordance with UK legislative requirements and takes into account the spill risk associated with the operation; the nature of the hydrocarbons that could be spilt; the prevailing meteorological and hydrographic conditions and the environmental sensitivity of the surrounding areas.

1.2 LEVELS OF CALL OUT

Tier 1 spills
For minor spills, where the response is addressed within the dock, the Harbour Master will take the appropriate action and arrange for safe storage and legal disposal of waste arising's. Since all oil spills, regardless of size, have to be reported to the appropriate Authorities, the Harbour Master will always alert the MCA.
Tier 2 and Tier 3 spills
For all spills of a higher level, the Harbour Master will alert the Incident Response Organisation according to this Plan.

Table 1: Tiered Response Definitions

Response Tier	Definition
Contained Operational Spills	These are spills which are contained on the vessel or dockside and do not enter the water.
Tier 1	Small operational spills that may occur within a location as a result of daily activities. The level at which events can be controlled using on site resources. A Tier 1 spill is not likely to require recourse to intervention by resources out with the port, an external incident response organisation or external authorities, except for purposes of notification.
Tier 2	Medium sized spills within the Port, that will be handled by Port Personnel and a nominated contractor or other external assistance as nominated within this plan. A Tier 2 incident may involve Local Government.
Tier 3	In the event of a much larger spill or a loss of containment incident the MCA and other authorities will mobilise along with relevant Tier 3 and national stockpiles. A Tier 3 incident is beyond the capabilities of both local and regional resources.

Source: Contingency Planning for Marine Pollution Preparedness and Response: Guidelines for Ports (2012)

SECTION 2: FAST FACTS

Harbour Office contact details	Scrabster Harbour Trust Harbour Office Scrabster Caithness KW14 7UJ			
	Telephone Email Website	01847892779 harbour@scrabster.co.uk http://www.scrabster.co.uk/		
Latitude and longitude of harbour entrance	58° 36' 63"N 03° 31' 75"W			
Admiralty chart numbers	1462-2			
Water Depth	**Quay**	**Length**	**Depth at Chart Datum**	**Depth in approach channel**
	Queen Elizabeth Ro-Ro	160m	9.0m	9.0m
	QE Lay By	180m	8.0m	8.0m
	St Ola Ro-Ro	115m	5.5m	7.5m
	St Ola Lay By	100m	5.5m	7.5m
	Fish Market Quay	120m	4.5m	7.5m
	South Wall	85m	4.5m	7.5m
	Fuel Berth	65m	4.5m	7.5m
	Southern Quay	120m	7.5m	7.5m
	Tanker Berth	73m	7.5m	7.5m
	Inner Basin	130m	4.5m	7.5m
Maximum beam*				
Navigational access – *i.e. leading lights, buoyage*				
Environmental sensitivities	Protected Site	Distance (km)	Direction	
	Holborn Head SSSI	1.7	North	
	Pennylands SSSI	1.1	South	
	North Caithness Cliffs SPA	1.6	North East	
Tugs	None available			
Pilotage	Pilotage requirements must be pre-arranged with the harbour office.			
Berths				
Repair facilities – *i.e. dry docks and slipways*				
Cargo handling facilities – *i.e. bulk, fuel, containers*				
Local authority	Highland Council			
Hazards – *pipelines, overhead cables*	None			
Tidal range	5.4m			
ISPS compliant				

SECTION 3: AREA OF OPERATION SCRABSTER

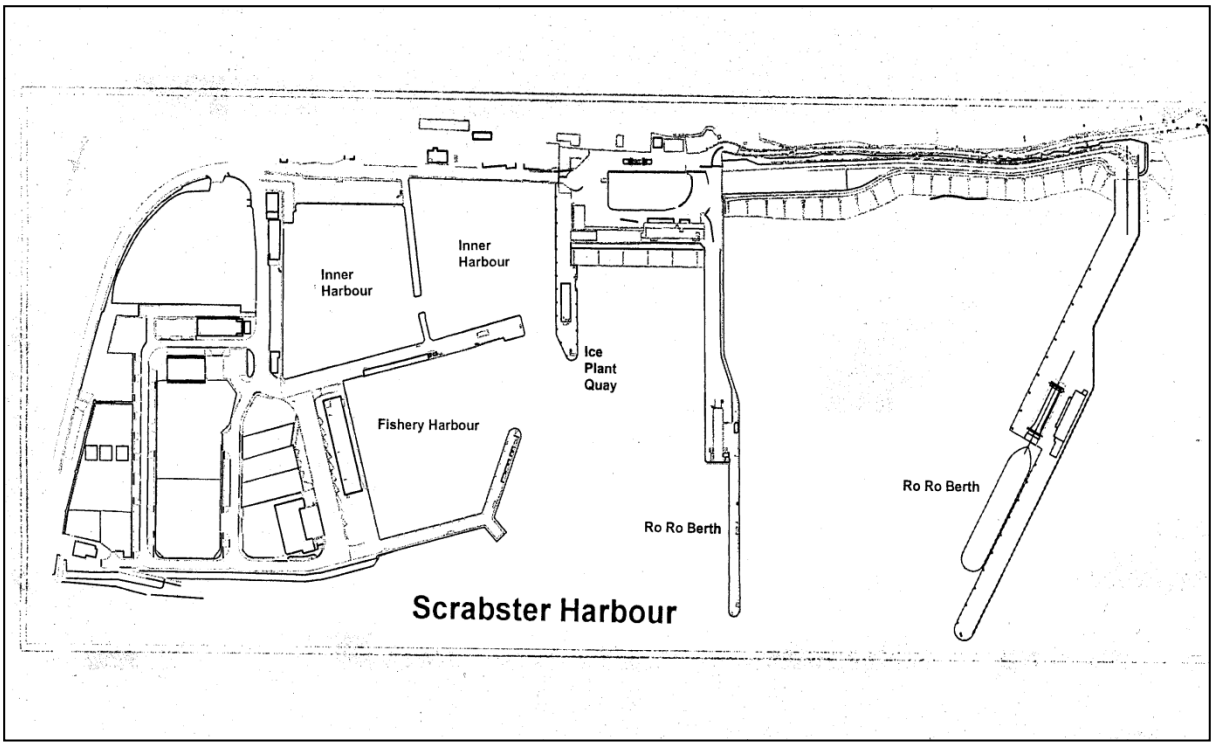

Figure 1: Scrabster Harbour

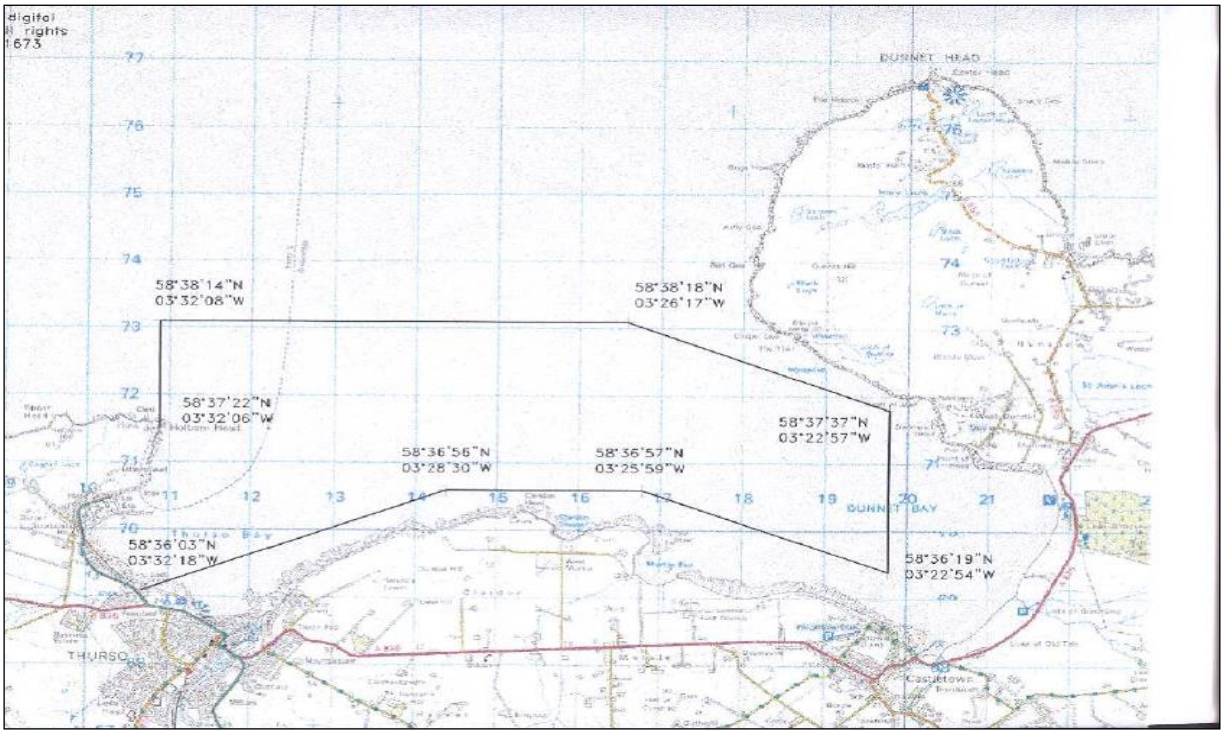

Figure 2: Harbour Limits

SECTION 4: ROLES AND RESPONSIBILITIES

4.1 ROLES AND RESPONSIBILITIES OF PARTIES ASSOCIATED WITH THIS PLAN

4.1.1 Scrabster Harbour Trust

The responsibility for control of oil pollution within the statutory harbour area rests with Scrabster Harbour Trust. The authority to act on their behalf has been given to the Harbourmaster: Strategy & Support in his capacity as Oil Pollution Officer. The Harbourmaster's Strategy & Suppor roles and responsibilities include:

- Having in place appropriate contingency planning procedures.
- Ensuring adequate resources and trained personnel available to respond to any oil spill in harbour waters.
- Implementing and co-ordinating all measures outlined in the Oil Spill Contingency Plan.
- Employing outside contractors, equipment or vessels as necessary.
- Liaison with HM Coastguard, MCA Pollution Control, Scottish Natural Heritage, Scottish Environment Protection Agency (SEPA) and other external agencies as required.
- Co-ordinate release of information to the media.

4.1.2 Tanker or Vessel Owners

- Responsible for having in place adequate Shipboard Oil Pollution Emergency Plan (SOPEP).
- Responsible for having third party liability, including pollution liability, insurance.

4.1.3 Maritime and Coastguard Agency (MCA)

- Responsible for ensuring that port and harbour authorities have adequate contingency plans and resources for dealing with a spill in harbour waters.
- Co-ordinate government response to pollution at sea.
- Acts in accordance with National Contingency Plan.
- Mobilise government equipment resources as required.
- Assists in co-ordinating clean-up of the shoreline (in conjunction with local authorities).
- Responsible for establishment of SRC on request from Scrabster Harbour Trust and following mutual agreement between both parties that such an action is necessary.
- Provide advice and technical/scientific expertise.

4.1.4 HM Coastguard

- Co-ordinate maritime search and rescue.
- Provide early warning system for oil pollution and reports all spills to the Maritime & Coastguard Agency.
- Provide facilities for MCA pollution response operations if required.

4.1.5 Secretary of State's Representative (SOSREP)

The role of the SOSREP is to represent the Secretaries of State for the Department for Transport (in relation to ships) and for the Department of Energy and Climate Change (in relation to offshore installations) by removing or reducing the risk to safety, property and the UK environment arising from accidents involving ships, fixed or floating platforms or sub-sea infrastructure. SOSREP's powers extend to UK territorial waters (12 nautical miles from the coast/baseline) for safety issues and to the UK Pollution Control Zone (200 miles or the median line with neighbouring states) for pollution. SOSREP is empowered to make crucial and often time-critical decisions, without delay and without recourse to higher authority, where such decisions are in the overriding UK public interest.

Working closely with the MCA, its parent organisation the Department for Transport (DfT) and the Department of Energy and Climate Change (DECC), SOSREP's key responsibilities include:

- acting at the earliest point during a shipping or offshore incident to assess the risk to safety, to prompt the end of any such incident and to ensure that increasing risk is evaluated and appropriate measures taken to prevent or respond to escalation;
- monitoring all response measures to significant incidents involving shipping and the offshore industry;
- if necessary, exercising ultimate control by implementing the powers of intervention, acting in the overriding interests of the UK and its environment;
- participating in major national and international exercises;
- reviewing all activities after significant incidents and exercises.

4.1.6 Scottish Natural Heritage (SNH)

- Lead conservation body with respect to oil pollution incidents within the 12-mile territorial limit.
- Provide advice on conservation issues to SRC.
- Will participate in the advisory Environment Group should one be established.
- Carry out surveys of any affected coastline in the event of an oil spill.
- Responsibility to safeguard and enhance Scotland's natural heritage, particularly its natural, genetic and scenic diversity.

4.1.7 Scottish Environment Protection Agency (SEPA)

- SEPA is a non-departmental public body responsible for the protection of the environment in Scotland and is accountable to the Secretary of State for Scotland.
- Responsible for water quality issues from land-based sources, including monitoring discharges, taking enforcement action where illegal pollution occurs and overseeing remedial work.
- Provides advice on the impact of spills and at-sea operations as far as these affect licensed sites such as marine fish farms.
- Regulatory authority on the disposal and management of waste.
- Provide advice on waste minimisation.
- Provide advice on the location and form of temporary waste storage and treatment.
- Provide advice on the disposal options for waste.

4.1.8 Royal Society for the Protection of Birds (RSPB)

- A voluntary organisation concerned with the conservation of birds and their habitats
- Provides up to date information on the numbers and whereabouts of birds at risk.
- Can mobilise staff and volunteers to establish numbers of oiled birds on beaches.

4.1.9 Ministry of Defence (MoD)

- Responsible for dealing with pollution caused by naval or other MoD vessels.

4.1.10 International Oil Pollution Compensation Fund (IOPC)

- Provides compensation for oil pollution damage from laden tankers over and above the liability of the vessel owner.

4.1.11 International Tanker Owners Pollution Federation (ITOPF)

- Provide technical advice on oil spill response.
- Advises IOPC fund on technical aspects of the response option and reasonableness of claims for compensation.
- Advises vessel owners and P&I club insurers on technical aspects of oil spill response.
- Provides advice to central and local government on clean-up measures with particular relevance to compensation schemes.

4.1.13 UK Petroleum Industry Association (UKPIA)

- Consultation service
- Technical and information services

4.1.14 HM Revenue and Customs (HMRC)

- Responsible for claiming Petroleum Revenue Tax from landed recovered oil

4.1.15 Highland Council

- Coordinate local response for shoreline oil spill clean up operations.
- Coordinate with MCA concerning the establishment of a Shoreline Response Centre (SRC).

4.2 INTERFACES WITH OTHER PLANS

The divisions of responsibility, which are adhered to by the MCA Counter Pollution Branch (as the national competent authority), and which determine which contingency plans will be activated to respond to a pollution incident, are defined in the National Contingency Plan. These divisions of responsibility are dependent on the source of pollution and the likelihood of oil beaching.
Under the National Contingency Plan, ports are responsible for responding to incidents of marine pollution within their areas of jurisdiction.
In addition, the National Contingency Plan states that in the early stages of an incident, the local authority or EHS establishes a Tier 1 or Tier 2 response.

4.3 INCIDENT RESPONSE ORGANISATION

In response to an oil spill, Scrabster Harbour personnel will be mobilised. The level of response is determined by the size of oil spill incident. The Harbourmaster will be responsible for co-ordinating response to oil spill incidents in Scrabster Harbour.
As an incident response progresses it is imperative to have feedback from sites in the field, assessment of the situation and forward planning, all on a regular basis.

Table 2: The responsibility for clean-up operations.

Location of pollution	Responsibility for clean-up lies with:
On the water	Scrabster Harbour Trust
Jetties/wharves/structures owned by Harbour Authorities	Scrabster Harbour Trust
Beach/shoreline owned by the harbour authority	Scrabster Harbour Trust
Foreshore owned by a private individual or group	Foreshore owner(s)
Shoreline (including land exposed by falling tide) and other structures	Local authority

4.4 RESPONSIBILITIES AND INCIDENT CONTROL ARRANGEMENTS

In the event of an oil spill, the Salvage Control Unit (SCU) will be established for the use of the ERT in the Emergency Response Centre. For small Tier 1 spills it may not be necessary to establish the SCU where the Harbourmaster and personnel can manage the situation. The decision not to establish the SCU will be made by the Harbourmaster or his delegate.

In a major spill situation (Tier 3) where Scrabster Harbour resources are not sufficient to deal with the spill a Shoreline Response Centre (SRC) may be established. An SRC will only be established at the request of Scrabster Harbour to the Maritime & Coastguard Agency (MCA) and with the mutual agreement of both parties. An MCA counter pollution officer will be deployed to act as land co-ordinator and other central government scientific, technical and administrative staff will be brought in as necessary. Scrabster Harbour Trust will retain control of determining strategy and priorities for action and the MCA will assist in achieving these objectives.

In the event that an incident escalates such that the National Contingency Plan is activated, primacy of control will be with SOSREP. In this case the Harbour Authority will render advice and every assistance to SOSREP in achieving his objectives whilst ensuring that ultimate responsibility for the response remains, and is seen to remain, with SOSREP. The SCU will remain an operational centre though SOSREP and his team will be housed elsewhere. As the scale of an incident becomes apparent various aspects of Scrabster Harbour Trust Emergency Plan will be invoked to accommodate an influx of responders, press, volunteers, etc, as well as dealing with external media enquiries.

SECTION 5: ACTION SHEETS

This section contains an overview of incident control arrangements held by personnel within Scrabster Harbour Trust in the event of an oil spill. Personnel call-out will be determined by the specific oil spill situation and it is the responsibility of the Oil Pollution Officer to determine personnel call-out requirements.

HARBOUR MASTER		
NO.	**ACTION**	**Actioned**
1	Obtain all available information. Ensure that an Incident Log has been started.	□
2	Determine initial level of manpower and equipment resource mobilisation required.	□
3	Establish communication with all concerned parties and ensure that statutory reporting requirements have been carried out.	□
4	Determine level of response that has been initiated and inform Coastguard, SEPA and SNH of intended response. Inform Highland Council if spreading out with Harbour Limits. Determine level of response required from duty personnel.	□
5	Contact/Call out Incident Response Team Personnel, activate MRC as appropriate.	□
6	Ensure that a sample of spilt oil has been taken, especially when the origin of the spill is unknown or legal proceedings are liable to be taken.	□

TIER 1 SPILL RESPONSE		
NO.	**ACTION**	**Actioned**
7	Call-out Duty Team to handle all additional spill notifications.	□
8	Monitor situation. Obtain regular briefings from Clean-up Supervisor on progress of clean up.	□
9	Determine likely impact of incident. Complete and log a full report	□
10	If it appears that the spill has escalated, proceed as for Tier 2 and Tier 3 incidents.	□

TIER 2 AND 3 INCIDENTS		
NO.	**ACTION**	**Actioned**
11	Contact Response Contractor and agree primary level of response required.	□
12	Start and maintain an accurate log of all communications with contractor.	□
13	Establish communication link with the contractor's Response Manager and issue a call back number.	□
14	Determine extent of incident in terms of: • Any casualties • Any safety hazard • Damage to facilities • Extent of pollution • Results of any actions taken so far.	□
15	Brief Response Supervisor of actions as appropriate.	□
16	Establish review/planning meetings. Continue normal communications and ad hoc briefings.	□
17	When incident stood down confirm incident closure with all agencies involved.	□
18	Complete incident log and ensure receipt of report from response supervisor.	□

The Harbour Trust Chief Executive Officer, Chairman / Vice Chairman should be ready to assist if deemed necessary by the Harbour Master and must be in a position to make corporate decisions regarding contracts, media reporting and liaising with underwriters.

SCRABSTER HARBOUR TRUST CHIEF EXECUTIVE		
NO.	**ACTION**	**Actioned**
1	Obtain briefing from Harbour Master with situation report and then relocate to Harbour Office if required.	□
2	Assess incident in terms of: • People • Environment • Damage to facilities • Disruption to business	□
3	Approve outline response strategy	□
4	Approve immediate and future contracted equipment requirements.	□
5	Arrange initial Public Relations programme.	□
6	Attend review meetings in Incident Centre	□

For specific telephone numbers see Section 7.1

SECTION 6: INCIDENT SHEETS

6.1 INFORMATION TO BE OBTAINED AS INITIAL SPILL REPORT (CG 77 POLREP)

To MCA – MRCC Aberdeen

Copy to Agencies as required

From …….. Fax to 01224 212862

INCIDENT:	
Classification	**i) Doubtful**
	ii) Probable
	iii) Confirmed
Date	
Time	
Name of person reporting incident	
Job title	
Details of company / organisation or address	
Call back number	
Location of the incident	
Extent of spill (m^2 / km^2)	
Estimated quantity of spill (litres / tonnes)	
Type of oil / substance spilled	
If bulk chemicals, UN Number (if known)	
Source of spill (if known)	
Reason for spill	
Action taken to prevent further spillage	
Is the spill continuous (Y/N)	
Has the MCA / MRCC been informed?	
Other relevant information	

6.2 INCIDENT LOG SHEET

All incidents and actions taken need to be detailed in this form or a form which contains similar information. This is for internal use and for use in the event of an audit of an incident.

Incident:	
Date:	
Location:	
Name:	
Time	**Details**

SECTION 7: NOTIFICATIONS

7.1 NOTIFICATION MATRIX

	Oil Spill Tier				
Organisation	1	2	3	Contact Details	Remarks
Scrabster Harbour	✓	☎	☎	Harbour Control (24/7) Tel: 01847892779	
MCA MRCC Aberdeen	☎ 🖷	☎ 🖷	☎ 🖷	01224 592334 01224 212862	Coastguard will require information on the Oil Spill Report Form in Section 6.1. Confirm details with fax. Coastguard will inform the appropriate personnel
SNH Edinburgh	✓ ✓ 🖷	☎ ☎ 🖷	☎ ☎ 🖷	07774161273 0131 316 2610 0131 316 2690	Fax all spills immediately. Contact immediately by telephone or fax if spill exceeds one tonne.
SEPA	☎	☎	☎	01786 452595 0800 807 060	Call routed to a 24 hour call centre and cascaded to appropriate persons
Marine Scotland	✓	☎	☎	07770 733 423	The Marine Laboratory should be contacted. Marine Scotland will notify fish farm operators and shellfish farm operators
Highland Council	✓	☎	☎	01463 713 479	Contact the Oil Pollution Officer if oil is outwith the harbour
Oil Spill Contractor Braemar Howells Ltd. Dundee		☎	☎	08700 7377 6673	Contact the 24-hr contact number and ask for the Duty Manager

✓ Notify during normal hours

☎ Notify immediately by phone

🖷 Notify immediately by fax

For additional contact details and telephone and fax numbers see Section 6.3.

7.2 COMMUNICATIONS AND REPORTING

Reporting of oil pollution

It is essential that all spills are reported by whatever means as quickly as possible.

A. Responsibility for reporting of oil pollution rests with the Master in all cases involving a vessel and with the berth Operator in the case of a berth or quayside incident. In cases involving a vessel alongside both parties are equally responsible.

B. Any person either ashore or afloat, seeing oil pollution on the water within the Harbour Authority's jurisdiction or liable to pose a threat to it, should report it whether or not the source is known. (*Section 5.1*)

C. The Harbourmaster is responsible for ensuring mandatory notifications are made.

Communications

Initially reports will be passed by both landline and mobile telephone (when using mobile consideration should be given to security implications). The Harbour Authority maintains VHF sets, which would be issued to On-scene Commanders once a clean-up strategy had been established.

In the event of a clean-up operation, a shift system will be instituted to ensure the main switchboard is manned on a 24 hour basis.

Records

It is essential that all events occurring during an incident are logged and recorded. This will provide assistance if liability, compensation or reimbursement issues arise as a result of the incident. To achieve this, logs should be kept by all key personnel.

Entries in the logs should, as a minimum, show details of events, actions taken, communications with outside Agencies, decisions made and points relevant to the operation.

These logs should be forwarded to the Harbour Master once the incident has ended to form part of the final incident report and provide the basis for a "wash-up" meeting.

7.3 CONTACTS DIRECTORY

Company / Body Name	Contact	Office Hours	Out Of Hours	Fax
Highland Council Emergency Planning Unit	Switchboard	01463 713 479	01463 713 479	01463 243 583
Braemar Howells Ltd. Dundee	24 hour Duty Manager	08700 7377 6673	08700 7377 6673	01382 731699
Scrabster Harbour	Harbour Control (24/7)	01847 892 779	01847 892 779	01847 892 353
	Harbour Master Gordon Mackenzie	01847 892 779	01847 896 566 07824 348321	VHF channels 16 and 12
	Deputy Harbour Master Jason Hamilton	01847 892 779	01955 606 922 07717 229 771	
	Chief Executive Officer Rod Johnstone	01847 892 779	07825 264 365	
MRCC/MCA Aberdeen 4th Floor Marine House Blaikies Quay Aberdeen AB11 5PB	Duty Officer	01224 592334	01224 592334	01224 212862
Maritime and Coastguard Agency Spring Place 105 Commercial Road Southampton SO15 1EG	Switchboard	02380 329100	02380 329483	02380 329485
SEPA Strathbeg House Clarence Street THURSO Caithness KW14 7JS	Switchboard Thurso	01786 452595 01847 894 422	0800 80 70 60 (24 hours)	01786 461425 01847 893 365

7.4 STATUTORY NOTIFICATION

Organisation to be contacted	When and how to report	Contact person	Contact details (24 hours unless stated)
HM Coastguard 4th Floor Marine House Blaikies Quay Aberdeen AB11 5PB	**Report immediately by telephone** and confirm by fax any discharge or escape of hydrocarbon entering the sea. Use Oil Spill Report Proforma. HM Coastguard will notify MCA	Duty Officer	Tel: 01224 592334 Fax: 01224 212862
Scottish Environment Protection Agency (SEPA) Strathbeg House Clarence Street Thurso Caithness KW14 7JS	**Report all spills immediately by telephone and confirm by fax.** Report using Oil spill Report Proforma.	Switchboard	Tel: 01847 894422 (call divert system in operation out of hours) Fax: 01847 893365
Scottish Natural Heritage Research & Advisory Services Directorate 2/5 Anderson Place Edinburgh EH6 5NP	**Report all spills immediately by telephone and confirm by fax.** Report using Oil Spill Report Proforma	Switchboard Incidents affecting: Golspie Office	Tel: 0131 554 9797 (Office hours) Fax: 0131 446 2405 Tel: 01408 634063 (Office hours) Fax: 01408 634 014
Marine Scotland	The Marine Laboratory should be contacted. Marine Scotland will notify fish farm operators and shellfish farm operators	Duty Officer	07770 733 423
Maritime and Coastguard Agency's Counter Pollution Branch	The coastguard will automatically alert the MCA. Therefore there are no statutory reporting requirements. Operational and scientific advice can be requested as required throughout the incident.	Marine Emergency Operations Room (MEOR) Operational Advice & Scientific Advice Lead Environmental Scientist : Kevin Collcomb Environmental Scientist Advisor	Tel: 02380 329 600 (office hours) Fax: 02380 329 414 Tel: 02380 329 411 (office hours) Tel: 02380 329228 (office hours)
Braemar Howells Ltd. Dundee	Call-out by Oil Pollution Officer (or Terminal Shipping Superintendent)	Duty Manager or Duty Officer	Tel: 01382 775 760 Fax: 01382 731699 24hr National Emergency Response 08700 73776673

7.5 CONTACT DETAILS FOR OTHER ORGANISATIONS

Organisations to be contacted	When and how to report	Contact person	Contact details (24 hours unless stated)
Royal Society for the Protection of Birds (RSPB). Dunedin House 25 Ravelston Terrace Edinburgh EH4 3TP	Notify all spills. Mainly for consultation purposes regarding seabirds at sea and preferred action to minimise pollution damage.	Mr M Fraser	Switchboard: 0131 311 6500 Fax: 0131 311 6569 Tel: 01750 725 323 (Office hours)
Scottish Society for the Prevention of Cruelty to Animals (SSPCA).	Notify all spills by fax. Notify immediately by telephone if spill >1 tonne.	Chief Superintendent	Tel: 0131 339 0111 (Office hours) Tel: 0131 332 2649 (Out of hours) Fax: 0131 339 4777 Emergency Contact Tel: 0870 332 2649
Health and Safety Executive Scotland and North East England Unit Belford House 59 Belford House Edinburgh EH4 3UA	Notify as soon as possible by telephone any “dangerous occurrence” involving the release of hydrocarbon.	Switchboard	Tel: 0131 247 2000 (office hours) Fax: 0131 247 2052
		Duty Officer Jane Miller (Clerk for HID Inspection)	Tel: 0151 922 9235 (out of hours) Tel: 0131 247 2042 ext 2056
International Tanker Owners Pollution Federation (ITOPF)	Inform ITOPF of major incidents involving tankers. Give brief description of incident and vessel from which it occurred. Report using Oil Spill Proforma.	Switchboard	Tel: 02075 666999 (office hours) Tel:07623984606 (out of hours) Fax:02075 666950
OPOL	Regarding incidents associated with pipelines and offshore installations		Tel: 02087 863640 Fax: 02087 863641
HM Customs & Excise Scotland Customs Co-ordination Unit Falcon House Inchinnan Road Paisley PA3 2RE			Tel: 0141 848 1808 Tel: 0141 887 9369 Fax: 0141 848 1639
Scottish Power plc Cockenzie Power Station Prestonpans East Lothian EH32 9SD		Duty Engineer	Tel: 01875 810075 Fax: 01875 814 768
Meteorological Office Fitzroy Road Exeter Devon EX1 3PB			Tel 0870 900 0100 Fax: 0870 900 5050
Northlink Ferries		Jane Allan	Tel: 01847 891 904 07990 978 627 Fax: 01847 895 632
Scrabster Oil Depot		Jim Fraser	Tel: 01847 891 880 Fax: 01847 894 625
Simpson Oils, Wick		Hugh Simpson	Tel: 01955 604 444 07932 120 560 Fax: 01955 602 316
Speedy Skip			Tel: 01847 893 797 Fax: 01847 893 797
OSS (Waste Collection)		Uddingston Office	Tel: 0870 870 2088 Fax:01698 817 894

SECTION 8: RESOURCES DIRECTORY

8.1 RESPONSE EQUIPMENT

Scrabster Harbour has access to the following resources for handling a Tier 1 incident. The response time should be within 30 minutes of initial notification. The equipment is positioned on the bunkering jetty and is in mobile kit form:

Personnel	
15	Permanent Staff - 4 certified On Scene Commanders 1 Incident Controller 10 Manual staff

	Resources	Location
1	Static spill response kit: ▪ 16 x M55 booms ▪ 1 x M90 absorbent roll ▪ 100 x M75 pads ▪ 1 x coil polypropylene rope ▪ 25 x HD waste sacks plus ties ▪ 1 x Oil spill sampling kit	Bunker point, Fish Dock
1	Wheeled Response Kit: ▪ 6 x M50 booms ▪ 1 x M90 absorbent roll ▪ 820 x M75 pads ▪ 1 x coil polypropylene rope ▪ 25 x HD waste sacks plus ties ▪ 1 x oil spill sampling kit	At end store, QE Pier Terminal building

Additional Oil Kit Equipment Stored:	
Quantity	Resource
5.5	M75 Pads
25	Waste sacks and ties
2	Oil sample kits
17	M50 booms
1	45 gallon drum with mangle attached
6	150’ x 36” rolls
3	M55 booms
1	11.5kg Imbiber sand mix
4	1.2kg imbiber shaker packs

8.2 TIER 2

Provision of Tier 2 resources will be from Braemar Howells Ltd. They will mobilize within 1 hour of notification and arrival on site will be achieved as soon as possible.

8.3 TIER 3

Tier 3 Response resources may be available from the MCA UK stockpiles. The response will be in accordance with the National Contingency Plan.

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PART 2: STRATEGY

CONTENTS

SECTION 10: RISK ASSESSMENT 2
10.1 RISK ASSESSMENT 2
10.2 ASSESSMENT SCOPE 2
10.3 METHODOLOGY 4
10.4 HISTORICAL DATA 5
10.5 FACTORS OF ASSESSMENT 5
10.6 AVAILABILITY OF TUGS 5

SECTION 11: HARBOUR CHARACTERISTICS 6

SECTION 12: RESPONSE STRATEGY 9
12.1 HEALTH AND SAFETY 9
12.2 OIL SPILLS 13

SECTION 13: TRAINING AND EXERCISE POLICY 14
13.1 TRAINING POLICY 14
13.2 EXERCISE PROGRAMME 14
13.3 FORMS TO BE COMPLETED – POST EXERCISE 15
13.4 FORMS TO BE COMPLETED ON AN ANNUAL BASIS 17

SECTION 10: RISK ASSESSMENT

10.1 RISK ASSESSMENT

A risk assessment to meet with OPRC Contingency planning requirements for Ports and Terminals has been completed by Briggs Environmental Services Ltd. (BESL) on the basis of format previously agreed with the Maritime Coastguard Agency (MCA).

10.2 ASSESSMENT SCOPE

This assessment covers both quayside operations and marine operations carried out within jurisdiction of Scrabster Harbour. (See figure 1 below).

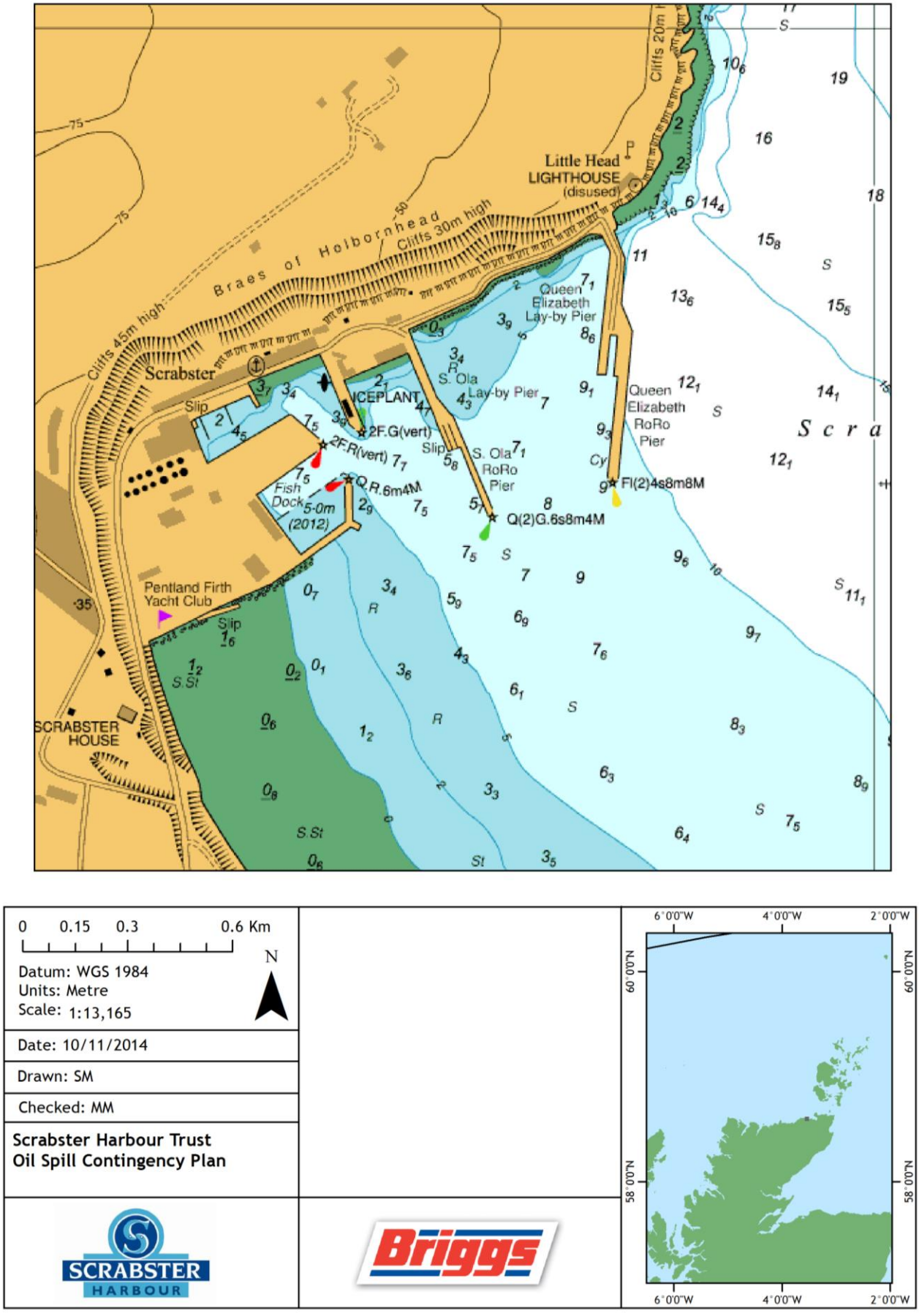

Figure 1: Scrabster Harbour Limits.

10.3 METHODOLOGY

This risk assessment is designed to identify potential oil sources, the size of potential spills and to estimate the probability of events that may result in a release of oil into the marine environment. The result will be a targeted, specific investigation which will identify areas of unacceptable risk and potential mitigation methods.

In order to assess the consequence, and subsequent overall risk acceptance criteria of a spill, it is important to identify those systems that contain oil and are associated with the harbour's operations. Operations that could initiate events resulting in an accidental spillage are examined and the potential maximum volume that could be released is identified. Probability and consequence are then combines in a risk matrix model to ascertain overall risk acceptance criteria.

The frequency of a specific type of incident can be expressed as probability. When classified against criteria this should provide an indication as to the most commonly occurring events. Control measures can reduce the probability of an event occurring. The full range of control measures implemented by Scrabster Harbour to minimise the risk of an oil spill event have therefore been considered before applying specific probability criteria

Table 1 shows the probability and consequence ratings used in this risk assessment.

Table 1: Probability of Scenario Occurrence

Risk Rating	Description
Low	Minimal or no impacts detectable; No detectable aroma of oil or silvery sheen. A small operational type spill confined to harbour limits.
Moderate	Minor to Moderate damage to immediate environment; Definite aroma of oil in the air; Oil visible as metallic sheen on water surface; Moderate bunkering spill or small hydraulic spill.
High	Extensive damage to immediate environment; Extensive contamination of nearby shorelines; Oil visible as metallic sheen on water surface; Large diesel spill or heavy oil spill.

Probability and consequences can be multiplied to produce an overall risk rating. This can then be applied to specific scenarios in order to prioritise potential control measures and risk minimisation procedures. Table 2 determines the overall level of risk. In principle, all risks should be within the insignificant to minor categories. Moderate risk and above will require attention and improvement plans to reduce the risk.

Table 2: Overall Level of Risk

Risk	Description
Low	Risks are broadly acceptable. Need to maintain assurance that risks remain at this level.
Moderate	Tolerable risks – action may be required to reduce risks in this region. Risks are tolerable provided they can be demonstrated to be ALARP (As Low As Reasonably Practicable), i.e. if risk reduction is impracticable or its cost is disproportionate to the improvement gained.
High	Unacceptable risks – action generally required to reduce risks in this region.

When potential hazards and the probability of their occurrence have been established the oil type and fate of the oil must be considered to evaluate consequence. It should be remembered that although the level of risk of an incident occurring may be low, the level of impact on the environment can potentially be high (high volume or increased toxicity for example). The consequence for each identified hazard is evaluated using the level of risk and the impact. Should the biological impact be rated high, the risk overall will have a higher rating.

Hydrocarbons are broadly grouped into four categories: group I oils such as diesels are non-persistent and will tend to dissipate completely within a few days. Group II and III oils are more persistent and have a tendency to form emulsions. Group IV oils are very persistent due to the lack of volatile constituents and will remain in the environment indefinitely (ITOPF, 2006/2007). The volume and type of hydrocarbons released will determine the consequences for low to high probabilities. The consequences for all low to high probabilities will be mild to severe unless proven otherwise.

The risk assessment contains a table which identifies the initiating events and corresponding control measures that were considered in relation to the oil containing systems.

10.4 HISTORICAL DATA

In May 2014 a fishing vessel sank, spilling 7m³ of diesel into the marine environment. The diesel fuel was contained within the harbour area using Tier 1 equipment by harbour staff.

10.5 FACTORS OF ASSESSMENT

The port covered by this plan is controlled by the Scrabster Harbour Harbour Master and is mainly used by cargo and fishing vessels, oil refinery traffic and privately owned yachts.

Vessels in Transit

The statutory duty for reporting and dealing with pollution from any vessel en route to Scrabster prior to entering the port area, lies with the Master and vessel owners. After commencing pilotage to Scrabster through the designated area of jurisdiction covered by the plan, reporting and response to an oil pollution incident will be co-ordinated through the Scrabster Harbour Authority's Oil Spill Contingency Plan.

Pre-Arrival Checks

Pre-arrival form must be completed.

Availability Pilot Vessels

Pilotage requirements must be pre-arrangement with the Harbour Office.

10.6 AVAILABILITY OF TUGS

There are no tugs available from Scrabster Harbour.

SECTION 11: HARBOUR CHARACTERISTICS

Table 3: Vessel traffic within Scrabster

Vessel traffic 2013	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
F Vsls	70	70	59	69	67	73	74	89	82	85	64	71	**873**
For F Vsls	4	0	3	6	6	6	1	0	1	3	2	7	**39**
Tankers	1	1	1	1	1	2	0	0	0	2	2	1	**12**
Cargo Vsls	3	2	2	5	1	2	1	2	1	5	2	2	**28**
Fish Cargo	8	8	8	8	7	9	8	9	8	9	9	5	**96**
Yachts	0	0	0	0	5	9	19	13	5	1	1	0	**53**
Pass Vsls	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Nuclear	1	1	0	2	1	1	0	0	0	1	1	0	**8**
Tugs	0	0	0	0	0	0	0	0	2	0	0	0	**2**
Ferries	0	0	0	0	0	0	0	0	0	0	0	0	**0**
DAFS/Light	0	0	2	3	1	1	2	0	0	0	1	1	**11**
Customs	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Survey	1	1	2	1	1	0	0	0	1	0	0	0	**7**
Oil Rel	4	3	5	6	9	5	14	11	5	2	3	6	**73**
Renewables	2	0	0	0	0	0	0	1	0	0	0	1	**4**
R.N.L.I.	1	1	0	0	0	0	0	0	1	0	0	0	**3**
Misc.	0	0	2	4	1	3	4	1	5	1	2	2	**25**
Total	**95**	87	84	105	100	111	123	126	111	109	87	96	**1234**

Many harbour operations carry with them a risk of hydrocarbon spillage to the sea. A risk assessment has therefore been carried out to:

- Identify as far as possible likely oil spill scenarios from harbour operations;
- Quantify the possible frequency and size of spills;
- Identify the likely consequences of a hydrocarbon spill.

The risk assessment undertaken considered the risk of oil pollution in the areas covered by this section, Scrabster. Based on the risk assessment, a response strategy for each area has been devised.

OPERATIONAL HAZARDS

RISK: BERTHING FAILURE

Harbour Control authorises all vessel movements in the harbour with single and multi-movements frequently taking place. Only single ship movements are allowed when oil tankers are manoeuvring. Berthing failure is considered to be a low-level risk, due to the size of vessel able to use the harbour and harbour controls in place. The result of collision damage to the largest cargo fuel tank, based upon the size of tanker that utilise the harbour, taking into consideration hydrostatic pressure is calculated at 5.5 bars of Marine Gas Oil.

RISK: FUEL DELIVERY BY VESSEL

The maximum size of tanker that discharges at this facility is about 3,100 dwt. All tankers that are involved in oil transfer operations have been approved for use. This process is based on risk assessment and ensures that the vessels being used are maintained and operated to the highest industry standards and as such the likelihood of operational failures is significantly reduced. Subsequently, this operation is classified as a low risk due to the control measures in place.

RISK: OIL CARGO TRANSFER AT TERMINAL

Operations are carried out using specialised discharge facilities operated by the Depot. These facilities are well managed with full bunding of the appropriate area. Discharge is by rigid arms and pipeline that are pressure tested annually. The use of flexible hose is not allowed. All tanker operations are carried out in accordance with jetty, harbour and ISGOTT requirements and checklists are used; copies of which are provided to Masters before operations can commence. All shore tanks are located in a protected and bunded area and any spill incident would not be expected to cause marine pollution. With these stringent control measures in place, the risk is classified as low.

RISK: BUNKERING OPERATIONS ON QUAYSIDE

A bunkering facility exists for fishing vessels and others on the South Breakwater. Here a dedicated Fuel Quay has been established with pipeline to Scrabster Oil Depot's storage tanks.

Bunkering of MGO by road tanker can be carried out at all main berths and is used for supply, survey and fishing vessels as well as general merchant shipping. On average 20,222 tonnes (approximately 800 deliveries) of MGO are made annually. The frequency varies with the time of the year and the activities being undertaken. Sometimes a twin road tanker operation is used to maximise efficiency of delivery. Written delivery procedures set out the mechanisms to be adhered to and an operator is always present on the jetty and with a second colleague on the vessel. A stock of sorbents is kept in close proximity, to effect rapid clean-up of any spill. The Ro/Ro ferry utilises MGO: a road tanker will make deliveries to the harbour but to eliminate spill risk, when possible, the tanker boards the ferry and discharges from the car deck.

RISK: BUNKERING SHIP TO SHIP

Bunkering operations between vessels has been introduced in Scrabster harbour. These operations will take place at the QE Pier, St.Ola Pier and Jubilee Quay. The maximum amount of fuel transferred between vessels will be 1200mt of MGO/Intermediate gas oil. The risk of a spill from the ship to ship transfer of MGO is considered low as the operation is carried out by trained individuals and the control measures in place.

ACCIDENTAL HAZARDS

RISK: SPILLAGE OF WASTE OIL DURING DISCHARGE

Waste oil is discharged by vessels under The Merchant Shipping (Port Waste Reception Facilities) Regulations 2003 (SI 2003 / No 1809). Scrabster Harbour's Port Waste Management Plan is in operation and will cover the procedures to be followed in the discharging of waste oil and oily waste.

RISK: STORAGE OF WASTE OIL

Scrabster Harbour has two 2,500 litre bunded storage tanks for the storage of waste lube oil on site. Collection is carried out every 1-2 months by OSS, using trained staff and a specialist vehicle. Harbour staff will request a collection if necessary between scheduled visits if they consider that the levels collected need dealt with. Oily filters are drained on site in a dedicated area of a transit shed, installed with specialist equipment and checked daily by Harbour staff. The waste oil is stored on site until Northern Oil collects it once a month.

SUMMARY OF POTENTIAL SPILLAGE

Vessel traffic within the Scrabster vicinity is made up of Cargo and fishing vessels, oil refinery traffic, and privately owned yachts. The risk of a fuelling/defueling or collision incident occurring is low due to the control measures in place, but Figure 3 shows the worst case scenario.

Figure 3 Risk of an Oil Spill in Scrabster Harbour

HAZARD	SPILL VOLUME	RISK PRIOR TO CONTROL	EXISTING CONTROL MEASURES	RISK FOLLOWING CONTROL
OPERATIONAL				
Berthing Failure Fuel Delivery Oil Cargo Transfer Bunkering on Quayside Bunkering Ship to Ship	<250 tonnes HFO <25 tonnes HFO 250 tonnes 25 tonnes 1200 tonnes	Moderate	• Procedures in place for the movement of vessels within the area of jurisdiction • Restricted speed • Experiences masters • Structural integrity of the vessels • All equipment is regularly maintained to reduce the risk of ruptures	Low
ACCIDENTAL				
Spillage of Waste Oil Storage of Waste Oil	< 5000 litres <300 litres	Moderate	• Carried out by trained and competent individuals • Follow set procedures	Low

SECTION 12: RESPONSE STRATEGY

12.1 HEALTH AND SAFETY

Statutory Duties

Table 4 provides a synopsis of applicable statutory law and its implications for the work place.

Table 4: Applicable Statutory Law

LAW	IMPLICATIONS
The Health and Safety at Work Act 1974	Places duty on all employers and persons responsible for premises to ensure the workplace is safe and in the case of the employer, to have a safe system of work. This duty is placed regardless of whether the workers are employees, sub-contract workers, temporary workers or self employed persons.
Implementation of the Health and Safety at Work Regulations 1999	All employers carry out suitable and sufficient Risk Assessments of all tasks to be undertaken in the workplace. Where five or more employees are employed then the Assessment is to be recorded and those at particular risk must be informed accordingly. The employer is required to execute a Safety Management System and that measurement of performance against standards is made. All employees must receive adequate training, information and supervision. Additionally, there is a requirement for all employees to receive suitable and sufficient health surveillance to ensure that they are fit to carry out the work and that the work and conditions do not cause them adverse effect.
The Provision and Use of Work Equipment Regulations 1998	All equipment provided for use at work is safe and fit for purpose. The persons using the equipment must be adequately trained in its use and use must be properly supervised.
The Personal Protective Equipment Regulations 1992	All equipment provided is fit for purpose and does not cause adverse effect. That all personnel are trained in its use and that all associated risks are recorded controlled and pointed out to those affected.
The Manual Handling Regulations 1992	All work where lifting, pulling and pushing is involved, is assessed and all risks to the health and safety of those involved are reduced to a level as low as reasonably practicable.
The Control of Substances Hazardous to Health Regulations 2002	All substances to which a worker may be exposed, including dusts and gasses are properly assessed and the risks to health reduced to a safe and acceptable level.

Site Safety Plan

To achieve a safe operation, those in charge of the response must follow those generalised parts of the Contingency Plan, which apply in all circumstances. Additionally they must have available the means to prepare those elements of the Plan which are site and response specific.

The Site Safety Plan is intended to prevent uncontrolled incidents occurring which may cause further damage to the environment or loss due to damage, injury or illness. The Site Safety Plan should comprise the sections shown in Table 5. Each section should be addressed jointly and separately before work commences and the appropriate steps taken to ensure that requirements are adequately met.

Table 5: Site Safety Plan Sections

SECTION	CONTENTS
Site survey	A site survey form should be available, which when followed correctly will add all of those site unique details which assist in the decision making process and remind staff of essentials which might otherwise be omitted. The site survey should address the safety of those personnel taking part in the cleanup as well as those members of the public who may also be involved. The following indicates a few of those subjects which, should be addressed, assessed and reported in the survey. The list is by no means exhaustive. • Communications requirements; • Exposure to temperature; • Feasibility of handrails or ropes; • Hazards to the eyes; • Lack of or shelter from weather; • Lighting conditions; • Machinery usage; • Manoeuvrability; • Manual handling; • Pedestrian traffic; • Requirement to access confined spaces; • Sample collection; • Terrain surface and incline; • Vehicle traffic; • Visibility; and • Water hazards.
Operations analysis	Having surveyed the site and assessed the aspects which are influenced by the terrain, water conditions, and other pertinent factors. The On-Scene Commander will assess the way in which the operation is to be conducted. The intention to use the following facilities can be stated and the reasons for and priorities of each facility established. • Cranes; • Boats; • Breathing apparatus; • Detergents; • Forklifts; • Hoses and pumps; • Low loaders; • Motor vehicles; • Raking and sweeping gear; and • Winches

SECTION	CONTENTS
Site Control	It is essential that those in charge of the spill cleanup have control of the site as soon as possible and before any significant part of the cleanup operation begins. Access to the site must be restricted to those personnel who are essential to the cleanup operation. Arrangements must be made for the area to be barriered, closed and policed such that no one can enter the work area without reporting to the site supervisor. No workers should be allowed on site until they have received the full vetting and briefing with respect to the safety plan.
Logistics and supplies	Specifically with respect to safety, it should be ensured that the appropriate equipment, materials and substances are available at the required times. Particular attention should be paid to the availability of the various sizes of protective clothing required. This sometimes cannot be established until the members of the workforce have been detailed and their individual roles and tasks decided. Consideration must be given for a prolonged clean-up operation possibly stretching to 24 hours operations. In which case shelter, accommodation, feeding, refreshment, rest areas, sanitation and first aid must be available. Where training has to be delivered, the necessary instructors and equipment must be available before work commences. It is an error to allow experienced workers to commence work whilst others are waiting for training. **Personal Protective Equipment (PPE)**. If the weather is at all inclement, the protective clothing issued to workers must be warm, water and chemical-proof. It should include coveralls, gloves, boots, eye protection and headgear. If the weather is warm, the use of the same protective clothing may be necessary, but the requirements for ventilation and cooling will be greater. PPE includes: • Breathing apparatus including respirators; • Flotation suits and vests; • Gloves / gauntlets; • Protective clothing; • Goggles, visors and safety glasses; • Hard hats; • Insulated clothing; and • Reinforced boots, shoes and gloves. **First Aid**. The Health and Safety (First Aid) Regulations 1981, together with the New Code of Practice on First Aid, lay down the requirements for trained first aiders and the equipment that must be provided. A foreshore clean up is considered as a special circumstance and the appropriate extra provisions should be taken into account.
Personnel	Selection of Personnel to carry out the cleanup must be dominated by safety considerations.

Safety on the Dockside

During the execution of a foreshore Site Survey, access to the area to be cleaned must to be carefully assessed. Account needs to be taken of low and high tides and the need for workers to access difficult to navigate inlets, cliffs and terrain. Tide tables should be consulted as well as the taking of advice from those with local knowledge.

Where necessary and appropriate, the use of equipment such as handrails, ropes and ladders should be considered. Where workers are, by necessity, required to work out of sight of one another, communication between them and the supervisor is essential. The provision and use of Personal Emergency Beacons and Distress Flares by appropriate personnel should be considered.

Safety on the Water for HSE Purposes

The Harbour Office should be informed of vessels involved in operations together with all the necessary details of vessel capability and POB.

Workers operating from sea-going vessels should be equipped with harnesses built to BS 1397. They should, at all times, wear an approved self or automatic inflating lifejacket and should be protected by a survival suit.

Safe Operations

Risk Assessment

The identification of all hazards at a worksite or spill location is a singular task that should be done by involvement of the people who are expected to carry out the work. The supervisor responsible for co-ordinating the risk assessment should ensure that all hazards are identified before the next step in the process is attempted. A hazard is an object, place, process or circumstance with the potential to do harm in the form of injury, damage, delay or pollution.

Decontamination

Conditions requiring decontamination

Clothing contaminated by crude oil or chemicals, which might have been used during the cleanup operation, needs to be cleaned to prevent further contamination. Facilities for such cleansing should be made available either near to Rest or Feeding areas or close by, but clear of the work site.

Personal hygiene practices on the job

Workers should be instructed on the dangers of ingesting hydrocarbons and chemicals through contact of contaminated equipment or clothing. Facilities for removing protective clothing and washing before consuming food or smoking should be made available.

Decontamination area drainage

Cleansing water and contaminants washed from clothing and personal equipment should be drained into tanks. Care should be taken to ensure contaminated waste does not drain into either the normal drainage system or into soil under the decontamination area.

Disposal of contaminated clothing

Clothing, which is not fully washable or capable of having all traces of contaminant removed, may need to be disposed of safely. Such clothing may comprise Special or Hazardous Waste. If incineration facilities do not exist at the site, the clothing may need to be delivered to the Local Authority or to a Special Waste Contractor.

12.2 OIL SPILLS

Introduction

An oil spill can occur almost anywhere - a leakage or accident during transportation or during use, which can affect many areas including sea, coastlines, harbours and land.

Oil contains a variety of different types of hydrocarbons. The exact composition is dependent upon its origin. Oil may also contain a variety of impurities such as sulphur and nitrogen products. Generally oil is of relatively low toxicity; however this is dependent upon the properties of the source oil. The route of human exposure is via inhalation and skin absorption.

Oil when released in a spill will be subjected to various actions:

- spreading;
- evaporation;
- oxidation;
- dissolution;
- emulsification; and
- microbial degradation.

The effect of all these actions is to reduce the original oil volume by evaporation but increase it by emulsification, also reduce its flammability and its toxicity. The rate of these actions is dependent upon the physical composition of the oil and environmental conditions prevailing at the time. Therefore to be able to effectively combat a spill these factors must be known.

Oil Spill Sampling

Samples of the spilt oil should be taken as soon as possible before the oil has weathered. These samples may be required as evidence in legal proceedings. Guidance in the matter of collection samples is given in MCA STOp Notice 4/2001. Oil samples can be arranged by the Marine Services Manager.

It should be noted that MCA STOp Notice 4/2001 does not refer to the requirements in Scotland, to have every step of the sampling and analytical process witnessed if the results of the analysis are to be used in the report to the Procurator Fiscal. A sample label format has been developed to prompt the sampler to obtain a witness and deal correctly with the sample.

SECTION 13: TRAINING AND EXERCISE POLICY

13.1 TRAINING POLICY

The Contingency Planning for Marine Pollution Preparedness and response Guidelines for Ports state all personnel likely to be involved in a Marine Pollution Incident have to meet certain requirements and standards. Training should be conducted by a Nautical Institute accredited training provider.

In order to familiarise personnel in the use of this Oil Spill Contingency Plan and comply with MCA guidelines, Oil Spill Response training courses will be held for all employees of Scrabster Harbour Trust, their contractors and port operators with an identified role within the plan. In addition, there will also be awareness briefings with other harbour users and the Agencies involved in the consultation process.

After initial training, instruction will be specific with the use of the Tier 1 oil spill response equipment. This will be tested and deployed using those personnel who will be responsible for operating this equipment in the event of a spill.

In order to meet the minimum levels as recommended in the MCA guidelines, the training and exercising of key personnel is detailed below.

Table 6: Training in the use of this Plan

Position	Course
Harbourmaster & Deputy Harbourmaster	MCA Level 4/5
Scrabster Harbour Trust Chairman & Vice Chairman	Contingency plan familiarisation briefing
Operators	MCA Level 1

13.2 EXERCISE PROGRAMME

The Contingency Planning for Marine Pollution Preparedness and Response Guidelines for Ports state:

“Each Port / harbour / oil handling facility must participate in exercises in accordance with the provisions within their OPRC Compliant Oil Spill Contingency plan”

To ensure that the Oil Spill Contingency Plan is “user friendly” and understood by all those involved in its use, communications and practical exercises will be undertaken on an annual basis.

A record of Personnel Training and Contingency Plan Exercises will be held by Scrabster Harbour Trust and available for inspection by MCA.

The provisions specific to Scrabster Harbour are detailed in table 7 on the next page.

Table 7: Exercises in the use of this Plan

Exercise Type	Frequency
Notification Exercises	Twice per year
Mobilisation Exercises	Twice per year
Table-top Exercise (may incorporate mobilisation and deployment of local response equipment)	Once per year
Incident Management Exercise (will incorporate mobilization and deployment of resources up to Tier 2 level)	Once every 3 years*
*In an instance where a port, harbour or oil handling facility considers this requirement to be unduly onerous on the basis of the risk assessment, they may submit an alternative exercise programme to the Regional CPSO for consideration and approval, on an individual basis. In some circumstances it may be permissible to undertake an Incident Management Exercise in the fourth year of the plan's five-year life-cycle providing for the 'lessons-learned' to be captured within the final plan review/update year.	

Sharing of Exercises

In a situation where a group of ports and harbours are within a distinct geographic region and sharing the same Tier 2 contractor, there may be scope to undertake a joint exercise at one of the ports. Key individuals from nearby ports could be invited to observe or participate, thus gaining from the experience of the hosting port. In any case, each plan holder must host their own exercise involving mobilisation and deployment of their Tier 2 response, at least every three years.

A post exercise/incident form should be completed and forwarded to the Regional CPSO, and all relevant plan holders, each time an exercise is carried out.

Further guidance can be found in Section 17.

13.3 FORMS TO BE COMPLETED – POST EXERCISE

Below is a post exercise / incident report form which should be completed and forwarded to the regional CPSO and all relevant plan holders, each time an exercise is carried out. Similarly if a real incident were to occur details should be logged and copied to the MCA.

Proforma on following page.

Post Exercise / Incident* Report

Name of Port/Harbour/Oil Handling Facility:	

Tier Level (T1,2 or 3)		Name exercise / incident	

Names of any other participating ports, harbours or oil handling facilities if joint equipment deployment exercise/incident	

Date of exercise / incident		Time of exercise / incident	

Location of exercise/incident:	

Name of exercise / incident co-ordinator:	

Name of personnel participating in exercise/incident and role played:		List of equipment deployed:	

Name of any other organisations or authorities participating in exercise / incident:	

Details of amendments to be made to the Contingency Plan resulting from this exercise / incident:
(in addition to this form the revision list is to be updated & the appropriate pages within the plan amended & issued to all plan holders)

I can confirm that the details on this form provide a realistic summary of the exercise/incident. Any action points resulting from this exercise/incident have been dealt with accordingly, the relevant documents updated and copies provided to the appropriate bodies for their attention.

Authorised by (name in block capitals):		Position / Job Title:	

Signature:		Date:	

13.4 FORMS TO BE COMPLETED ON AN ANNUAL BASIS

To ensure that the MCA's records remain up-to-date, Port / Harbour authorities should complete an annual return of changes made (e.g. exercises conducted, new personnel trained, etc.). 'Nil' returns should also be submitted.

Electronic copies of the following form can be obtained from the MCA.

OPRC Annual Return

Name of Port, Harbour or Oil Handling Facility:			
Annual Return Period:		**to**	
Plan Approval date:			**(5 year life span of plans)**
Summary of Incidents: (include date, source, type and quantity of pollution)			
Summary of Exercises: (include date and type of exercise conducted)			
Pollution Training Undertaken (include date, MCA Level, Name & certificate No.)			
Summary of Amendments: (include date, amendment No., & item(s) changed)			
Signed:	Print:		
Position:	Date:		

This form must be completed by Ports, Harbours and Oil Handling facilities at the end of each calendar year by the 31st January and returned to the Regional Counter Pollution & Salvage Officer. Continue on separate sheet if necessary. Nil returns are required.

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PART 3: DATA DIRECTORY

CONTENTS

SECTION 14: MCA STOp NOTICE 4/2001 3

SECTION 15: SPILL SAMPLING 7
15.1 OIL POLLUTION SAMPLE – STANDARD LABEL 7
15.2: OIL POLLUTION SAMPLE: STANDARD FORM 8
15.3: SAMPLE LABEL FORMAT FOR PROCURATOR FISCAL 9

SECTION 16: BONN AGREEMENT COLOUR CODES 10
16.1: ESTIMATING THE SIZE OF A SPILL 12
16.2: SLICK TRACKING AND SURVEILLANCE 13

SECTION 17: POLREP (POLLUTION REPORT) FORM 15
SECTION 18: MCA OPRC EXERCISE GUIDELINES 17

SECTION 19: SENSITIVE AREAS INFORMATION 19
19.1 ENVIRONMENT GROUP 19
19.2 THE ROLE OF THE SOSREP 20

SECTION 20: ENVIRONMENTAL SENSITIVITIES AND PRIORITIES FOR PROTECTION 21
20.1 GENERAL STRATEGY 21
20.2 SENSITIVE AREAS 21
20.3 DISPERSANT USE 23

SECTION 21: BOOMING AND WASTE DISPOSAL 24
21.1 BOOMING 24
21.2 WASTE DISPOSAL OPERATION 24
21.3 WASTE DISPOSAL ACTION CHECKLIST 28

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SECTION 14: MCA STOp NOTICE 4/2001

SCIENTIFIC, TECHNICAL AND OPERATIONAL ADVICE NOTE
- STOp 4/2001
IMPORTANT
This STOp notice replaces STOp 2/98; please destroy your copy of STOp 2/98
ADVICE TO LOCAL AUTHORITIES ON THE COLLECTION AND HANDLING OF OIL SAMPLES

1. Background
2. Sampling from the sea and shoreline
3. Size of samples
4. Methods of collecting samples
5. Bottling, sealing, packaging and boxing of samples
6. Labelling and addressing of samples
7. Transportation of samples
8. Handling of samples for Bonn agreement states

Appendices

Appendix A: Oil Pollution Sample – Standard Label
Appendix B: Collection of Sample – Standard Form

Note: This document should be read in conjunction with:

- **STOp 1/2001 - The Environment Group and Maritime pollution response in the UK.**
- **STOp 2/2001 - The Establishment, Management Structure, Roles and Responsibilities of a Shoreline Response Centre during a Maritime Pollution Incident in the United Kingdom.**
- **The National Contingency Plan for Marine Pollution from Shipping and Offshore Installations (NCP).**

All extant MCA STOp notices may be found on the MCA web site: www.mcga.gov.uk and all enquiries regarding this and other MCA STOp notices should be directed to meor meor@mcga.gov.uk

1. BACKGROUND

Where an oil pollution incident is thought to have arisen from an illegal operational discharge an effort should be made to collect a sample of the pollutant and, if possible, matching samples from the suspect ship or other source for analysis, comparison, and possible subsequent use in legal proceedings. Samples of the pollutant may need to be taken from the sea or coastline. When beach pollution has occurred, local authorities or HM Coastguard would usually take the necessary samples. For advice on sampling at sea, contact the Counter Pollution Branch of the Maritime and Coastguard Agency (MCA) on 02380 329483. This notice sets out the procedures to be followed when collecting and handling oil samples.

The MCA's Enforcement Unit will collect evidence concerning pollution incidents from shipping at sea, upon which a decision will be made as to prosecute or not. In England, Wales and Northern Ireland the MCA will conduct prosecutions. In Scotland the case will be presented to the Procurator Fiscal for action.

If samples are likely to be used in connection with legal proceedings then the following procedures should be implemented:

In England and Wales

Although a single sealed sample of each type of pollutant is required by law, MCA would prefer three samples to be collected.

In Scotland

There is no longer a legal requirement for three sealed samples of each type of pollutant in Scotland but as in England MCA recommend three samples: one for analysis, a second to be handed to the owner or master of the suspect vessel for retention and any appropriate action, and the third for production in court, where the prosecution will be handled by the local Procurator Fiscal.

In Northern Ireland

Although the law in Northern Ireland concerning this matter is the same as that in England and Wales, the Director of Public Prosecutions, who is responsible for handling prosecutions in Northern Ireland, has asked that for the sake of safety, three sealed samples of each type of pollutant should be provided on the same basis as in Scotland.

Responsibility for the collection of oil samples in Northern Ireland rests with Environment and Heritage Service, Department of the Environment (Northern Ireland).

Samples will usually be requested by a scientist/mariner in the MCA's Counter Pollution Branch or one of the Principal Counter Pollution and Salvage Officers as part of the response to a reported incident. Once a sample has been taken, agreement must be obtained from the Counter Pollution Branch before it is analysed.

Please remember that analysis of sample will only be carried out and paid for by the MCA if authorised by the Counter Pollution Branch.

Please note that organisations such as Ports and Harbours or the Environmental Regulator may be taking independent samples as part of their own individual responsibilities for oil spill response and pollution regulation. The analysis of the samples and the cost of analysis of such samples will be the responsibility of the organisation taking the sample and not the MCA.

2. SAMPLING FROM THE SEA & SHORELINE

When a large oil slick exists at sea or on a coastline, the number of samples that MCA may require is:

offshore spill - minimum of 1 sample / slick / day where possible,

onshore spill - representative samples from the shoreline, following discussion with Counter Pollution Branch .

Following an incident, attempts may be made to infer that not all the oil pollution came from one vessel, and that some of it may have come from other sources. Where therefore an oiled beach is being sampled, a careful and detailed examination of the beach should be made to determine the uniformity of the oil deposit and the extent to which it is polluted by more than one type of oil. In particular, if there are any tarry, semi-solid lumps or wet tarry patches, their presence should be recorded and some idea of their quantity and extent obtained. In addition, samples of such pollution should be retained and an attempt should be made to estimate costs expended on the cleanup of different oils.

In cases where samples have been taken at intervals along the beach, these should be clearly identified (see section 6 on labelling). It is desirable that samples of oil are taken in the area where the oil is first washed ashore. This is helpful since the fresher the oil the easier it is to identify by laboratory techniques.

3. SIZE OF SAMPLES

Modern analytical methods mean that very little original pollutant is required to carry out most analyses. However, a larger sample is likely to be more representative. Detailed analyses are often hampered by either contamination or the loss of the oil's lighter fractions. A larger undisturbed sample may consist of a weathered oil crust covering a less weathered (holding a greater percentage of lighter fractions) and therefore more valuable sample. The recommended minimum quantities required for a detailed programme of analyses are:

Type	Quantity
Unweathered oils that are liquid and substantially free of water	10ml
Oil exposed to seas surface and forming water-in-oil emulsion "chocolate mousse"	10ml
Overside water discharge where contravention of 100ppm or 15ppm is suspected	1 litre of the discharge
Tarry lumps as found on beaches	10 grammes

A sample should not be withheld because the recommended quantity cannot be obtained, since much smaller samples can give useful results. In cases of pollution within UK territorial waters, when it is only necessary to prove that some oil has been discharged, a relatively small sample may be acceptable. Larger samples may be useful to carry out a range of tests to determine the most appropriate response/clean-up strategy. MCA can advise when and why such an approach is desirable.

4. METHODS OF COLLECTING SAMPLES

When liquid samples are skimmed off the surface of the sea, care should be taken to ensure that the sample contains sufficient oil. Various techniques may be adopted to skim thin layers of oil from the waters' surface and consolidate using a bucket with a hole.

Care should be taken to minimise contamination of liquid samples by solid matter. Oil deposited on rocks or other impervious materials should be scraped off and placed directly into the sample container. Lumps of tarry or waxy pollutant should be placed directly into sample containers; no attempt should be made to heat or melt these samples to enable them to flow into a container. The sample container should be sealed as soon as possible to minimise evaporation of the higher fractions.

Oil adhering to seaweed, small pieces of wood, sand, plastic, material, cloth, vegetation or other debris should be dealt with by placing the complete specimen comprising oil and support material into the sample container.

5. BOTTLING, SEALING, PACKAGING AND BOXING OF SAMPLES

All samples should be securely packed and sealed, using screw topped containers and UN approved fibreboard boxes to ensure safe carriage of the sample. These have been supplied to HM Coastguard Stations and MCA Marine Offices for use by MCA Staff. In consultation with CPB, MCA sampling bottles can be made available to local authorities.

As proof against unauthorised opening, the sample container should be sealed with wire and a lead or sealing wax seal. Alternatively, adhesive labels with a signature stuck on the bottle top in such a way that they have to be broken to open the bottle are acceptable.

The bottle should then be placed inside a plastic bag, which should be sealed with a further adhesive label in the same way as for the sample bottle to ensure that it is not tampered with.

If it is necessary to take an oil sample where one of the standard containers above is not available the receptacle should be of glass with a screw-cover and a seal which would not be affected by the oil. Small (100ml) and medium (500ml) glass bottles are readily obtainable from chemists or hardware shops.

The use of closed metal receptacles or plastic jars is strongly discouraged as contact with metal or plastic can, in some cases, interfere with the analysis. Avoid the use of any metal tool made of nickel or vanadium

based alloys, as these metals occur naturally in crude oils and refined products and their levels may assist in the identification of the oil source.
When boxing the sealed samples for transport, the Peters and May (Dangerous Goods) Ltd, packing instructions should be followed, to ensure the integrity of the package for transport under Dangerous Goods regulations. Vermiculite should be used to surround the sample(s) in the box for added protection and to absorb any possible seepage. Make sure that the dangerous goods documentation is completed. Whenever possible, samples should be stored in refrigerators or cold rooms at less than 5 degrees C in the dark. These precautions are particularly important for samples containing water or sediment, but less so for bulk oil samples.

When ordering sample bottles it is important to consider the following:

- Wide necked bottles make sampling easier.
- Sample security can be achieved with locking cap seal.
- Ensure that no components of the bottle can interfere with analysis, e.g. waxed cap inserts.

6. LABELLING AND ADDRESSING OF SAMPLES

Care should be taken to ensure that every sample bottle is not only suitably sealed but also clearly labelled before being submitted to the MCA for analysis. It is important that a sample is positively identified, particularly where more than one is taken during an incident. It is of vital importance to maintain continuity in the chain of evidence. MCA recommend that each sample is labelled *and* is accompanied by more detailed information set out on a standard proforma. The form accompanying each container should therefore provide the following details: -

a. An identifying number:

year	2 digits
month	2 digits
day	2 digits

and the initials of the official in charge of taking the samples.
For example 02/04/17/JS = Sample taken on 17th April 2002 by John Smith

b. Description of samples.

c. Position from which sample was taken, grid reference if possible.

d. Date and time of sampling.

e. Purpose for which sample was taken.

f. If known, suspected source, e.g. name of tanker or ship.

g. Whether or not dispersants have been used and, if known, their type and make.

h. Method of sampling (description of sampling device and any possible contamination).

i. Name, address and contact details of person taking the samples and of anyone witnessing the taking of it.

If possible the following information would also be helpful:

j. Wind direction and velocity.

k. Air and water temperature.

l. Sample descriptions, i.e. viscosity, colour and contaminants.

m. Description of the oil spill, i.e. distribution and consistency.

An example of the recommended oil pollution sample standard label can be found in Appendix A. The recommended sample form is at Appendix B.

To assist with any subsequent investigations it is important that a letter is sent to MCA quite independently of the sample (but a copy should be sent with the samples), setting out details a to m, where available.

7. TRANSPORTATION OF SAMPLES

If a sample needs to be analysed the Counter Pollution Branch will contact their contractor to arrange for the sample to be collected by courier and analysed.

Please ensure that samples are labelled correctly and securely packed in UN approved boxes to avoid breakage. It is important that the standard proforma described in section 6 should also be included with the sample along with all carriage documentation. To facilitate sample transportation, clear information on the number of samples to be collected, the location they need to be collected from and a contact name and phone number must be given to Counter Pollution Branch.

8. HANDLING OF SAMPLES FOR BONN AGREEMENT STATES

In cases where samples are taken at the request of a contracting member of the Agreement for Co-operation in Dealing with Pollution of the North Sea by Oil, the Bonn Agreement, the Counter Pollution Branch would be the focal point for processing the samples for either analysis or onward transmission to the requesting member state. The results of such tests would not be made public until the contracting party involved was informed.

SECTION 15: SPILL SAMPLING

15.1 OIL POLLUTION SAMPLE – STANDARD LABEL

OIL POLLUTION SAMPLE – STANDARD LABEL

ID No.	Date/Time	Location) (Grid Ref)	Name and Address of person taking sample
.....			

For continuity of evidence: Please complete clearly
Sample passed to:

Date	Name	Address	Signature
.....			
.....			
.....			
.....			

OIL POLLUTION SAMPLE - STANDARD LABEL

ID No.	Date/Time	Location) (Grid Ref)	Name and Address of person taking sample
.....			

For continuity of evidence: Please complete clearly
Sample passed to:

Date	Name	Address	Signature
.....			
.....			
.....			
.....			

15.2: OIL POLLUTION SAMPLE: STANDARD FORM

Collection of oil samples - This form to be completed by person taking sample If in doubt please refer to MCA STOp Notice on sampling. Remember to complete sample jar label and sign		
A	ID Number - YY/MM/DD - with initials of person taking sample	
B	Sample description	
C	Location of sample – OS Grid Ref or Lat/Long if possible	
D	Date and time of sample collection	
E	Purpose for which sample was taken	
F	If known, suspected source	
G	Were dispersants used?	
H	Method of sampling (device?)	
I	Name, address, e-mail address & Tel No of person taking sample and any witnesses	
If possible the following information would also be helpful		
J	Wind speed and direction	
K	Air and Sea Temperature	
L	Sample description, viscosity, colour, any contaminants?	
M	Description of the oil spill, distribution and consistency	
Original form to be kept with sample - please send copy of the form to the Counter Pollution Branch of the MCA - Bay 1/11, Spring Place, 105 Commercial Road, Southampton, SO15 1EG Tel:023 8032 9485		

15.3: SAMPLE LABEL FORMAT FOR PROCURATOR FISCAL

DATE: .....

TIME: .....

NATURE OF SAMPLE: .....
(description) .....
.....

SAMPLED AT: .....
(Site / positions) .....
.....

SAMPLED BY: .....
Print name
SIGNATURE .....

WITNESSED BY: .....
Print name
SIGNATURE .....

REFERENCE NUMBER OF TAMPER PROOF PLASTIC TAG .....

SECTION 16: BONN AGREEMENT COLOUR CODES

Code 1 – Sheen (< 0.3 µm)

The very thin films of oil reflect the incoming light slightly better than the surrounding water and can therefore be observed as a silvery or grey sheen. All oils in these thin layers can be observed due to this effect and not the oil colour itself.

Oil films below approximately 0.04 µm thickness are invisible. In poor viewing conditions even thicker films may not be observed.

Above a certain height or angle of view the observed film may disappear.

Code 2 – Rainbow (0.3 µm – 5.0 µm)

Rainbow oil appearance represents a range of colours, yellow, pink, purple, green, blue, and red, copper, orange; this is caused by an optical effect and independent of oil type.

Depending on angle of view and layer thickness, the distinctive colours will be diffuse or very bright.

Oil films with thicknesses near the wavelength of different coloured light, 0.2 µm – 1.5 µm (blue, 400nm or 0.4 µm, through to red, 700nm or 0.7 µm) exhibit the most distinct rainbow effect. This effect will occur up to a layer thickness of 5.0 µm. Bad light conditions may cause the colours to appear duller.

A level layer of oil in the rainbow region will show different colours through the slick because of the change in angle of view. Therefore if rainbow is present, a range of colours will be visible.

Code 3 – Metallic (5.0µm – 50 µm)

The appearance of the oil in this region cannot be described as a general colour and is oil type dependent. Although a range of colours can be observed, blue, purple, red and greenish the apparent colour is not caused by interference of light or by the true colour of the oil. The colours will not be similar to 'rainbow'. Where a range of colours can be observed within a rainbow area, metallic will appear as a quite homogeneous colour that can be either blue, brown, purple or another colour. The 'metallic' appearance is the common factor and has been identified as a mirror effect, dependent on light and sky conditions. For example blue can be observed in blue-sky conditions.

Code 4 – Discontinuous True Colours (50 µm – 200 µm)

For oil slicks thicker than 50 µm the true colour will gradually dominate the colour that is observed. Brown oils will appear brown, black oils will appear black. The broken nature of the colour, due to thinner areas within the slick, is described as discontinuous. This is caused by the spreading behaviour under the effects of wind and current.

'Discontinuous' should not be mistaken for 'coverage'. Discontinuous implies true colour variations and not non-polluted areas.

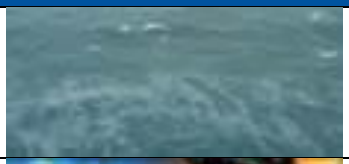
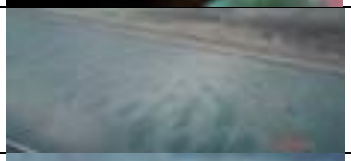
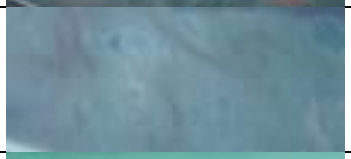
Code 5 – True Colours (>200 µm)

The true colour of the specific oil is the dominant effect in this category.

A more homogenous colour can be observed with no discontinuity as described in Code 4.

This category is strongly oil type dependent and colours may be more diffuse in overcast conditions.

Table 1: Oil Characteristics

Code	Oil Appearance / Colour	Pictorial	Quantity (Tonnes / km²)	Litres per km^2
1	Sheen (Silvery / Grey)		0.04 to 0.30	40 – 300
2	Rainbow		0.30 to 5.0	300 – 5000
3	Metallic		5.0 to 50	5000 – 50,000
4	Discontinuous true oil colour		50 to 200	50,000 – 200,000
5	Continuous true oil colour		More than 200	More than 200,000

16.1: ESTIMATING THE SIZE OF A SPILL

It is important to determine the size of the spill and to classify it. **Where possible, calculate the volume of oil spilled from methods other than the evaluation of a spill on the sea for example from:**

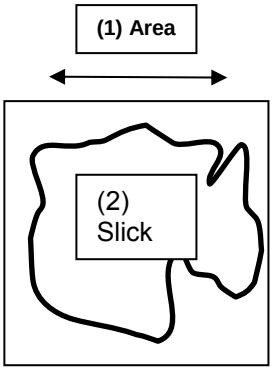
- volume of diesel in hose;
- lost or unaccounted volume of diesel or oil.

If an estimate of the spill size cannot be determined from operational information, a visual inspection may be made by observing the slick on the sea surface. Although this can be performed from a pier or vessel, best estimates are made during aerial surveillance flights. When using this technique, bear in mind that the entire area of the slick may not be visible and that this can only provide an order of magnitude estimate of the amount of oil spilled. The following tables and graphs should be used to assist you to make a best estimate of spill size.

Calculation of the volume of oil spilled from the appearance of oil film on water

Estimate total size of the area as a square or rectangle (in km) ie maximum extremities of the slick.

1 Assess the area affected by the slick in km^2 calculated as a % of the total area in (1).
2 Estimate the area covered by each colour of oil, calculated as a % of the total area affected.
3 Multiply the area covered by each colour by the appropriate figure in the oil quantity table below.
4 Adding all of the colour figures will give the total quantity of oil in m^3 within the slick.



Example: if the total area of a rectangle is $30km^2$ and the area within that covered by oil is estimated to be about 75% then total area affected is $22.5km^2$. If the area covered by "blue" oil is 40% then that will equal $9m^3$, area covered by "rainbow" oil is 60% then that will be $4m^3$; total amount of oil spilled will then be about $13m^3$.

Table 2: Oil Quantity estimation by colour

Code	Appearance/colour	Quantity (m^3/km^2)
1	Silvery	0.02
2	Grey	0.1
3	Rainbow	0.3
4	Blue	1
5	Blue/brown	5
6	Brown/black	15-25
7	Dark brown/black	>100

Mass Balance Calculations

With the variable compositions of oils the initial volume spilt can often be significantly different to the amount which remains on the water over time or is stranded on the shoreline. This is because of the processes of evaporation, dissolution and emulsification. Whilst some idea of the magnitude of these processes can be ascertained from an examination of the physical properties of the fresh oil this can be only a guide.
On the NOAA website: http://response.restoration.noaa.gov there are a number of tools available to oil spill responders, one of these is a software package called ADIOS 2 which is available for free download. This application has a database of oil characteristics and by entering a number of simple parameters (volume spilt, wind speed, time since spill) it will calculate and graph changes in the mass balance ie: amount evaporated, amount emulsified, etc. This gives a much better overview of the changes through time of the amounts of material likely to be encountered.

16.2: SLICK TRACKING AND SURVEILLANCE

After the initial spill assessment has been completed, the slick should be tracked and monitored throughout the incident to evaluate the extent of the slick, monitor the movement of the slick and decide on the appropriate action. This will occur as follows:

1 In the early stages of the incident, the slick may be monitored from the pier side or harbour vessel. Figure 1, which predicts the movement of oil on water as a function of wind and current, should be used to assist this.

2 For large spills, the Oil Pollution Officer should mobilise aircraft to undertake aerial surveillance. Surveillance should be undertaken at least twice per day until such time as no oil is visible on the sea surface. Scrabster Harbour Trust will notify the HM Coastguard of its intentions to use aerial surveillance. Aerial surveillance will be undertaken as soon as possible after an incident has occurred.

Table 3: Slick surveillance/tracking checklist

Checklist	Notes
Determine extent and co-ordinates of slick	
Chart slick size, growth patterns and affected area(s); estimate quantities if possible.	Estimate by direct observation and use Annex 34.
Carry out slick trajectory predictions	Use vectors (⇒ Figure 1 over page)
Follow direction of movement of slick	
Identify heaviest concentrations of oil	Likely to be at downwind leading edge of spill
Identify onset and progress of water in oil emulsion formation	Heavy oil (eg intermediate fuel oil) will change in appearance soon after spill; in initial stages, the thicker parts will appear as dense, black areas, but as emulsification takes place, the colour will change to brown, orange or yellow.
Watch for any flocks of birds	Refer to Environmental Maps
Watch for any oil floating subsurface	
Watch for break up of slick and determine direction of movement of any oil patches	
Report on progress of natural dispersion	This is likely to be good for diesel or base oil hydrocarbon spills
Report on effectiveness of response	If dispersants are employed watch particularly for signs of dispersant not working.

In addition to gravity spreading which will cause the oil to cover a progressively larger area, the oil moves on water as a function of wind and current – the current has a 100% influence and the wind a 3% influence. A slick will continue to spread until a thickness of about 1-mm is reached. Once this stage is reached, the slick may break up into windrows, which will further increase the spread of the slick. To plot the movement of a slick, the following steps should be taken in association with Figure 1:

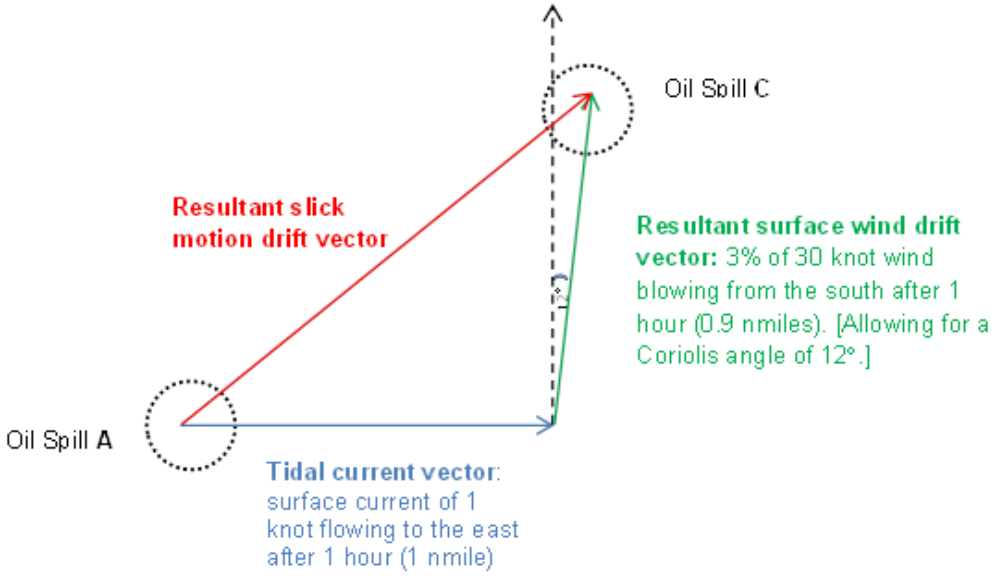
1 Plot 100% of the current speed on an appropriate chart in the direction that it flows (ie if the current is 1 knot, then plot 1 nautical miles on an appropriate chart).

2 From this end point then plot the wind direction as 3% of its value in the direction it is blowing (ie if the wind is 30 knots, then plot 0.9 nautical miles in the direction it is blowing).

3 Point B will be the centroid of the oil spill 1 hour later and vector AB its predicted trajectory.

For best results, the plot should be updated hourly and verified with overflights.

Figure 1: Manual prediction of oil slick trajectory prediction



Computerised Slick Tracking

There are a number of software applications used to predict the movement of oil spills. Over the years these have become increasingly sophisticated with a library of oil types and aspects of the 3-Dimentionality being incorporated. However they remain fundamentally limited to the quality of the environmental data ie: wind speeds, current speeds, fed into them. Thus they are useful tools to forecast slick movement when visual observation is impossible but visual observation should always be used to calibrate and correct the forecasts. Within confined waters, as would be found around Scrabster, the timescale to beaching is often so short to highlight further limitations in the modelling packages.

SECTION 17: POLREP (POLLUTION REPORT) FORM

To MCA – MRCC - Aberdeen
Copy to Agencies as required
From ……..

Part 1 – Information which should be provided in an initial pollution report	
A.	**Classification of Report:** **(i) doubtful (ii) probable (iii) confirmed** **(Delete as necessary)**
B.	**Date: _____ Time: _____ pollution observed** **Identity of Observer/Reporter: _____**
C.	**Position of Pollution _____** **(by latitude and longitude if possible, state range and bearing from some prominent landmark)** **Extent of Pollution _____ litres/barrels/tonnes** **Size of polluted area _____from _____** **(from where sighted)** **(estimated amount of pollution, e.g. size of polluted area, number of tonnes of oil spilled; or number of containers, drums, etc. lost. When appropriate give position of observer relative to pollution)**
D.	**Wind Speed: _____ knots; Direction from: _____** **Tidal status at time pollution observed: _____ after/before HW/LW**
E.	**Weather Conditions and sea state:** **_____ sea state/ wave height _____ metres**
F.	**Characteristics of Pollution:** **Type: _____** **(e.g. oil, crude, diesel: packaged or bulk chemicals UN Number if known, garbage)** **Appearance:_____** **(e.g.: liquids, floating solid, liquid oil, semi-liquid sludge: tarry lumps; weathered oil, discoloration of sea; visible vapour; etc.)**
G.	**Source of Pollution: _____** **(from vessel or other undertaking)**

Cause of Pollution: _____

_____

_____

(apparent deliberate discharge or casuality. If the latter give a brief description. Where possible name, type, size, nationality and Port of Registry of polluting vessel. If vessel underway give course speed and destination if known)

H. **Details of other vessels in the area:** _____

_____

(to be given if the polluter cannot be identified and the spill is considered to be of recent origin)

J. **Photographs taken** **Yes / No**

Sample taken for analysis **Yes / No**

K. **Remedial action taken, or intended, to deal with spillage:** _____

_____

_____

L. **Forecast of likely effect of pollution:** _____

_____

(e.g. arrival on coastline, with estimated timing)

M. **Names of those informed other than addressees:**

_____

_____

N. **Any Other relevant information:** _____

_____

_____

(e.g. names of other witnesses, references to other instances of pollution pointing to source)

Part 2 – Supplementary information to be provided later
(this part may be disregarded when POLREPS are for UK internal distribution only)

O. **Results of sample analysis** _____

_____

P. **Results of photographic analysis**

_____

_____

Q. **Results of supplementary Inquiries:** _____

_____

(e.g. inspection by Surveyors, statements from ship's personnel, etc. if applicable)

R. **Results of mathematical models** _____

_____

SECTION 18: MCA OPRC EXERCISE GUIDELINES

The following provides guidance on planning and conducting exercises which have been designed to evaluate the contingency plan and include a degree of training for any personnel likely to be involved in an oil spill incident.

Each port / harbour / oil handling facility must participate in exercises in accordance with the provisions within their OPRC Compliant Oil Spill Contingency Plan.

The objectives of any exercise need to be pre-agreed, enabling the exercise planners to tailor the exercise to the needs of the players. For example, it may be desirable for different aspects of the plan to be exercised separately such as notifications or equipment mobilisation / deployment. A larger exercise, encompassing all aspects of the response, may not explore the detail of each of these individual themes but will help promote a wider understanding of the purpose and scope of the whole plan. Whatever the scale or type of exercise, the invited participation by the appropriate environmental and regulatory authorities, and others, will aid the collective understanding of the plan, to the benefit of all involved.

The following list gives examples of exercise types that can be undertaken.

Notification Exercise - announced or unannounced

Used to test alert and call-out procedures for response teams, test communication systems, availability of personnel, evaluate travel options and arrangements and test the transmission of information. Such an exercise can be used to check the validity of contact information within the plan and should be carried out at least twice per year.

Mobilisation Exercise

May be used to test the actual mobilisation times of individuals and contracted resources. Ideally mobilisation should be tested without prior warning, although the requirement for an unannounced callout will need to be balanced against the practical difficulties and financial penalties of doing so. Whilst this important aspect of the response may be exercised in isolation, it may be seen as beneficial to incorporate this as a specific objective within the scope of another of the framework exercises.

Desk-Top Exercise

Whilst the degree of complexity can be decided upon by the exercise coordinator, a table-top exercise can be used to test the emergency management knowledge and capability. It provides individual and also team training, enabling personnel to be familiarised with the various roles and responsibilities and identification of resources. A table-top exercise can also explore the interaction between the different parties involved, particularly by testing the principles of the response strategies. These exercises can be used to test coordination with local authorities and the emergency services. Some organisations, which have peripheral responsibilities, may be role-played. During this exercise the capability to respond to a Tier 2 type spill and initiate the primary actions in the event of a Tier 3 response can be put to the test. As discussed above, it can be effective to combine this exercise with an equipment mobilisation / deployment exercise, but in any case a table-top exercise of the incident management structure should be incorporated within the exercise programme at least annually.

Incident Management Exercise - requires significant planning

These exercises can test the capability of local teams to respond to Tier 1, Tier 2 and Tier 3 type incidents, providing experience of local conditions and spill scenarios, enhancing individual skills and teamwork, integrating the roles of external bodies and organisations. MCA considers that each port, harbour and oil handling facility *must* hold an Incident Management Exercise, incorporating equipment deployment to a Tier 2 level at least every three years, following initial plan approval. This is likely to incorporate, or be combined with a Tier 1 equipment deployment. Such exercises need, so far as possible, to involve actual involved organisations to represent a real emergency. However, if this cannot be achieved, role-playing personnel can be used to simulate roles and responsibilities.

A Balanced Programme of Exercises

Different types of exercises will test different facets of the plan whilst even the most ambitious Incident Management Exercise cannot be expected to test every aspect of the plan. Notification exercises, which are useful to update contact details within a plan, should be undertaken with greater frequency than equipment mobilisation exercises, for example. Before an exercise takes place, the appropriate authorities should be notified. This notification procedure should be formally documented and a copy of this documentation held and logged within the port / harbour / oil handling facility.

A typical programme of exercise frequency is as follows:

EXERCISE TYPE	FREQUENCY
Notification & Mobilisation Exercises	Twice per year
Table-top Exercise (may incorporate mobilisation and deployment of local response equipment)	Once per year
Incident Management Exercise (IME) (will incorporate mobilisation and deployment of resources up to Tier 2 Level)	Once every 3 years*
*In an instance where a port, harbour or oil handling facility considers this requirement to be unduly onerous on the basis of the risk assessment, they may submit an alternative exercise programme to the Regional CPSO for consideration and approval, on an individual basis. In some circumstances it may be permissible to undertake an Incident Management Exercise in the fourth year of the plan's five-year life-cycle providing for the 'lessons-learned' to be captured within the final plan review/update year.	

Sharing of exercises

In a situation where a group of ports and harbours within a distinct geographic region and sharing the same Tier 2 contractor, there may be scope to undertake a joint exercise at one of the ports. Key individuals from nearby ports could be invited to observe or participate, thus gaining from the experience of the hosting port. In any case, each plan holder must host their own exercise involving mobilisation and deployment of their Tier 2 response, at least every three years.

A post exercise/incident form should be completed and forwarded to the Regional CPSO, and all relevant plan holders, each time an exercise is carried out.

SECTION 19: SENSITIVE AREAS INFORMATION

19.1 ENVIRONMENT GROUP

An Environment Group (EG) will not normally be formed for a local spill, although there are circumstances when an EG could be formed, depending on the locale of the spill relative to sensitive resources and type of oil spilt. With a local spill {Tier 1) individual organisations will normally deal with the incident as defined by the NCP and local authority plans.

An EG will be formed for regional and national (i.e. Tier 2 and Tier 3) spills at the discretion of the MCA. The response to any maritime incident in the UK requiring a national {Tier 3} or regional {Tier 2} response, of whatever scale, involves the establishment of an Environment Group. However, the MCA under all situations will guide the activation of the EG for the scenario.

Key Roles in the EG will be filled by individuals most suited to the job and purpose (STOp 2/2009). The scope of the Environment Group functions will be directly proportional to the scale and nature of the incident, its geographical location, extent, severity, pollutant involved, potential hazard to human health and environmental sensitivities. The scale of the incident and response and their constituent phases are likely to evolve over time and the functions of the EG will need to be graduated to meet changing requirements, escalating or diminishing in the input to each phase over time.

As stated in the STOp Notice 2/2009 the Harbour Authority should consult with the EG. This will be at the discretion of all parties.

The EG will have an Environment Liaison Officer (ELO) in each response unit established to deal with the incident. The chair of Environment Group will nominate the ELO for each response unit, taking into account the location, nature and scale of the incident, and the sort of expertise that each unit is most likely to require.

Core members of EG will comprise as a minimum representatives from:

- Scottish Natural Heritage
- Marine Scotland
- Scottish Environment Protection Agency

The location of the EG will depend on the nature and location of the incident and will be agreed with MCA.

19.2 THE ROLE OF THE SOSREP

The Secretary of State's Representatives (SOSREP) role has been created as part of the Government's response to Lord Donaldson's Review of Salvage and Intervention and their command and control.

The report identified that during salvage activities, ultimate control over all operation should become the responsibility of a single designated Secretary of State's Representative (SOSREP) for the purpose of maritime salvage and intervention and that the SOSREP could not abdicate his responsibility. Whether or not he exercised any intervention powers at all the SOSREP would be in no doubt what so ever that he was in charge and would be held responsible for the outcome of all plans and decisions. Put simply – to ignore a situation is not an option.

The powers of intervention with which the SOSREP is vested could indeed not be more far reaching. They are however, presently wider for response to pollution than for safety. They provide that the SOSREP can direct a person to take, or refrain from taking "any action of any kind whatsoever". Indeed, if the SOSREP is not convinced that the person directed can, or will, take the action then he may cause the action to be taken himself – even if this includes the total destruction of a vessel. The legislation also creates criminal offences for non-compliance with a Direction. It should be noted that Directions must be given to specified persons who are those being in charge of a vessel or a port or harbour authority.

In the event of an incident requiring salvage operations the SOSREP will decide whether it is necessary to set up a Salvage Control Unit (SCU). If the size of the incident merits the establishment of a SCU, the SOSREP will travel to the scene at the appropriate time. Upon establishment of a SCU, the Marine Services Manager will become an active member of the SCU team liaising with the SOSREP throughout the course of the incident. The members of the SCU are:

- SOSREP
- The Salvage Manager from the salvage company appointed by the ship owner
- The Marine Services Manager, if the incident involves the Harbour of its services
- A single representative nominated by agreement between the ship owner and the insurers (for both the physical property and their liabilities)
- A counter pollution and salvage officer
- An Environmental Liaison Officer, nominated by the Chair of the Environment Group
- Coastguard liaison office; and
- If SOSREP decides to appoint on, SOSREP's personal salvage advisor.

The SCU will be located in the Emergency Response Centre on Castle Road, adjacent to the main gate of the site. Facilities available at the office include mobile phone coverage, Local Area Network (LAN) connectivity, Wi-Fi connectivity, and full VHF radio coverage of the area.

SECTION 20: ENVIRONMENTAL SENSITIVITIES AND PRIORITIES FOR PROTECTION

20.1 GENERAL STRATEGY

If anything other than small operational spills occur, SEPA and SNH should be contacted.

Where possible, considering safety and local conditions, any floating oil on the water surface should either be allowed to degrade naturally or be removed physically – no chemical dispersants are to be used. Removal should particularly be attempted where this may significantly reduce the possibility of quantities of oil coming ashore on areas of recreational and environmental importance. Floating absorbent should be used when necessary to prevent oil coming ashore and to reduce the amount of oil on the water.

Where access to shoreline is possible, considering safety and local conditions, mechanical methods to clean up oil may be used – no chemical dispersants are to be used – otherwise oil should be left to degrade naturally.

Where oil comes ashore, it should generally be left to degrade naturally although some manual removal (but not mechanically) may be possible. No chemical dispersants are to be used during this treatment. In some instances the use of protective or deflective booms to reduce oil on the shore may be possible.

In general, any areas within the Sites of Specific Scientific Interest (SSSIs) should be protected from gross disturbance e.g. by use of vehicles. Land within the SSSI should not be used for wider oil spill control/ co-ordination works.

20.2 SENSITIVE AREAS

Table 4: Protected Areas Surrounding Scrabster Harbour

Location	Area Description
Holborn Head	SSSI
Pennylands	SSSI
North Caithness Cliffs	SPA

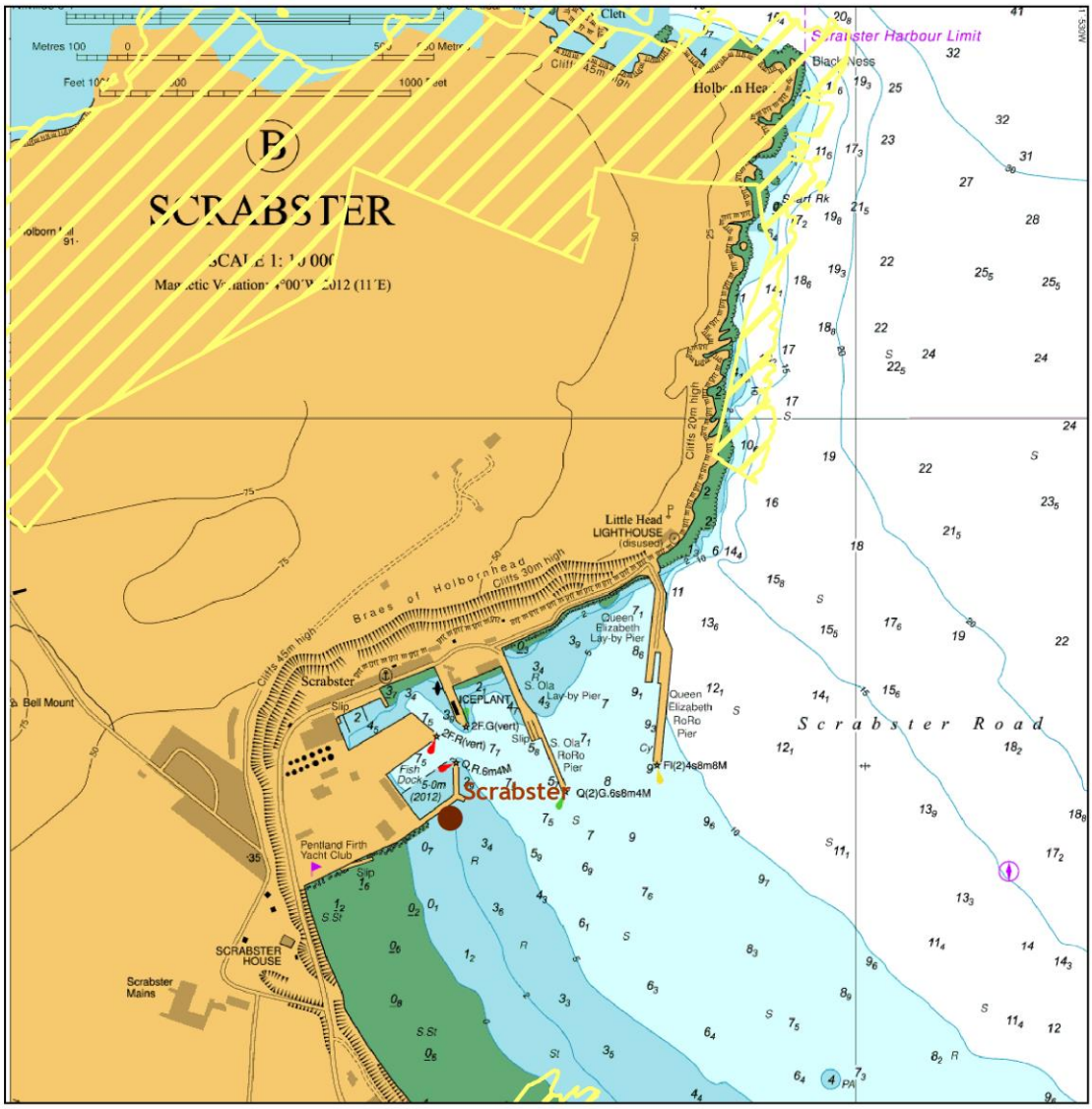
Table 5: Sites of special scientific interest (SSSI'S)

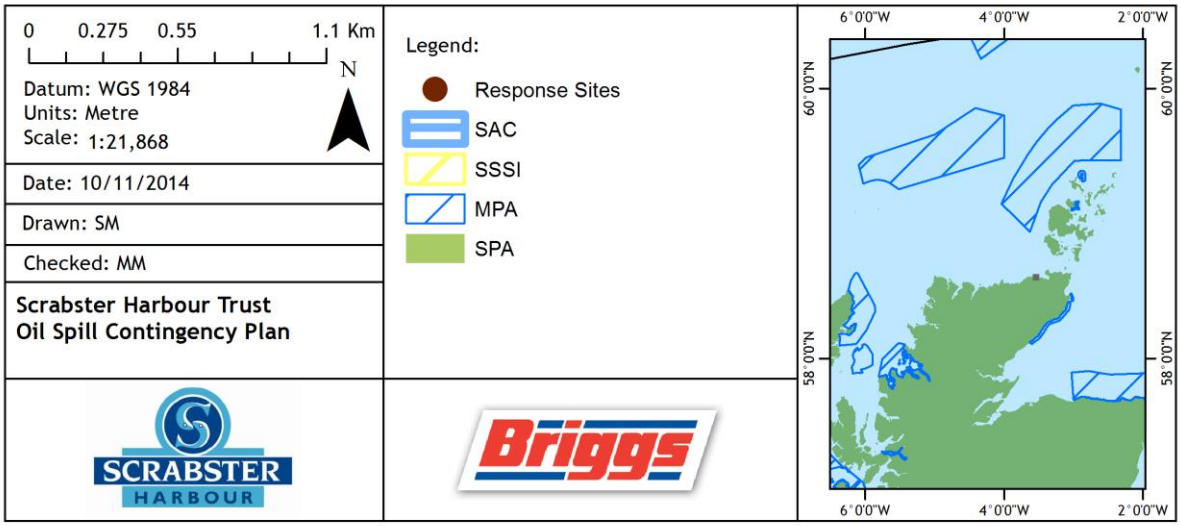
Name of Site	Description
Holborn Head	Holborn Head SSSI lies 2km northwest of Thurso. The site covers 4.5km of coast west of the lighthouse at Scrabster. The site is designated for its nationally important Middle Devonian fossil fish and coastal vegetation. The site supports a range of species-rich maritime heath and maritime grassland vegetation.
Pennylands	Pennylands SSSI is located on the foreshore between Thurso and Scrabster on the north coast of Caithness. The site has been notified due to the exposure of a sequence of layers of sedimentary rocks which contain both fossil fish and evidence of the geography and environment in which the fish lived. These rocks were deposited around 380 million years ago during the Middle Devonian geological era. The cliff and foreshore rock outcrops at Pennylands provide important exposures through sedimentary rocks in the youngest part of the Caithness Flagstones and the transition to the overlying John O'Groats Sandstone.

Table 6: Special Protection Areas (SPA)

Name of Site	Description
North Caithness Cliffs	North Caithness Cliffs SPA is of special nature conservation and scientific importance within Britain and the European Community for supporting very large populations of breeding seabirds. The seaward extension extends approximately 2km into the marine environment to include the seabed, water column and surface.

Figure 2: Environmental Sensitivities





20.3 DISPERSANT USE

It is not the Scrabster Harbour Trust's policy to use dispersants unless a 'force majeure' situation exists.

Under the provisions of Part 4 of the Marine (Scotland) Act 2011, as read with regulation 15 of The Marine Licensing (Exempted Activities)(Scottish Inshore Region) Order 2011 (SSI 2011 No 204), and regulation 13 of The Marine Licensing (Exempted Activities)(Scottish Offshore Region) Order 2011 (SSI 2011 No. 57), no deposit may be made in the sea of any (a) marine chemical treatment substance, (b) marine oil treatment substance, or (c) marine surface fouling cleaner in an area of the sea where the depth of water is less than 20 metres or within one nautical mile of any such area except with the prior approval of the Scottish Ministers. This includes any area submerged at mean high water springs (eg beaches and other inter-tidal zones). Scottish Ministers are the marine licensing authority for internal waters, UK territorial waters, and UK controlled waters adjacent to Scotland, while designated staff at the Marine Scotland Marine Laboratory, Aberdeen act as the first point of contact within the Scottish Government in the event of an oil or chemical spill in these specified sea areas.

For Scottish sea areas outwith shallow waters (the 20 metres plus one nautical mile rule) there is no such statutory obligation. Those responsible for responding to oil and chemical spills are however advised that it is UK Government/Scottish Government policy that the appropriate licensing authority should be consulted in advance of all proposals to use treatment substances except under "force majeure" conditions, eg where people's health is at risk, or the safety of a vessel or offshore installation is threatened. It is therefore essential to consult Marine Scotland for advice in advance of treatment operations commencing about the implications for fisheries and the marine environment of using treatment substances except where other arrangements have been approved in advance eg where a standing approval to spray dispersants has been applied for and agreed.

To request approval for dispersant spraying, please contact the Marine Scotland Duty Officer as detailed below:

Duty Officer

Mobile	07770 733 423
Fax	01224 295 524
E-mail	spillresponse@marlab.ac.uk (should normally only be used once initial contact has been established by phone.)

In the event that a call to the mobile phone fails to connect with the duty officer then a call should be made to the Marine Scotland Marine Laboratory switchboard: (01224) 876 544.

All enquiries about this information should be addressed directly to:

MARINE SCOTLAND
Marine Laboratory
PO Box 101
375 Victoria Road
ABERDEEN
AB11 9DB

Tel: 01224 295 579
Fax: 01224 295 524

SECTION 21: BOOMING AND WASTE DISPOSAL

21.1 BOOMING

In general, spills should be contained in the smallest area possible. This can be achieved by drawing booms across corners of docks or around vessels to capture the oil.

N.B: No recovery or containment of any oils or spilt fluids should be attempted without donning the appropriate Personal Protective Equipment (PPE).

21.2 WASTE DISPOSAL OPERATION

NB: Within this Plan waste oil refers to oil which has been contained and recovered as the result of a spill or a pollution incident.

The safe handling and disposal of recovered oil is governed by relevant sections in the following legislation:

a) The Environmental Protection Act 1990;

b) The Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991;

c) Control of Pollution (Amendment) Act 1989;

d) The Waste Management Licensing Regulations 2011;

e) Special Waste Regulations 1996 (as amended);

f) The Water Environment (Controlled Activities) (Scotland) Regulations 2011

g) Landfill (Scotland) Regulations 2003

h) Water Environment (Oil Storage) Regulations 2006

If oily waste material is produced as a result of a pollution incident then the polluting party (operator) has a duty of care to ensure that the waste is contained, handled, transported and ultimately disposed of in an appropriate manner. If the material is to be handled by contractors then the operator (to reduce liabilities to a minimum) has to ensure that each contractor has the relevant transportation registration and waste management licences, where applicable.

SNH and SEPA (as the Waste Regulatory Authority) should be consulted on any proposal to dispose or store waste material to ensure that sensitive wildlife areas such as designated sites are not affected. SEPA should also be consulted to ensure compliance with the relevant legislation relating to controlled waste and the protection of controlled waters. In addition HM Revenue and Customs must be notified if recovered oil is brought ashore by dedicated oil recovery vessels. Landing should not be hindered by the absence of an official from HM Revenue and Customs; however, the Operator should maintain a careful log on the quantity and nature of the recovered oil.

The options for waste disposal or treatment of material, be it oily liquids or oiled solids are:

a) Temporary store, clean, stabilise and then recover or re-use;

b) Temporary store and then take to appropriate disposal site for burial;

c) Take to a refinery / incinerator (mainly for oily liquids only);

d) Take to appropriate disposal site.

Each disposal option is examined below with various points for consideration highlighted.

a) Temporary storage / clean, treat, stabilise, recover, reuse

This option aims to store the material temporarily and then, slowly over the ensuing period, to clean or stabilise it and then to recover or reuse it. In most cases this is the best practicable environmental option (BPEO), avoiding the risk of changing what was a marine oil pollution problem into an inland surface pollution problem or groundwater pollution problem.

From temporary storage the contaminated material can be stabilised with cement, lime, clay, organic binders and asphalt. The characteristic of each product needs to be considered when determining the ultimate disposal route or any perceived end use. It is important to note that the treatment of wastes also comes under the waste management licensing system. Therefore, any strategy to deal with the waste in this manner can only be developed through close liaison with the Local Authority concerned and SEPA.

SEPA should be consulted on any intention to temporarily store oil collected on shores and beaches under paragraph 41 Exemption under Schedule 3 of the Waste Management Licensing Regulations 1994. Furthermore, waste oil is likely to be classified as Special Waste and should be treated as such until otherwise determined. It would therefore be subject to the Special Waste Regulations (as amended) 1996. Mixes of crude oil / sand and oil / seawater etc would be considered as Special Waste if the percentage of carcinogenic compounds is above 0.1% or where the waste would be considered as an absolute entry in the European Waste Catalogue (EWC 1994). It is therefore likely that oily beach materials and oil / water liquids would have to be handled as Special Waste.

b) Temporary storage and take to an appropriate disposal site for burial

The reasons for constructing a temporary storage site are as follows:

1. There is no immediate disposal outlet for large quantities of oil / sand mixture or for oil / water mixtures and clean-up cannot be slowed or stopped.
2. The equipment used to clean beaches is usually labour intensive and therefore requires an immediate transfer area adjacent to the site to be provided.
3. The nature of the roads precludes high traffic densities.
4. The in situ treatment of contaminated material is often preferable to removing large quantities of material from the shoreline.

In addition, under the above legislation, the temporary storage site itself may require a Registered Exemption from Waste Management Licensing. Each site will have to be constructed in a specific manner. It is essential that the construction of temporary storage sites be done through close liaison with the Local Authority concerned and SEPA.

SEPA should be consulted on any intention to temporarily store oil collected on shores and beaches under paragraph 41 Exemption under Schedule 3 of the Waste Management Licensing Regulations 1994. Furthermore, waste oil is likely to be classified as Special Waste and should be treated as such until otherwise determined. It would therefore be subject to the Special Waste Regulations (as amended) 1996. Mixes of crude oil / sand and oil / seawater etc would be considered as Special Waste if the percentage of carcinogenic compounds is above 0.1% or where the waste would be considered as an absolute entry in the European Waste Catalogue (EWC 1994). It is therefore likely that oily beach materials and oil / water liquids would have to be handled as Special Waste.

c) Take to a refinery / incinerator (mainly for oily liquids only)

This material should be removed from site by a licensed waste handling company who will then arrange for its disposal in an appropriate manner. If there is suitable access, oily liquids produced from a shoreline clean-up operation can be removed from site by road tanker.

If the oily liquids are onboard a dedicated recovery vessel following an at sea containment and recovery operation then it can be transferred across the quay, at a suitable berth, to a road tanker or other suitable waste reception facility. Alternatively this waste can be fed directly into the reception facility at a marine terminal of an oil refinery. It is the responsibility of the Ships Master to ensure that this waste is disposed of appropriately. However, the Harbour Authority must confirm that any contractors have the necessary licenses to handle and dispose of the waste. The disposal route should also be agreed with SEPA to ensure it meets with their satisfaction.

Waste oil is likely to be classified as Special Waste and should be treated as such until otherwise determined. It would therefore be subject to the Special Waste Regulations (as amended) 1996. Mixes of crude oil / sand and oil / seawater etc would be considered as Special Waste if the percentage of carcinogenic compounds is above 0.1%. It is therefore likely that oily beach materials and oil / water liquids would have to be handled as Special Waste.

d) Direct to appropriate disposal site

All disposal sites require a Waste Management Licence. The licence is specific to the type of material that can be disposed of at the site. There are only a few sites that are licensed to receive organic or chemically polluting materials (includes oily waste). The Landfill (Scotland) Regulations 2003 ban the landfill of liquid wastes including oily waste. There will be a charge levied by the site operator for depositing material at the site. In addition there is landfill tax / levy applied to all waste deposited in a landfill.

Furthermore, waste oil is likely to be classified as Special Waste and should be treated as such until otherwise determined. It would therefore be subject to the Special Waste Regulations (as amended) 1996. Mixes of crude oil / sand and oil / seawater etc would probably be considered as Special Waste if the percentage of carcinogenic compounds is above 0.1%. It is therefore likely that oily beach materials and oil / water liquids would have to be handled as Special Waste.

The transportation of Special Wastes generally requires that the Scottish Environment Protection Agency (SEPA) be informed before the waste is removed. This is done by filling in parts A, B and D of a Special Waste Consignment Note, available from the SEPA, which is sent to SEPA responsible for the receiving facility. This should be done at least three clear working days before the waste is to be moved.

However, in the event of an ‘emergency’ SEPA may waive the requirement for pre-notification. The licensed waste carrier completes part C of the Consignment Note and takes it with the load to the receiving facility. The licensed operator of the receiving facility then signs the consignment note to say that they have accepted the load and that they are authorised to manage it properly.

The requirement for pre-notification generally does not apply to special waste from ships. Therefore oil recovered at sea by a dedicated Oil Recovery Vessel could be discharged within a Harbour to an appropriate waste reception facility without having to pre-notify SEPA. However a consignment note will have to be supplied with each load sent for disposal.

To ensure that oily waste material is transported and disposed of in an appropriate manner, a licensed waste carrier and disposal company should be contracted. The Operator and Waste Disposal Company should then liaise with SEPA to confirm that the disposal route identified meets with their satisfaction.

21.3 WASTE DISPOSAL ACTION CHECKLIST

Oily Waste Generated from a Shoreline Clean-up Operation
Temporary storage / clean, treat, stabilise, recover, reuse

1. Discuss requirement to establish temporary storage sites along the shoreline with SEPA and the Local Authority.
2. If agreed, identify temporary storage sites in close liaison with SEPA and Local Authority.
3. Instruct Oil Spill Response Contractors to construct temporary storage sites.
4. Confirm treatment methods and ultimate disposal with SEPA and Local Authority.
5. In close liaison with the Oil Spill Response Contractors agree course of action and assist with the necessary arrangements where necessary.
6. Ensure all associated paperwork, i.e. consignment notes, is retained and catalogued.

Temporary storage and appropriate disposal site for burial

1. Discuss requirement to establish temporary storage sites along the shoreline with SEPA and the Local Authority.
2. If agreed, identify temporary storage sites in close liaison with SEPA and Local Authority.
3. Instruct Oil Spill Response Contractors to construct temporary storage sites.
4. Identify suitably licensed waste carrier to remove material from site.
5. Confirm with waste carrier the disposal route and ultimate disposal site. Liaise with SEPA to ensure that the disposal strategy is acceptable.
6. Ensure all associated paperwork, i.e. consignment notes, are retained and catalogued.

Take to a refinery / incinerator (mainly for oily liquids only)

1. Identify suitably licensed waste carrier to remove material from site.
2. Identify suitable facility to receive the waste.
3. Confirm with waste carrier the disposal route and ultimate disposal site.
4. Liaise with SEPA to ensure that the disposal strategy is acceptable.
5. Ensure all associated paperwork, i.e. consignment notes, are retained and catalogued.

Direct transportation to appropriate disposal site for burial

1. Identify suitably licensed waste carrier to remove material from site.
2. Confirm with waste carrier the disposal route and ultimate disposal site.
3. Liaise with SEPA to ensure that the disposal strategy is acceptable.
4. Ensure all associated paperwork, i.e. consignment notes, are retained and catalogued.

Oily Liquids Recovered at Sea and Held on a Dedicated Recovery Vessel

1. Notify HM Revenue and Customs that you intend to land recovered oil.
2. Identify suitable oil handling plant (refinery) to receive the waste.
3. If 2 is not available identify a harbour with a suitable berth for handling oils.
4. Identify a suitably licensed waste carrier to take the oily liquids off the vessel.
5. Confirm the disposal route with the waste carrier.
6. Notify Regulator and confirm that the identified disposal route meets with their satisfaction. Ensure all associated paperwork, i.e. consignment notes, are retained and catalogued.
7. The removal of landed ships waste that is special waste to:

    a. conveyance for transport outside the harbour area
    b. reception facilities within the harbour area
    c. by pipeline to reception facilities outside the harbour
    All require to be consigned. However, there is no requirement to pre-notify these movements and consignment notes can be SC coded.
    d. All oil wastes including fuels, mixtures, emulsification and spills are classed as Absolute Entries in terms of the regulations therefore there is no longer any percentage threshold of carcinogenic compounds; they are now special waste regardless. All waste oils with the exception of edible oils are considered special waste irrespective of their composition, biodegradability, synthetic nature or otherwise. There is no longer any threshold applicable to consider whether they are special waste or not.

Notify Regulator and confirm that the identified disposal route meets with their satisfaction. Ensure all associated paperwork, i.e. consignment notes, are retained and catalogued

Appendix 2.3 Navigational Risk Assessment

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NAVIGATIONAL RISK ASSESSMENT

Introduction

This Navigation Risk Assessment (hereafter referred to the NRA) forms one in a series of supporting documents in the Environmental Impact Assessment Report (EIAR). The NRA report has been prepared by Scrubstar Harbour Trust.

Background Information and Proposed Redevelopment

Scrabster Harbour is a Trust Port established in 1841 and managed by Scrabster Harbour Trust. Scrabster is located on the north coast of Caithness and has a grid reference of ND10437 70310. Scrabster is situated 1.5 miles northwest of the town of Thurso.

A Plan showing the current harbour layout is attached as annex 1 to this assessment. Similarly, a plan showing the harbour limits is also included as an annex 2.

Scrabster is the main commercial port on the north coast of the British Mainland. Scrabster is a multi-purpose port and current activities include:

- Lifeline ferry route to Orkney Islands
- Major UK landing port for Whitefish and Shellfish
- Support of Oil and Gas activity on Atlantic Margin
- Support of Marine renewables in the Pentland Firth and surrounding waters.
- Cargo operations including weekly fish cargo service from the Faroes
- Coastal tankers
- Cruise Vessels
- RNLI
- Leisure

Scrabster Harbour Trust propose to redevelop the existing St Ola Pier. Details are set out in Chapter 2 Project Description of the EIAR. The redevelopment seeks to redevelop an existing pier, rather than created a new pier structure. A drawing showing the extent of the redevelopment works and the impacts of navigation channels is attached as Annex 3.

This report assesses the navigational effects of the proposed redevelopment during the construction and in the operational phases.

Current Navigational Arrangements

Navigational arrangements are included in the Scrabster Harbour Trust byelaws 2003 which can be accessed by the following weblink.
http://www.scrabster.co.uk/wp-content/uploads/2015/03/Harbour-Byelaws.pdf
Part II of the Byelaws deals with navigational issues
Scrabster Harbour Trust has responsibility for maintaining the navigational approaches to the harbour. Where identified by the formal risk assessment, suitable lights are placed at strategic points to facilitate safe entry to the harbour. All Navigation lights are checked daily to ensure safety of Navigation.

Scrabster Harbour is manned 24hrs and all vessels must contact Port Control on VHF CH 12 before entering/exiting/manoeuvring within the harbour limits. The Harbour Trust appoints Pilots and although pilotage is not compulsory, it is recommended for first arrivals and vessels carrying dangerous goods.

Under the Merchant Shipping (Traffic Monitoring and Reporting Requirements) vessels are required to provide notification to their intended port of call at least 24 hours in advance. The requirement is applicable to all vessels of 300GT and over, with the following exceptions:

- fishing vessels under 45 metres loa
- traditional ships under 45 m loa
- pleasure craft under 45 metres
- warships
- naval auxiliaries
- other ships operated or owned by the government of an EEA state which are used for non-commercial public service.

Masters and agents are advised that failure to provide notification at the appropriate time may result in the ship being delayed or denied access to the harbour authority areas and ports. Masters or agents of exempt vessels are required to forward evidence of their ship's status to the harbour authority operations room at least 24 hours prior to arrival.

A minimum under keel clearance of 1.0 metres should always be maintained when manoeuvring within the harbour area.

A harbour workboat is available, 16 tonne bollard pull.

Detailed information on the type and nature of the berths and anchorages/moorings that are available, are provided to mariners by the Port Control. Harbour navigation risk assessment and related documentation form part of the Scrabster Safety Management System (SMS) and is periodically reviewed in accordance with the risk assessment procedure. Any changes shall be documented, and the information made readily available to all harbour users through Notices to Mariners and ongoing Chart updates.

Vessel Activity Statistics

The vessel arrival statistics, for the Harbour, covering the last six financial years (1ST April to 31st March) are set out in Table 1 below. The statistics show that Ferry and Fishing Vessel traffic are the most frequent users of the harbour comprising approximately 85% of total traffic.

For both Ferry and Fishing, their berthing areas are located out with the Ola Pier, the Orkney ferry berths at the Queen Elizabeth (QE) Pier and the fishing vessels use the Fish Basin and the Jubilee Pier area, making only occasional use of the Ola Pier for layby.

Table 1

Number of Arrivals	2018-19	2017-18	2016-17	2015-16	2014-15	2013-14
Ferry	805	803	798	806	794	768
Fishing	1,344	1,145	1,049	1,125	1,068	977
Offshore Oil	105	96	136	97	76	89
Renewables	6	4	11	20	17	3
General Cargo	81	90	55	56	85	73
Fish Cargo	48	53	53	55	75	96
Tankers	31	39	37	45	24	13
Cruise	12	11	10	6	8	9
Visiting Yachts	48	61	62	48	61	53
Total Arrivals	**2,480**	**2,302**	**2,211**	**2,258**	**2,208**	**2,081**

Tonnage of Vessels	2018-19	2017-18	2016-17	2015-16	2014-15	2013-14
Ferry	7,057,334	7,026,860	7,006,440	7,007,762	6,971,220	6,662,034
Fishing	309,338	254,691	245,613	243,873	241,272	214,733
Offshore Oil	519,995	457,595	679,676	525,090	318,943	372,671
Renewables	40,050	22,296	49,611	19,272	27,906	2,552
General Cargo	136,443	153,080	74,766	61,473	138,222	136,532
Fish Cargo	195,992	211,497	235,906	244,890	248,896	236,352
Tankers	49,512	50,700	48,100	44,892	37,681	39,951
Cruise	203,174	191,140	228,395	131,498	81,431	133,767
Total Tonnage	**8,511,838**	**8,367,859**	**8,568,507**	**8,278,750**	**8,065,571**	**7,798,592**

Chapter 11 Marine Biodiversity of the EIAR (at Table 12 thereof) identifies a possible total of ten additional vessels involved in the construction phase of the proposed redevelopment. The precise numbers will be determined by the construction approach taken by the selected D & B contractor.

The vessels involved in the construction phase are likely to be predominantly barge, operating in the dredging area or to the outside of the existing pier for piling. These vessels will predominantly be stationary during the construction or when travelling, moving at a slow speed.

The appropriate Notice to Mariners will be issued advising shipping. The Port is manned 24 hours daily and all vessels are required to contact Port Control via VHF radio to seek permission to enter or leave the harbour.

The redevelopment of the St Ola Pier targets growth in the vessel activity from Cruise and Energy sectors, particularly Oil and Gas. The business case for the redevelopment project projects the following additional activity. The projections assume the following average vessel characteristics and activity:

- Oil & Gas - 5,000 GRT
- Cruise - 40,000 GRT, carrying 1,000 passengers and 350 crew

Following Construction Year	Extra O&G Arrivals	Extra Cruise Arrivals	Total Arrivals		Extra O&G Tonnage	Extra Cruise Tonnage	Total Tonnage
1	40	10	**50**		200,000	400,000	**600,000**
2	60	15	**75**		300,000	600,000	**900,000**
3	60	20	**80**		300,000	800,000	**1,100,000**
4	100	25	**125**		500,000	1,000,000	**1,500,000**
5	100	30	**130**		500,000	1,200,000	**1,700,000**

The business case assumes that by Year 5 following the completion of the construction total port vessel arrivals will have increased by 6%, and total vessel tonnage by 20%. On the current programme, year 5 following construction would be financial year 2025-26.

The Trust has considered the potential impacts, during both the construction and operational phases, these will be managed by existing systems and mitigations measures based on the existing harbour Navigational Risk Assessment, plus additional measures to be implemented during the redevelopment project.

Potential Risks / Impacts of the Proposed Redevelopment

The potential risks / impacts of the proposed redevelopment can be classified as below.

The generic marine risks are as follows: -

- **Collision** - Vessel contact with another vessel or floating object whilst underway, alongside or at anchor;
- **Contact** – Vessel contacting Harbour infrastructure or fixed structure;
- **Grounding** – Vessel contacting seabed or underwater obstruction;
- **Near Miss** – The passing of two or more vessels within an unacceptable safe distance;
- **Fire/Explosion/Flood** – Occurring on board a vessel or caused by a vessel due to the proposed redevelopment;
- **Pollution** – Resulting from any of the above;
- **Machinery Failure** – Failure resulting in loss of control or adequate control;
- **Capsize / Listing**

Each potential risk was further considered to determine the likelihood to occur as a result of the St Ola Redevelopment.

Risk	Risk Scenario	Potential
Collision	Increased size of commercial vessel operating in the Port. Maximum sized vessel defined as 250m length overall and 9m draft.	Yes
Collision	Increased frequency of commercial vessels.	No, as evidenced in the report the redevelopment will lead to a marginal increase in vessel activity.
Collision	Vessels and barges during the construction phase would operate in the current navigable waters restricting other vessels.	Yes
Contact	Contact with proposed redeveloped quay while large commercial vessel is manoeuvring to berth.	Yes
Contact	Contact to the proposed redeveloped quay during hours of darkness or restricted visibility. All vessels will need to be fully aware of any new construction which they may not be familiar with.	Yes
Contact	Any vessel may contact temporary or semi completed permanent structures during construction phase.	Yes
Grounding	Increased maximum draft of large commercial ship would reduce available under keel clearance.	No, redeveloped quay will be dredged to -9.5m on the outer berth and -7.5m on the inner berth providing adequate clearance for the expected vessel traffic.
Grounding	Grounding by any vessel on underwater obstructions during the construction phase.	Yes
Grounding	Reduction in navigable waters at the present locations used for turning large commercial ships. This may result in more difficult vessel manoeuvring during strong wind.	No, the redeveloped pier will be a uniform 32m wide resulting in a minor decrease in the navigation channels on either side of the quay.
Near Miss	The position for near miss is assessed as being the same as for Collision above	Yes
Fire / Explosion	Potential increase in likelihood of fire or explosion resulting from increase potential impact of Collision, Contact or Grounding.	Yes
Pollution	Potential increase in likelihood of pollution resulting from increase potential impact of Collision, Contact or Grounding.	Yes
Machinery Failure	Potential increase in likelihood of pollution resulting from increase potential impact of Collision, Contact or Grounding.	Yes
Capsize / Listing	Potential increase in likelihood of capsize or listing resulting from increase potential impact of Collision, Contact or Grounding.	Yes

The potential risks were then assessed using the scoring mechanism adopted in the Scrabster SMS. Each risk is assessed for likelihood (probability) of occurring on the following scale:

LIKELIHOOD (P)	Certain	10
		9
	Likely	8
		7
	Possible	6
		5
	Unlikely	4
		3
	Rare	2
		1

A score is also allocated based on the severity of impact based on a scale of 1 to 10, where 1 equals no damage and a score of 10 would indicate multiple fatalities and / or catastrophic pollution and or loss of a vessel.

By multiplying the Likelihood and the Severity numbers together a risk rating number will be produced. This gives a pre-control risk rating before any mitigation measures are considered. The pre-control risk ratings are set out in the Risk Rating (Table 2). The potential mitigations that currently exist or could be implemented were compared against each of the potential risk scenarios identified above.

Mitigation Measures

The potential mitigations that currently exist or could be implemented were compared against each of the potential risk scenarios identified above.

The mitigation and enhancement measures were identified as either, existing or proposed.

> **Existing** – these mitigation methods already in place as part of the Scrabster Safety Management System.
>
> **Proposed** – these mitigation methods were not in place at the time of this assessment, but Scrabster Harbour Trust are committed to their implementation before or during the construction phase of the proposed redevelopment.

The mitigation and enhancement measures were categorised the same way as the potential impacts above to allow for easier reference.

Risk	Existing Measure or Proposed	Mitigation Measures
Collision	Existing	• Existing access and egress port control procedures would continue to apply to all harbor traffic as below. • All vessels to contact Port Control on CH12 before manoeuvring/entering/exiting. • Competent Port Control personnel. • Port Control is manned 24/7 and provides VHF and AIS monitoring of all vessel movements in the Port and advice to embarked pilots and large commercial vessels. • Pre-arrival notification form and Cers3 paperwork to be correctly completed and made available before vessel arrives. Vessel to be in good order with no defects affecting power or manoeuvrability • Harbour Pilot available on request. • All vessels and barges involved with the construction phase would be required to observe the existing Port Control arrangements and procedures. Dredgers may be requested by Port Control to clear their current position to allow for a vessel manoeuvre.
Contact	Existing	• Existing access and egress port control procedures would continue to apply to all harbor traffic as above
Contact	Proposed	• New berths require adequate fender arrangements. The Scope for the redevelopment project requires the following. - Outer Berth – Vertical Trelleborg DD500 Rubber D fenders (or similar approved equivalent) at 7.5m centres. Fenders will be placed vertically from cope level to 0m CD. - Inner Berth – Vertical DD350 Rubber D fenders (or similar approved equivalent) at 4m centres. Fenders will be placed vertically from cope level to 0m CD. - Pier Head – Vertical Trelleborg DD500 Rubber D fenders (or similar approved equivalent) at 2m centres. Fenders will be placed vertically from cope level to 0m CD. Rubber D (Trelleborg DD500 or similar approved) shall be provided within each pier head chamfer placed vertically from cope level to 0m CD.
Contact	Proposed	• The scope for the redevelopment project includes the following measures to ensure to ensure adequate visibility during hours of darkness and restricted visibility. - During construction works – Any permanent navigation beacons removed during the works shall be replaced with temporary beacons in adjacent locations to denote navigable channels / dangers for shipping. - Post construction – A green SABIK LED 160 navigation light shall be positioned centrally at the end of the new pier. The navigation light shall be installed at a height of +13m CD. The column supporting the navigation light shall be marine grade stainless steel with a 50-year design like. - Quayside lighting shall be provided to the whole redeveloped pier area by High Mast Lighting. Lighting of 50 lux (average) shall be provided on the pier deck, with a minimum of 20 lux. Lighting columns and heads shall be marine grade stainless steel.
Grounding	Existing	• Existing access and egress port control procedures would continue to apply to all harbor traffic as above
Near Miss		• The Navigational mitigation and enhancement measures have been included in Collision, Contact & Grounding
Fire / Explosion		• The Navigational mitigation and enhancement measures have been included in Collision, Contact & Grounding
Pollution		• The Navigational mitigation and enhancement measures have been included in Collision, Contact & Grounding • Oil Spill Response Plan & Harbour Emergency Plan.
Machinery Failure		• The Navigational mitigation and enhancement measures have been included in Collision, Contact & Grounding
Capsize / Listing		• The Navigational mitigation and enhancement measures have been included in Collision, Contact & Grounding

Post Mitigation Risk Rating

Using the Scrabster SMS scoring methodology, a revised risk rating is calculated considering the existing and proposed mitigation measures. The revised results are set out in Risk Rating (Table 2). The table produces a traffic light summary as follows indicating what further action is required.

R=	1 - 9	Monitoring is required to ensure that controls remain effective.
R=	10 - 40	Additional assessment may be required to attempt to reduce the risk level to an acceptable level Monitoring is required to ensure that controls remain effective.
R=	42+	Work /Activity must not be started or continued until the risk has been reduced to below 42.

All the assessed risks are assessed as green.

Conclusion

This NRA assessed the navigational impacts of the proposed St Ola Redevelopment. The process identified potential impacts and mitigation measures both existing and proposed.

The effective implementation of the current and proposed mitigation for the proposed redevelopment is considered to reduce navigational risk to acceptable level

Table 2 – Risk Rating Summary

Pre-Controlled Risk Rating			Hazard	Risk Control Measures	Post Control Risk Rating		
P	S	R			P	S	R
2	9	18	a. Collision	See Section 4.19	1	9	9
2	7	14	b. Contact	See Section 4.19	2	4	8
2	8	16	c. Grounding	See Section 4.19	1	2	2
3	3	9	d. Near Miss	See Section 4.19	2	3	6
2	9	18	e. Explosion/ Fire/Flood	See Section 4.19	1	9	9
2	7	14	f. /Pollution	See Section 4.19	1	5	5
2	9	18	g. Machinery Failure	See Section 4.19	1	8	9
2	9	18	h. Capsize/Listing /sinking	See Section 4.19	1	9	9

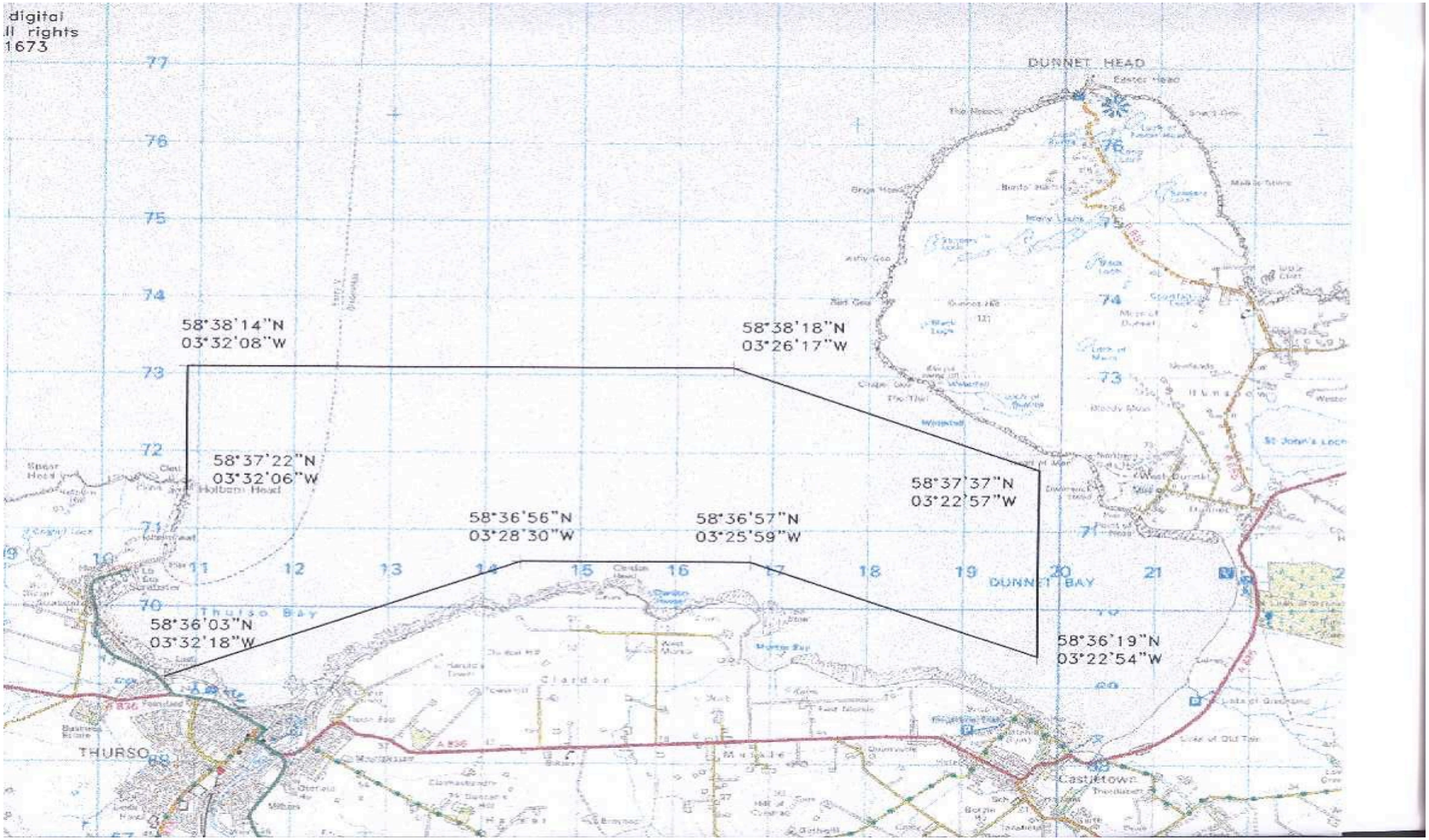
P = Probability/Liklihood Multiplies by S = Severity = R Risk Rating

Risk Rating Matrix

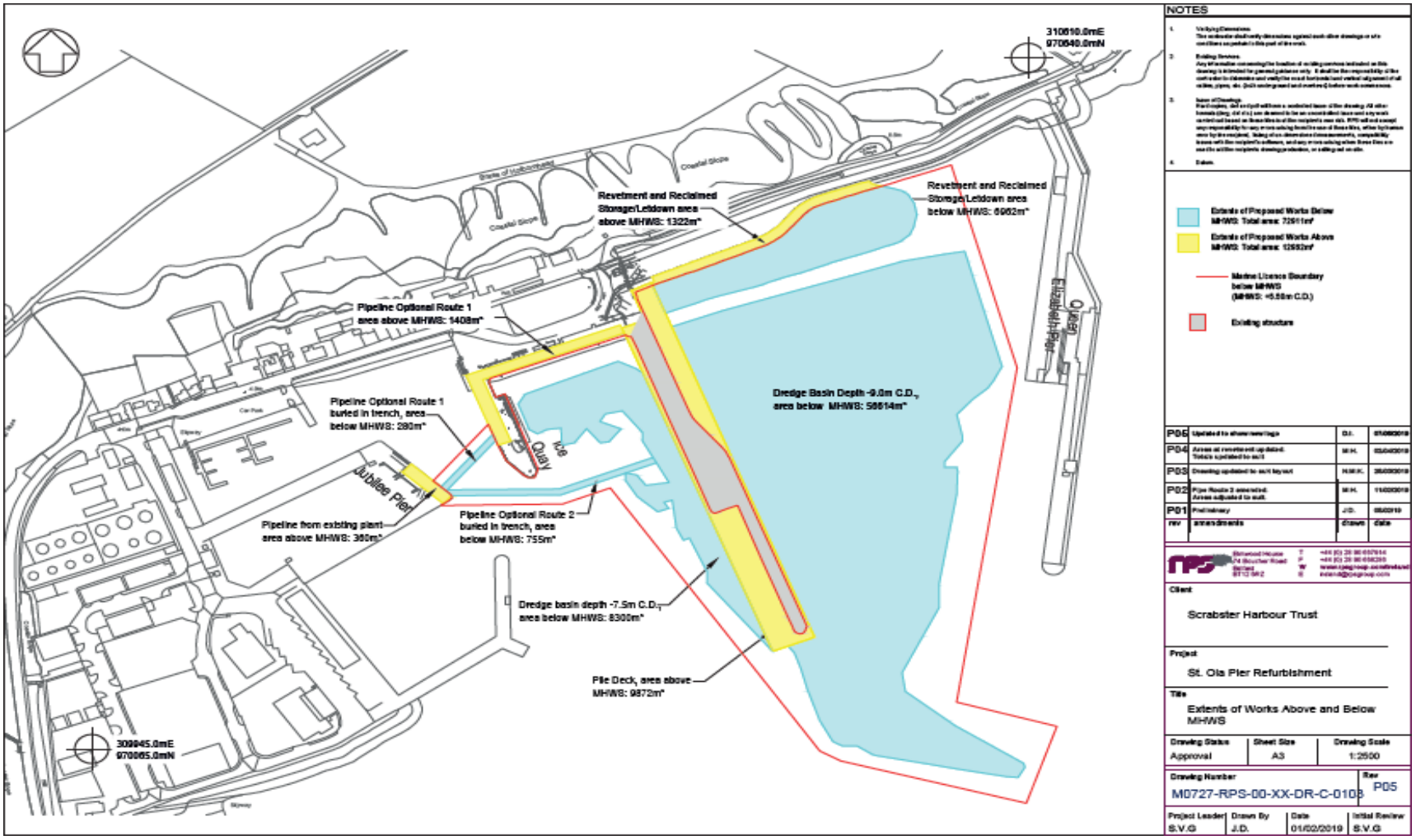
LIKELIHOOD (P)											
	Certain	10	10	20	30	40	50	60	70	80	90	100
		9	9	18	27	36	45	54	63	72	81	90
	Likely	8	8	16	24	32	40	48	56	64	72	80
		7	7	14	21	28	35	42	49	56	63	70
	Possible	6	6	12	18	24	30	36	42	48	54	60
		5	5	10	15	20	25	30	35	40	45	50
	Unlikely	4	4	8	12	16	20	24	28	32	36	40
		3	3	6	9	12	15	18	21	24	27	30
	Rare	2	2	4	6	8	10	12	14	16	18	20
		1	1	2	3	4	5	6	7	8	9	10
Risk Level			Low			Medium			High			

Annex 1 - Current Harbour Plan

Annex 2 – Scrabster Harbour Limits



Annex 3 – Proposed Redevelopment of St Ola Pier



Appendix 4.1 Scrabster Harbour Trust Waste Management Plan

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Scrabster Harbour
YOUR GATEWAY TO THE NORTH

Scrabster Harbour Trust

WASTE MANAGEMENT PLAN

FACILITIES AND PROCEDURES FOR THE REMOVAL OF GARBAGE AND WASTE OIL

Reviewed June 2018

TEL: 01847 892779
FAX: 01847 892353

SCRABSTER HARBOUR TRUST
WASTE MANAGEMENT PLAN

1 Introduction

Scrabster Harbour Trust are fully committed to providing adequate waste reception facilities for the Port of Scrabster. They are conscious of the need to do so without causing delay to vessels using such facilities and recognise the need to carry out regular reviews of the Waste Management Plan in consultation with existing and potential users.

The Scrabster Harbour Trust Waste Management Plan was first approved in April 1996 and experience gained has been taken into account in the preparation of this review.

Copies of this Waste Management Plan will be held in the Harbour Office and are available to all port users.

2 Legislation

In preparing this revised plan the following has been taken into account

1. **The Waste Scotland Regulations 2012**

2. **The Merchant Shipping (Reception Facilities for Garbage) Regulations 1988;**

3. **The control of pollution Amendment (Landed Ship's Waste) regulations 1989**

4. **The Merchant Shipping & Fishing Vessels (Port Waste Reception Facilities) Regulations 2003; as amended.**

5. **MGN 358 (M&F) Consolidated European Reporting Service (CERS). Reporting requirements in respect of :-**
    1. **Port Waste Infringements**
    2. **Bulk carrier infringements**

6. **MGN 377 (M&F) Guidance for the Completion of the Notification Form Required under the Merchant Shipping and Fishing Vessel (Port Waste Reception Facilities) Regulations 2003, as amended.**

7. **MGN 385 (M&F) Guidance on the Merchant Shipping (Prevention of Pollution by Sewage and Garbage from Ships) Regulations, as amended**

8. **MGN 387 (M&F) Guidance on The Merchant Shipping & Fishing Vessels (Port Waste Reception Facilities) Regulations 2003, as amended.**

9. **MGN 438 Consolidated European Reporting Service (CERS) – Exemption Arrangements under the Merchant Shipping (Vessel Traffic Monitoring and Reporting Requirements) Regulations 2004 (as amended)**

3. Objectives

- To bring the attention of Port Users to their responsibilities under relevant legislation

- To inform Port Users of the facilities available to them at Scrabster Harbour for disposal of waste

- To ensure that the facilities provided comply with current legislation and meet the needs of Port users

In order to maintain the harbour in a clean and environmentally friendly condition it is essential that all port users comply with this plan together with all the relevant regulations for the control of waste in force at the time.

4 Consultation

The facilities are regularly monitored to ensure that they are suitable and meeting the needs of Port Users. "Port Users Meetings" are held to update customers on port activities and developments and waste management is included on the agenda for users to give comment on the facilities in place. Comments received are used to improve or alter the facilities.

Scrabster Harbour Trust made a significant change to the facilities provided in 2014, changing from open skips to covered 1,100 litre Euro Bins, emptied under a contract with Highland Council. 1,100 litre Euro Bins for recycling materials (Paper, cardboard, tins and plastic bottles) were also installed. There had been gross abuse of the previous facilities, with the open skips being used on a regular basis by parties other than vessels or port users, at significant cost to Scrabster Harbour Trust. This change has worked well and improved things around the harbour.

5 Analysing the Requirements for Waste Reception Facilities

Fishing activity at Scrabster has maintained steady in 2015,2016 and 2017 approximately 10 to 12 whitefish vessels landing on a weekly basis at Scrabster. There is a fleet of around 4 larger vivier crab vessels landing weekly and an inshore fleet of 2 full time shellfish vessels under 10m.

The number of oil supply vessels servicing the oilfields in the West of Shetland Basin has remained fairly constant throughout the past few years, but it is hoped that this business shall continue to grow gradually over the next few years.

Scrabster Harbour Trust has been marketing the port to the cruise industry and vessel arrivals have remained at about 10 to 12 each year. But is anticipated that will continue to grow to the "mid-teens" over the next few years.

The number of cargo vessels fell in 2015 to 2017 and this was largely due to timber exports drying up.

A breakdown of arrivals by the various categories of vessels is given in Figure 1. below :-

	2011	2012	2013	2014	2015	2016	2017
F Vsls	1019	737	873	1011	1038	1039	1007
For F Vsls	60	41	39	55	43	74	107
Tankers	21	23	12	19	46	38	38
Cargo Vsls	31	28	28	40	22	17	25
Fish Cargo	96	99	96	85	55	54	53
Yachts	47	63	53	61	48	61	61
Pass Vsls	10	10	8	8	0	0	0
Nuclear	0	2	8	13	0	5	5
Tugs	15	17	2	1	1	2	4
Ferries	973	970	772	795	797	771	804
DAFS/Light	4	2	11	5	4	3	3
Customs	0	1	0	0	0	0	2
Survey	2	13	7	4	1	8	11
Oil Rel	90	69	73	89	92	112	121
Renewables	4	9	4	9	28	11	4
R.N.L.I.	3	2	3	3	5	7	4
Misc	42	29	25	34	37	31	38

Figure 1 – Number of arrivals by types of vessels

A record is maintained of the waste notified for landing at Scrabster and this figure is used to evaluate whether the facilities provided are adequate for vessels' requirements. The figures for waste notified by vessels for the past 3 years are shown below in Figure 2.

	Notified Waste (Cu. M)	Factor to convert waste to tonnes	Notified Waste by all vessels (tonnes)
2015	93.81	0.5	46.90
2016	79.45	0.5	39.72
2017	96.83	0.5	48.41

Fig 2 Conversion to show tonnage of Notified Waste

6 International Catering Waste (I.C.W.)

International Catering Waste must not be mixed with normal waste and must be discharged to a separate enclosed container. I.C.W. cannot be sent to local landfill sites and must be transported to a suitable reception facility in Central Scotland. This must be arranged through the vessel's agent and at the vessel's cost. As amounts of I.C.W. will not normally make this viable, it is recommended that vessels retain their I.C.W. onboard for discharge at a port with appropriate facilities

7 Cost of Facilities and Charging

Port Waste Reception Facilities Regulations 2003, **Section 4 & 12** states :-
Ships must pay a mandatory charge to make a significant contribution to the cost of the port reception facilities for ship generated waste, whether they use them or not.

Scrabster Harbour Trust Schedule of Rates and Dues, including the dues payable for Waste Disposal is published annually with effect from 1st April and a copy of the same is available by contacting the Harbour Office and is also published on the Scrabster Harbour Trust website www.scrabster.co.uk

To recover the cost of waste disposal at the port of Scrabster, a charge is made on each arrival by a vessel to which the above regulations apply. The charge with effect from 1st April 2014 is £36.00 per arrival. Fishing vessels pay a mixture of annual compounded harbour dues and also payment per arrival, a proportion of these harbour dues is allocated to waste disposal.

100% of the total costs of providing waste reception facilities are recovered by Scrabster Harbour Trust under the charging regime.

An additional charge will be made only for collection and disposal of extraordinary items and such charges are generally made on a cost recovery basis. The system works well and every opportunity is taken to remind port users of the availability of the service.

8. Reporting Procedure

Under the Merchant Shipping and Fishing Vessels (Port Waste Reception Facilities) Regulations 2003, all vessels visiting the port of Scrabster (other than fishing vessels and recreational crafts & visiting yachts) shall give prior notification of any waste they are carrying and wish to land at Scrabster, through their agent or via the harbour office, Fax 01847 892353 or email ops@scrabster.co.uk

The Waste information is required under the Port Waste Facilities Directive. This current process involves the completion of forms containing the vessel's waste information to be submitted to whoever at the port is in charge of the waste management plan (often the terminal or berth manager). This process will be phased out and replaced by the CERS Workbook which is a similar style form that contains the necessary information.

Ports also supply an annual return on waste to the MCA. This will be phased out as the electronic reporting of information into CERS will mean the MCA has the required information already.

Scrabster Harbour Trust has an obligation to report to the MCA any vessel to which the regulations apply which fails to provide the required notification under the Merchant Shipping and Fishing Vessels (Port Waste Reception Facilities) Regulations 2003 or which fails to land the garbage which has been declared. Reporting to the MCA shall be done via the Consolidated European Reporting System which was implemented on 1st January 2008.

It should be noted that the Serco Northlink Ferry, Hamnavoe, holds an exemption certificate, issued by the Marine and Coastguard Agency and valid until 23 March 2020, stating that "The vessel is exempt from the requirements to Notify, Deliver and Pay a mandatory charge for ship generated waste landed at Scrabster". Charges can however be made against the vessel if it makes use of the waste facilities at the port.

Figure 3

INFORMATION TO BE NOTIFIED BEFORE ENTRY INTO THE PORT OF SCRABSTER

(The harbour, terminal or port referred to in regulation 11 of the Merchant Shipping and Fishing Vessels (Port Waste Reception Facilities) Regulations 2003 as amended by Article 6 of Directive 2000/59/EC

1. Name, call sign and, where appropriate, IMO identification number of the ship :

2. Flag State :

3. Estimated Time of Arrival (ETA):

4. Estimated time of departure (ETD) :

5. Previous port of call :

6. Next port of call

7. Last port and date when ship-generated waste was delivered :

8. Are you delivering (tick appropriate box) :

   All ☐ some ☐ none ☐

   Of your waste into the port reception facilities?

9. Type and amount of waste and residues to be delivered and/or remaining on board and percentage of maximum storage capacity:

   If delivering all waste, complete second column as appropriate.
   If delivering some or no waste, complete all columns.

Type	Waste to be delivered m^3	Maximum dedicated storage capacity m^3	Amount of waste retained onboard m^3	Port at which remaining waste will be delivered m^3	Estimated amount of waste to be generated between notification and next port of c all m^3
WASTE OILS					
Sludge					
Bilge Water					
Others (specify)					
GARBAGE					
Food waste					
Plastic					
Other					
Sewage (1)					
Cargo associated waste (2) (specify)					
Cargo Residues (2) (specify)					

1) *Sewage may be discharged at sea in accordance with Regulation 11 of Annex IV of Marpol 73/78. The corresponding boxes do not need to be completed if it is the intention to make an authorised discharge at sea.*
2) *May be estimates*

Notes :

1) This information may be used for port State control and other inspection purposes
2) EEA states will determine which bodies will receive copies of this notification
3) This form is to be completed unless the ship is covered by an exemption in accordance with Article 9 of Directive 2000/59/EC.

I confirm that:

The above details are accurate and correct and there is sufficient dedicated onboard capacity to store all waste generated between notification and the next port at which waste will be delivered

Date : _____

Time:_____

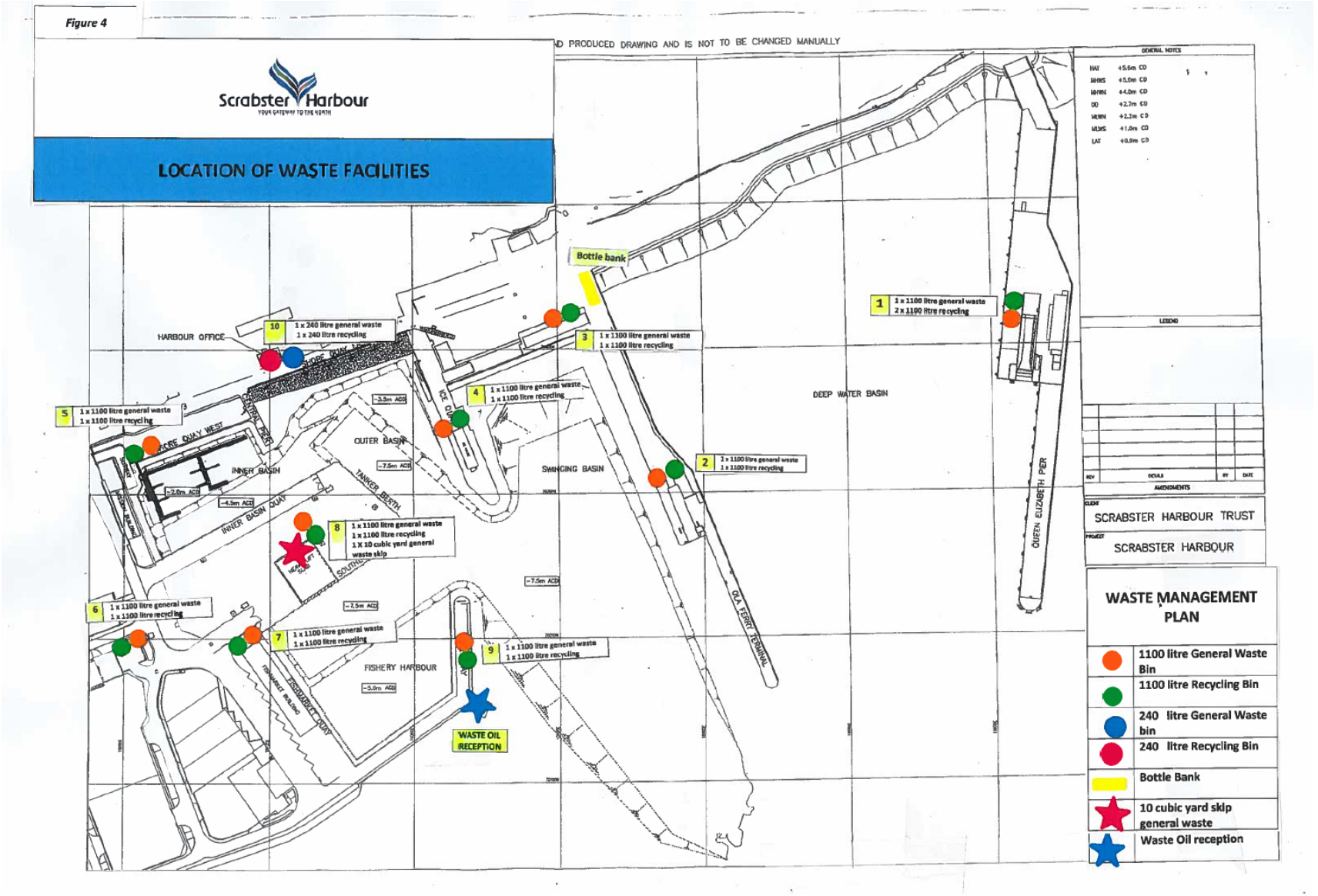
Signature:_____

9. Type and Location of Waste Facilities

Waste facilities at Scrabster are situated at the following locations. A Plan is attached below at Figure 4 :

1. Queen Elizabeth Lay By Berth -	1 x 1100 litre General Waste Bin 2 x 1100 litre recycling bin
2. St Ola Quay	2 x 1100 litre General Waste Bin 1 x 1100 litre recycling bin
3. Old Ferry Terminal Building-	1 x 1100 litre General Waste Bin 1 x 1100 litre recycling bin
4. Ice Quay-	1 x 1100 litre General Waste Bin 1 x 1100 litre recycling bin
5. Shore Quay Car Park	1 x 1100 litre General Waste Bin 1 x 1100 litre recycling bin
6. Business Centre	1 x 1100 litre General Waste Bin 1 x 1100 litre recycling bin
7. Fish Market	1 x 1100 litre General Waste Bin 1 x 1100 litre recycling bin
8. Tanker Berth	1 x 1100 litre General Waste Bin 1 x 1100 litre recycling bin 1 x 10 cubic yard General Waste Skip
9. Fuel Berth	1 x 1100 litre General Waste Bin 1 x 1100 litre recycling bin
10. Harbour Office	1 x 240 litre General Waste Bin 1 x 240 litre Recycling Bin
11. St Ola Quay	Bottle Bank
12. Fish Dock	2 x 2,500 litre Waste Oil Tanks

Figure 4


Scrabster Harbour
YOUR GATEWAY TO THE NORTH
LOCATION OF WASTE FACILITIES
ND PRODUCED DRAWING AND IS NOT TO BE CHANGED MANUALLY
Bottle bank
HARBOUR OFFICE
10 1 x 240 litre general waste 1 x 240 litre recycling
3 1 x 1100 litre general waste 1 x 1100 litre recycling
4 1 x 1100 litre general waste 1 x 1100 litre recycling
1 1 x 1100 litre general waste 2 x 1100 litre recycling
5 1 x 1100 litre general waste 1 x 1100 litre recycling
2 1 x 1100 litre general waste 1 x 1100 litre recycling
8 1 x 1100 litre general waste 1 x 1100 litre recycling 1 X 10 cubic yard general waste skip
6 1 x 1100 litre general waste 1 x 1100 litre recycling
7 1 x 1100 litre general waste 1 x 1100 litre recycling
9 1 x 1100 litre general waste 1 x 1100 litre recycling
WASTE OIL RECEPTION
OUTER BASIN
INNER BASIN
SWINGING BASIN
DEEP WATER BASIN
FISHERY HARBOUR
TANKER BERTH
INNER BASIN QUAY
QUEEN ELIZABETH PIER
OLA FERRY TERMINAL
SCRABSTER HARBOUR TRUST
SCRABSTER HARBOUR
WASTE MANAGEMENT PLAN
1100 litre General Waste Bin
1100 litre Recycling Bin
240 litre General Waste bin
240 litre Recycling Bin
Bottle Bank
10 cubic yard skip general waste
Waste Oil reception

Euro Bins

The Euro bins are checked regularly by SHT staff and where a bin is found to be full, it may be replaced by another to meet capacity until the bins are due for emptying.

Scrabster Harbour Trust pays an annual sum of £15,690 to Highland Council for emptying these bins.

Any bags of waste or drums containing waste oil placed on the piers are collected daily and taken an appropriate bin / skip or to the waste oil reception area where oil is decanted into the 2 main storage tanks by harbour staff.

A map showing the locations of the various facilities is shown at the end of section 6. .

Waste Oil

Large quantities of waste oil i.e. in excess of 2,500 litres should be discharged direct from vessel into road tankers provided by licensed contractors specialising in environmentally sensitive waste by prior arrangement. The fees for provision shall be borne by the vessel concerned.

2 x 2,500 litre capacity waste oil tanks are located in a BUNDED area, on the Fuel Berth. No charge is made to vessels for using this service. Smaller quantities of waste oil i.e. less than 2,500 litres can be landed by pumping direct from the vessel into the 2 storage tanks at the Fuel Berth or, at other berths, by pumping into 1,000 litre Intermediate Bulk Containers (IBC's) or drums, which can be provided by the Harbour Trust on request. The Harbour Staff shall collect the containers and take them to the waste oil reception facility at the Fuel Berth where they shall be pumped into the main storage tanks, or stored within the sealed bund and then pumped directly into a reception tanker at its next visit.

Waste Oil is collected on a regular basis by O.S.S. No charge is made by O.S.S. for this service as the oil is taken for recycling. O.S.S. Group issue a consignment note for all waste oil removed and these are retained in the Harbour Office.

Oil Filters

Wheelie bins, supplied by OSS Group are stored behind the Harbour office for the disposal of used oil filters and other oily waste materials. SHT have an annual contract with OSS Group for the emptying of these bins.

Oil Filters are picked up by Scrabster Harbour staff and drained into 45 gallon drums with plastic holders which sit on top of them which permit the oil to drain. The 45 gallon drums are decanted periodically into the 2 x 2,500 waste oil storage tanks.

10 Defect Reporting

Any inadequacy identified by any vessel in Scrabster should be reported by completion of a defect report form (fig 5) and submitted to the Harbour Master or Harbour office.

SCRABSTER HARBOUR TRUST
WASTE MANAGEMENT PROCEDURE DEFECT REPORTING SYSTEM

Please use this form to report any defect / complaints identified.

From Vessel Name ……..

Date …..... Time…… Location ……..

Nature of Defect

……

……

Submit completed forms to Harbour Master.

Fig 5 Port Waste Management Plan Defect Report Form

On receipt of a Waste Management Procedure Defect Form, Scrabster Harbour Trust shall undertake such actions as may be necessary to ensure that all current legislation is complied with and shall issue a notice (Fig. 6) to the complainant, outlining remedial actions taken to ensure compliance

SCRABSTER HARBOUR TRUST
WASTE MANAGEMENT PROCEDURE DEFECT REPORTING SYSTEM

Please use this form to report any remedial work intending to be undertaken with regard to defect / complaints received.

From Harbour Personnel To Vessel Name ……
Date …..... Time…… Location ……..

Nature of remedial work undertaken

……

……

Submit completed forms to Vessels Owners / Captain or Agent

Fig 6 Port Waste Management Plan Defect Remedial Action Form

11. Waste Contractors

Skips and dry waste collection may be arranged by contacting the waste removal companies listed below.

All skips used to contain foodstuff and galley waste must be covered or netted

Speedy Skip Hire
Sir Archibald Road
Thurso

Tel : 01847 893797

Highland Council
Protective Services Department
Market Place
Wick.
Tel : 01955 603761

Oils and Hazardous Materials

The following list contains the addresses and telephone numbers of licensed waste carriers authorised to remove waste products other than general ships garbage which cannot be placed into normal skips i.e. waste oil, empty oil drums, oily water, liquid waste and chemical waste :

OSS Group Ltd,
Stockpit Road,
Knowsley,
Merseyside,
L33 7TQ
Tel : 0870 240 1055

SURECLEAN Ltd
Unit 10
River Drive
Teaninich Ind. Estate
Alness, IV17 0PG
TEL. 01349 884480
FAX 01349 883612

MSIS
Admiralty Base,
Shore Road
Invergordon
IV18 0HR
Tel : 0845 0956120

Contact Details

Scrabster Harbour Trust
Harbour Office
Scrabster
Caithness
KW14 7UJ
Tel : 01847 892779

Marine and Coastguard Agency
Blakies Quay
Aberdeen
Scotland
AB11 5EZ
Tel : 020 38172001

Appendix 4.2 Outline Site Waste Management Plan

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APPENDIX 4.2: OUTLINE SITE WASTE MANAGEMENT PLAN

Introduction

This high-level Site Waste Management Plan (SWMP) has been prepared by RPS to provide an assessment of the impacts arising from the generation of waste materials during demolition and construction of the proposed development. This document is to accompany the planning application for the redevelopment of St Ola Pier located at the centre of Scrabster Harbour.

This SWMP is to ensure that all construction and demolition wastes associated with the redevelopment at Scrabster Harbour are managed and controlled to prevent the risk of environmental pollution or ecological damage. This high-level plan outlines the mitigation measures that have been identified in the EIAR to ensure the residual impacts are acceptable and will be included during the construction phase.

Please note that this document is a draft for planning submission purposes which is intended to set a clear path and philosophy for the future Main Works Contractor (MWC) in drawing up their own final strategy for the management of construction and demolition waste arising at the site.

A final SWMP can only be produced after planning permission is received, in order to address any conditions imposed by the planning authority and after entering into a contract with a suitably experienced Contractor to undertake the works but in advance of the construction works commencing. The MWC will be responsible for producing an updated SWMP, providing further detail on how the required environmental controls and management will be implemented to ensure the mitigation measures outlined in the EIAR and the conditions imposed as part of the approval process are adhered to. The SWMP will be a live document and will be subject to revision throughout the course of the construction phase.

Objectives of the SWMP

The objectives of this SWMP are as follows:

- Compliance with requirements for waste management during all works.
- Minimisation of the risk of environmental pollution or ecological damage during the works.
- Application of best environmental practices in relation to waste management on site.

Roles and Responsibilities

The SWMP will clearly outline the key roles and responsibilities of the MWC staff with regard to waste management. This will include the procedures that will be followed for ensuring implementation of the SWMP through the onsite management structure but also across all members of the construction team.

An MWC Environmental Co-ordinator or waste manager will be appointed to ensure commitment, operational efficiency, and accountability during the construction and demolition phase.

Records and Reporting

Records will be kept for each waste material which leaves the site, whether for reuse on another site, recovery, recycling or disposal. A system will be put in place to record the construction waste arising on site. The MWC Environmental Co-ordinator or delegate will record the following:

- Waste taken off-site for reuse

- Waste taken off-site for recovery
- Waste taken off-site for recycling
- Waste taken off-site for disposal
- Waste (soil and stone) accepted on site (not envisaged as part of this contract).

For each movement of waste off-site, a signed waste collection docket will be obtained by the MCW Environmental Co-ordinator (or delegate) from the contractor. This will be carried out for each material type. This system will also be linked with the delivery records. A signed waste acceptance docket will be issued for each movement of waste on-site.

Auditing

The appointed MWC Environmental Co-ordinator will be responsible for conducting a waste audit at the site during the C&D phase of the development. A review of all records for the waste generated and transported off-site, should be undertaken mid-way through the C&D phase.

Corrective Actions

If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. Each material type will be examined in order to see where the largest percentage of waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved.

Reporting

Upon completion of the C&D phase a final report will be prepared summarising the outcomes of waste management processes adopted and the total recycling/reuse/recovery figures for the development.

Training

The MCW Environmental Co-ordinator will be given responsibility and authority to select a waste team if required i.e. members of the site crew that will aid them in the organisation, operation and recording the waste management system implemented on-site.

The MCW Environmental Co-ordinator will have overall responsibility to oversee records and provide feedback to the client on everyday waste management on the site. Authority will be given to MCW Environmental Co-ordinator to delegate responsibility to sub-contractors where necessary and to coordinate with suppliers, service providers and, sub-contractors to prioritise waste prevention and salvage.

The MCW Environmental Co-ordinator will be trained in how to set up and maintain a record keeping system, how to perform, audit and how to establish targets for waste management on site. They will also be trained in the best method for segregation and storage of recyclable materials, have information on the materials that can be reused on-site and implement the SWMP.

Training of the site crew is the responsibility of the MCW Environmental Co-ordinator and as such, a waste training programme should be organised. A basic awareness course will be held for all crew to outline the SWMP and to detail the segregation of waste at source. This may be incorporated with other training needs (e.g. general site induction, safety training, etc.). This basic course will describe the materials to be segregated, the storage methods and the location of waste storage areas. A subsection on hazardous wastes will be incorporated and the particular dangers of each hazardous waste will be explained.

Guidance

Mitigation measures will include the requirements for best practice and adherence to the following relevant Irish policies, strategies, legislation, and guidelines, or recognised international guidelines where Irish guidelines are not available:

National and Regional Policies and Strategies such as:

- Scotland's Zero Waste Plan

National and European Legislation including:

- The Environmental Protection (Duty of Care) (Scotland) Regulations 2014
- The Waste (Scotland) Regulations 2012
- The Waste (Scotland) Regulations 2011
- The Waste (Scotland) Regulations 2005
- The Waste Management Licensing (Scotland) Regulations 2011
- The Waste Batteries (Scotland) Regulations 2009
- The Criteria And Procedures For The Acceptance Of Waste At Landfills (Scotland) Direction 2005
- The Criteria and Procedures for the Acceptance of Waste at Landfills (Mercury) (Scotland) Direction 2013
- Environment Act 1995
- Environmental Protection Act 1990
- Environment Protection (Waste Recycling Payments) (Scotland) Regulations 2000
- The Landfill (Scotland) Regulations 2003
- The Landfill (Scotland) Amendment Regulations 2003
- The Landfill (Scotland) Amendment Regulations 2013
- The Special Waste Regulations 1996
- The Controlled Waste Regulations 1992
- The Special Waste Amendment (Scotland) Regulations 2004
- The Special Waste Amendment (Scotland) Amendment Regulations 2004
- Pollution Prevention and Control Act 1999
- The Pollution Prevention and Control (Scotland) Regulations 2012
- Waste and Emissions Trading Act 2003
- The Landfill Allowances Scheme (Scotland) Regulations 2005
- The Producer Responsibility Obligations (Packaging Waste) Regulations 2007
- The End-of-Life Vehicles (Storage and Treatment) (Scotland) Regulations 2003
- The Litter (Fixed Penalties) (Scotland) Order 2013
- The Litter (Fixed Penalty Notices) (Scotland) Order 2014
- The Controlled Waste (Fixed Penalty Notices) (Scotland) Order 2014
- European Communities (Waste Directive) Regulations, 2011;
- Industrial Emissions Directive (2010/75/EU);
- Waste Framework Directive (2008/98/EC).

Specifically in relation to the waste management requirements at port and harbour facilities, the following were also considered:

- EU Directive 2000/59/EC on port reception facilities for ship-generated wastes and cargo residues

- Directive 2002/84/EC amending the Directives on maritime safety and the prevention of pollution from ships
- Commission Directive 2007/71/EC of 13 December 2007 amending Annex II of Directive 2000/59/EC of the European Parliament and the Council on port reception facilities for ship-generated waste and cargo residues
- Commission Directive (EU) 2015/2087 amending Annex II to Directive 2000/59/EC on port reception facilities for ship-generated waste and cargo residues
- Directive 2005/35/EC on ship-source pollution and on the introduction of penalties for infringements
- Directive 2009/123/EC amending Directive 2005/35/EC on ship-source pollution and on the introduction of penalties for infringements
- MARPOL 73/78, International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978
- A guide to good practice – IMO Consolidated Guidance for port Reception Facility Providers and Users.

Waste Steam Management Option and Strategy

Proposed management route and strategy for each anticipated waste stream has been set out in Table 1 below.

Table 1 Waste Stream Management Option and Strategy

Work Stream	Waste	Waste Type	Waste Management Option	Waste Management Strategy
Demolition	Concrete	Inert	Reuse onsite or disposal	• Crushed to allow for reuse within the construction works as engineered fill
Dredging	Gravel & larger pockets of course material	Non-hazardous	Reuse on-site	• Where feasible these dredged materials will be reused on-site
	Sandy gravel and clay sediment	Non-hazardous	Disposal at offshore site	• The majority of the dredged material will be disposed of at the authorised offshore disposal site Scrabster Spoil Ground, located within the area bounded by the joining points: 58 38.22'N 003 29.82'W 58 38.10'N 003 29.44'W 58 38.03'N 003 29.54'W 58 38.15'N 003 29.91'W • It is also anticipated that there will be some reuse of dredged material into the reclamation areas and into the body of the pier if economically feasible.
	Drill cuttings	Non-hazardous	Disposal at offshore site	• Drill cutting waste is likely to be generated during the dredging phase, however, oil-based drilling muds will not be used.
	Various waste oils & lubricants	Special	Treatment as Special waste Residual waste to Special waste facility	• All Special waste must be source segregated before treatment and/or disposal and then independent moved to a secure collection point. It is then collected by a specialist contractor and transferred

Work Stream	Waste	Waste Type	Waste Management Option	Waste Management Strategy
Construction	Concrete	Inert	Re-use on site Return to supplier Recycle on site Recover off-site Residual waste to landfill	• Concrete will be batched on site. Care will be taken to ensure waste is minimised during this process. Investigations will be undertaken to identify if any excess concrete can be re-used in new batches. Awareness will be raised about the importance of effective handling. If additional concrete has to be delivered to the site a take-back scheme will be established for excess concrete with suppliers. Investigations will also be undertaken to determine whether concrete can be crushed on-site for use as aggregate of fill material where it is not possible to re-use it in its current form. • Where this is not feasible the concrete waste shall be recovered off-site
	Other inert	Inert	Recovered off-site where feasible Residual waste to landfill	• All inert waste shall be segregated for off-site recycling or recovery.
	Metals	Non-hazardous	Recycle off-site	• All metals shall be segregated for off-site recycling
	Plastics	Non-hazardous	Recycle off-site	• Plastics shall be segregated for off-site recycling
	Paper & cardboard	Non-hazardous	Recycle off-site	• Paper and cardboard shall be segregated for off-site recycling
	Timber	Non-hazardous	Recycle off-site	• Storage pallets shall be returned where possible • Wood waste will be segregated into a separate container so that off-site recycling can occur
	Glass	Non-hazardous	Recycle off-site	• Glass will be segregated into a separate container so that off-site recycling can occur
	Mixed waste	Non-hazardous	Materials Recovery Facility (MRF)	• Residual waste must be placed into a skip labelled mixed waste. Investigations shall be undertaken to identify potential recovery options for all waste.
	Paint tins	Special	Treatment as Special waste Recovery where feasible Residual waste to Special waste disposal facility	• Empty paint tins arisings on site will be segregated in stockpiles on site away from all watercourses and water bodies. All Special Waste must be source segregated before treatment and/or disposal and then independently moved to a secure collection point. It is then collected by a specialist contractor and transferred for suitable treatment and/or disposal.
	Various waste oils & lubricants	Special	Treatment as Special Waste Residual waste to Special Waste Disposal Facility	• All Special Waste must be source segregated before treatment and/or disposal and then independently moved to a secure collection point. It is then collected by a specialist contractor and

Work Stream	Waste	Waste Type	Waste Management Option	Waste Management Strategy
				transferred for suitable treatment and/or disposal. Special waste shall be recycled where possible.

Environmental Mitigation Measures

Chapter 4, Section 4.5 of the EIAR assesses the likely significant impacts on waste management arising from the proposed development. Table 2 below summarises the potential impacts identified and the mitigation measures required, where necessary. These measures will be integrated into the SWMP for the harbour redevelopment at Scrabster Harbour.

Table 2 Summary of Mitigation Measures Arising from the Environmental Statement

Potential Impact (Waste Management)	Summary of Proposed Mitigation (Waste Management)
Demolition Phase	
• The existing concrete deck and concrete capping beam will be broken out to allow for the installation of the new tie rod system (if proposed by Contractor) and allow for infilling of the new structure & construction of new concrete decking and capping beam. • As the existing structure varies in construction, the extent of demolition required will vary along the length of the existing pier. Additionally, the existing pier layout varies in width and extents and as such the extent of required infilling will vary along the length of the structure.	• Where appropriate, the material generated from the breaking out of the existing deck and capping beam will be screened and re-used on site, within the pier structure, proposed reclamation or revetment. • All other material will be disposed offsite in accordance with all relevant statutory requirements and regulations.
Construction Phase	
• There is the potential for quantities of materials to be deposited in landfill sites rather than reused or recycled.	• All waste materials will be dealt with in accordance with regional policies, national legislation and the waste hierarchy. • Site management procedures will be in place to ensure the appropriate management of waste segregation, storage, and handling. • Each material for recycling will be segregated into suitable containers which will have adequate access for collection vehicles. • Waste collections and transportation will be as required by a licensed and authorised collector.
• The use of non-permitted waste contractors or unlicensed facilities could give rise to inappropriate management of waste and result in environmental impacts/pollution.	• Contractors working on site during the works will have a duty of care and be responsible for the collection, control, and disposal of all wastes generated by the works. Scrabster Harbour and their appointed contractor will ensure that all waste materials leaving the site will be transported via road by a registered and licensed carrier and arrive at a licensed/permitted site. Waste will only be disposed or recovered through licenced operators and in accordance with national waste legislation.

Potential Impact (Waste Management)	Summary of Proposed Mitigation (Waste Management)
	• All waste materials will be dealt with in accordance with regional policies, national legislation, and the waste hierarchy. • Site management procedures will be in place to ensure the appropriate management of waste segregation, storage, and handling. • Each material for recycling will be segregated into suitable containers which will have adequate access for collection vehicles. • Waste collections and transportation will be as required by a licensed and authorised collector.
• Waste materials will be arising from site management practices during the construction phase, for example, excess materials and packaging, over-ordering materials, off-cuts, damaged materials and, poor storage during the construction phase.	• Every effort will be made in the management of the site to minimise the oversupply of construction materials. • Waste gypsum can be recycled therefore a skip will be provided for the separate collection of waste plasterboard and collected as necessary. • Cardboard packaging will be flattened and placed in a covered skip to prevent it from getting wet prior to collection by a waste contractor. • Plastic will be segregated at source and kept as clean as possible and stored in a dedicated skip prior to collection by a waste contractor.
• Waste will be arising from the construction compound.	• Recyclable waste such as paper, cardboard packaging and canteen waste will be segregated on site in covered skips for recycling. • Regular housekeeping of the temporary canteen, office and construction compound will be carried out by a permitted waste contractor.
• Sewage from the temporary site toilets will be emptied under contract for disposal at an appropriate facility.	• Any temporary W/C utilities used on site during the construction phase will be maintained by an approved and permitted contractor.

Appendix 5.1 Highland Council Scoping Correspondence

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The Highland Council
Comhairle na Gàidhealtachd

Scrabster Harbour
c/o Scottish Government
Louise Wilcox
Marine Scotland
Marine Laboratory
375 Victoria Road
Aberdeen AB11 9DB

Please ask for: Shona Turnbull
Direct Dial: 01955 609528
Email: shona.turnbull@highland.gov.uk

Our Ref: 18/00455/PREAPP/SHTU/JEBA
Your Ref: GSX: Scrabster Harbour Trust
Date: 15 February 2018

Dear Sir/Madam

MS-LOT SCREENING CONSULTATION: RE-DEVELOPMENT OF SCRABSTER HARBOUR AT FERRY TERMINAL, SCRABSTER

Thank you for consulting us on 31 January 2018 regarding the screening opinion for the above works.

From the information provided and the subsequent meeting on 9th February 2018 with Scrabster Harbour, it would appear that the dredge spoil is likely to be deposited on the same spoil grounds as used for the development of the Jubilee pier. The bulk of this spoil ground lies within the North Caithness Cliffs Special Protection Area. However, it would appear that the spoil is unlikely to be significantly contaminated but a standard protocol for vessel movements could be applied ensure no significant impact on the qualifying features.

Various cetaceans, including porpoises, are found in the area therefore the impacts of piling and other construction noise on cetaceans should be considered in the Appropriate Assessment. General Policy 8A: Noise of the Pilot Pentland Firth and Orkney Waters Marine Spatial Plan would be helpful.

Sectoral Policy 7 of the Pilot Pentland Firth and Orkney Waters (PFOW) Marine Spatial Plan:
supports the sustainable growth of ports and harbours within the area, particularly within existing facilities, where:-

- access to ports and harbours is not restricted
- safety considerations are primary
- navigational routes are not compromised.

Dredging within the area will be supported by the Plan where dredged material is recycled or disposed of in appropriate locations.

Advice from our Environmental Health Officers may be helpful for furfure stages of the proposal:

> 'The works will entail partial demolition, reconstruction and extension of the existing pier. During construction, there is potential for neighbouring residents to be significantly affected by noise, dust and possibly light nuisance. Any application will need to include an assessment of noise from all construction work which would include piling, dredging and construction traffic. A Construction Environmental Management Plan which identifies the proposed mitigation measures to reduce the impact of emissions will need to be submitted for approval.

Once operational, the anticipation is that the development will result in increased use of the harbour by cruise ships and other large vessels however the screening report has assessed any resulting noise impact as being insignificant. I would agree that during the daytime, noise from increased activities is unlikely to cause any significant problems however, the matter is less clear for noise which might arise from an increase in night time activity. I would advise that any application should include an operational noise assessment in terms of any potential impact due to an increase in night time activities resulting from the redevelopment of the pier.'

The advice from our senior engineer in transport planning will also help in future stages of the proposal:

Consultation Summary

A Transport Assessment is not considered necessary regarding the Council's Transportation interests.

However Consultation on a Transport Statement at the appropriate stage is requested. The Statement should give suitable environmental consideration to the following issues and identify any appropriate mitigation;

1. The increase in vehicular traffic and in particular HGV traffic during operation and construction due to the development. This should be compared against the base line condition for the immediate access route to verify the assumption that the proposals will not have a significant impact. If the impact is shown to be significant then further consultation with the Council on local roads issues is requested.
2. Access, turning and parking provision to mitigate any increase in vehicular traffic. In particular it should consider if any upgraded facilities for public transport and coaches are required to service additional cruise ships.
3. Appropriate links and facilities for pedestrians and cyclists within the development connecting to the external network.

Impact on Transport

The Council has an interest in ensuring appropriate transportation links by sustainable modes to Thurso and other destinations to safeguard health and road safety and to encourage economic benefits for the local community. The Caithness and Sutherland emerging Local Development Plan notes that there are congestion and HGV problems within Thurso due to the historic nature of the road layout and single bridge crossing of the river within the town.

The screening report does not examine transportation in detail. This should be remedied by provision of a Transport Statement as part of the detailed environmental considerations.

However the development takes direct access onto the A9 Trunk Road for which Transport Scotland are the Roads Authority not the Council. The Scoping Report indicates re-use of dredgings on site or disposal at sea and finally; the development proposes upgrading an existing pier rather than development of a new facility. Therefore it appears that the transport impact remote from the site and the Trunk Road during construction and operation will not be significant.

It is considered that a full Transport Assessment is not required for the local network.

On balance, it is suggested that a full Environmental Statement may not be required, but additional information on the likely impacts of the spoil and construction would be required, along with the HRA requirements to ensure the qualifying features of the various Natura sites e.g. various seabirds and salmon, are appropriately assessed and mitigated. The general policies of the PFOW may be helpful for these assessments.

The transport and environmental health issues will also need due consideration at the appropriate stage in the development of the proposal.

Yours faithfully

Shona Turnbull
Case Officer

Appendix 5.2 Transport Scotland Scoping Correspondence

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Development Management and Strategic Road Safety
Trunk Road and Bus Operations

Buchanan House, 58 Port Dundas Road, Glasgow G4 0HF
Direct Line: 0141 272 7386, Fax: 0141 272 7350
John.McDonald@transport.gov.scot

TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

Your ref:

Our ref:
TS00538

Date:
01/08/2018

Rania Sermpezi
Marine Scotland
Marine Laboratory
375 Victoria Road
Aberdeen
AB11 9DB

ms.majorprojects@gov.scot

Dear Sirs,

MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017

SCOPING REQUEST FOR ST. OLA PIER REDEVELOPMENT, SCRABSTER

With reference to your recent correspondence on the above development, we acknowledge receipt of the Environmental Impact Assessment (EIA) Scoping Report (SR) prepared by RPS Group in support of the above development.

This information has been passed to SYSTRA Limited for review in their capacity as Term Consultants to Transport Scotland – Trunk Road and Bus Operations (TRBO). Based on the review undertaken, we would provide the following comments.

The proposed development comprises the redevelopment of St Ola Pier within Scrabster Harbour, located approximately 1.5 miles north-west of Thurso. The nearest trunk road to the site is the A9(T) which forms the northern boundary of the harbour, and from which access to the harbour is taken.

The SR indicates that the redevelopment will result in a renovated pier approximately 280m long with the ability to accommodate cruise ships up to 250m long, as well as service and cargo vessels.

It is noted that the works may also include the reclamation of 0.92ha around the pier to provide storage space for cargo handling and improved queuing area. The volume of dredge material generated by the works is approximately 145,000m^3 of sandy gravel and clay. This material may be reused within reclaimed areas of the site; disposed of at a sea disposal site; disposed of at a licensed waste facility or a combination of each of these options. In addition to the above, a water pipe and a fuel pipe will be laid on the seabed to service vessels.

We understand that no road network upgrades are proposed for the transit of goods to service supply vessels or cruise vessels.

The SR indicates within Chapter 8 - Transportation that Highland Council have determined that a Transport Assessment is not necessary to support the application. Instead, a Transport Statement will be provided.

While Transport Scotland is in agreement that a Transport Assessment is not required, we would request that an assessment of the potential environmental impacts associated with increased traffic be provided within the EIA.

Assessment of Potential Environmental Impacts

With regard to the potential environmental impact of the development on receptors adjacent to the trunk road network, there are a number of issues which should be taken into consideration when assessing the merits of the development. The EIA should provide information including the preferred route options for the movement of any heavy loads and an estimate of vehicle trip generation to and from the site. We would request that a worst-case scenario be considered, whereby all the dredged material is transported off-site. In addition, information must be supplied identifying potential environmental impacts on the trunk road once the development is operational, including, inter alia, the potential trips generated by cruise ships utilising the pier.

Potential trunk road related environmental impacts such as driver delay, pedestrian amenity, severance, safety etc should be considered and assessed where appropriate (i.e. where Institute of Environmental Management and Assessment Guidelines for further assessment are breached). These specify that road links should be taken forward for assessment if:

- Traffic flows will increase by more than 30%, or
- The number of HGVs will increase by more than 30%, or
- Traffic flows will increase by 10% or more in sensitive areas.

In the case of the Environmental Statement, the methods adopted to assess the likely traffic and transportation impacts on traffics flows and transportation infrastructure, should comprise:

- Determination of the baseline traffic and transportation conditions, and the sensitivity of the site and existence of any receptors likely to be affected in proximity of the trunk road network;
- Review of the development proposals to determine the predicted construction and operational requirements; and
- Assessment of the significance of predicted impacts from these transport requirements, taking into account impact magnitude (before and after mitigation) and baseline environmental sensitivity.

Where significant changes in traffic are not noted for any link, no further assessment needs to be undertaken. Where environmental impacts have been fully investigated but found to be of little or no significance, it is sufficient to validate that part of the assessment by stating in the report:

- The work that has been undertaken e.g. Transportation/ Noise / Air Quality Assessments etc;
- What this has shown i.e. what impact if any has been identified; and
- Why it is not significant.

It is not necessary to include all the information gathered during the assessment of these impacts although this information should be available if requested.

I trust that the above is satisfactory and should you wish to discuss any issues raised in greater detail, please do not hesitate to contact Alan DeVenny at SYSTRA's Glasgow Office on 0141 343 9636.

Yours faithfully

[Redacted]

John McDonald

Transport Scotland
Trunk Road and Bus Operations

cc Alan DeVenny – SYSTRA Ltd.

Appendix 6.1 DMRB Screening Model Inputs and Outputs

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APPENDIX 6.1 DMRB SCREENING MODEL INPUTS AND OUTPUTS

Introduction

1.1 This appendix presents the assessment of the effects on air quality due to the proposed redevelopment. The effects of 'Local' and 'Regional' air quality have been undertaken in accordance with the methodology for a 'Simple' assessment, as stated within the Design Manual for Roads and Bridges (DMRB) Advice Note 207/07, published by the Highways Agency (HA) (Highways Agency, 2007).

The most important pollution concentrations in relation to roads emissions are set out in the table below:

From Chapter 6: Table 6.1: Chapter Summary of Air Quality Objectives (AQO) of the National Air Quality Strategy

Pollutant	Concentration	Measured as	To be achieved by
Benzene	3.25 µg/m^{-3}	Running annual mean	31 December 2010
1,3-Butadiene	2.25 µg/m^{-3}	Running annual mean	31 December 2003
Carbon Monoxide	10.0 mg/m^{-3}	Running 8-hour mean	31 December 2003
Lead	0.5 µg/m^{-3} 0.25 µg/m^{-3}	Annual mean Annual mean	31 December 2004 31 December 2008
Nitrogen Dioxide (NO_2)	40 µg/m^{-3} 200 µg/m^{-3} not to be exceeded more than 18 times a year	Annual mean 1-hour mean	31 December 2005 31 December 2005
Particles (PM_{10}) (gravimetric)	18 µg/m^{-3} 50 µg/m^{-3}, not to be exceeded more than 7 times a year	Annual mean 24 hour mean	31 December 2010 31 December 2010
Particles ($PM_{2.5}$) (gravimetric)	10 µg m^{-3} (limit)	Annual Mean	2020

This study for the proposed redevelopment makes predictions for the following:

- **Particles (PM_{10})**
- **Nitrogen Dioxide (NO_2)**

DMRB Local Assessment Inputs

1.2 Traffic - The following input parameters are used in the DMRB local assessment:

Traffic Year	Exising (3.7% HGV)	Proposed (3.9% HGV)
Operational Traffic		
2018	3223	-
2021	3339	3351
2031	3652	3664
Construction Traffic		
2020	3300 (3.7% HGV)	3386 (3.8% HGV)*
2020	3300 (3.7% HGV)	3453 (8% HGV)**

*Dredged material reused or disposed off at sea

**Worst Case Scenario - All dredged material removed by road. This was used in the construction modelling predictions.

Note: All flows along the main A9 Road

1.3 The following background information is relevant to the project.

1.4 Defra Background Pollution Concentrations

Background Pollution Concentration	Year	NOx	Nitrogen Dioxide (NO_2)	Particulate Matter (PM_{10})	Particulate Matter ($PM_{2.5}$)
	2018	3.65	2.91	7.36	4.3
	2021	3.18	2.54	7.17	4.13
	2031	2.45	2.0	6.94	3.93

1.5 These Defra background levels are provided to assist local authorities in support of Review and Assessment of local air quality. To assist local authorities undertaking their air quality Review and Assessments, 2017-based background maps for years 2017 to 2030 for NOx, NO_2, PM_{10} and $PM_{2.5}$ are available. The information used in this assessment represent pollution concentrations at a location closest to the proposed redevelopment. The coordinates for the location are X311500; Y967500 located off St. Andrews Drive.

1.6 Scotland Background Maps - Mapped background concentrations for use in LAQM Review and Assessments undertaken by Scottish local authorities are available on the Scottish Air Quality Website. These maps differ from the UK model maps downloadable from the UK selector and are created from a Scotland-specific model using Scottish monitoring data and Scottish meteorological data. They are available for NOx, NO_2 and PM_{10} only. These are presented in the following section:

1.7 Data for Local Authority Review and Assessment purposes (www.scottishairquality.co.uk)

Background Pollution Concentration	Year	NOx	Nitrogen Dioxide (NO_2)	Particulate Matter (PM_{10})	Particulate Matter ($PM_{2.5}$)
	2018	7.33	5.34	8.72	NA
	2021	6.74	4.93	8.59	NA
	2031	5.67	4.18	8.46	NA

1.8 Scotland specific maps are not currently available for $PM_{2.5}$. The Scottish Government advise that for this pollutant, Defra UK wide background maps from a base year of 2017 (https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017) are used in the review and assessment of local air quality.

1.9 The higher values are used in the calculations.

1.10 Representative sensitive receptor - A representative receptor is set at a distance of 2m from the modelled A9 road for all scenarios.

1.11 Average speed is set to 20kmph to represent any slowed or congested traffic. This will give elevated pollution concentration predictions.

1.12 Road type was set to 'A' reflecting an A road.

DMRB Local Assessment Outputs

1.13 The following table shows the DMRB outputs for the modelled scenarios for the local assessment.

Nitrogen Dioxide	Construction Phase	Without 2020	With 2020	2020 Actual Difference	2020 % Change	Overall Significance
1	Representative Receptor A	7.01	7.90	0.89	13	Negligible
PM10	**Construction Phase**	**Without 2020**	**With 2020**	**2020 Actual Difference**	**2020 % Change**	**Overall Significance**
1	Representative Receptor A	9.12	9.20	0.08	1	Negligible
Nitrogen Dioxide	**Operational Phase**	**Without 2021**	**With 2021**	**2021 Actual Difference**	**2021 % Change**	**Overall Significance**
1	Representative Receptor A	6.55	6.61	0.06	1	Negligible
PM10	**Operational Phase**	**Without 2021**	**With 2021**	**2021 Actual Difference**	**2021 % Change**	**Overall Significance**
1	Representative Receptor A	8.99	8.99	0.00	0	Negligible
Nitrogen Dioxide	**Operational Phase**	**Without 2031**	**With 2031**	**2031 Actual Difference**	**2031 % Change**	**Overall Significance**
1	Representative Receptor A	5.92	5.98	0.06	1	Negligible
PM10	**Operational Phase**	**Without 2031**	**With 2031**	**2031 Actual Difference**	**2031 % Change**	**Overall Significance**
1	Representative Receptor A	8.91	8.91	0.00	0	Negligible

1.14 In summary, there is no predicted significant impact from operational traffic emissions (or construction phase traffic emissions) and the effect is negligible on the closest sensitive receptor (highly sensitive human receptor).

DMRB Regional Assessment Inputs

1.15 The inputs are the same as the local assessment inputs with the exception of setting a distance for the A9 road modelled. This was set to 5km for all scenarios.

1.16 The following table shows the DMRB outputs for the modelled scenarios for the regional assessment.

Pollutant	2021 Without	2021 With	2031 Without	2031 With
CO	9,131	9,161	9,911	9,945
THC	1,104	1,116	1,200	1,214
NOx	2,351	2,409	2,575	2,639
PM10	95	96	107	108
C	433	437	474	479

1.17 In summary, these are not significant in terms of a regional impact from operational traffic emissions and the effect is negligible with regard to greenhouse gas emissions.

Appendix 6.2 Construction Phase Distance Banding Figure

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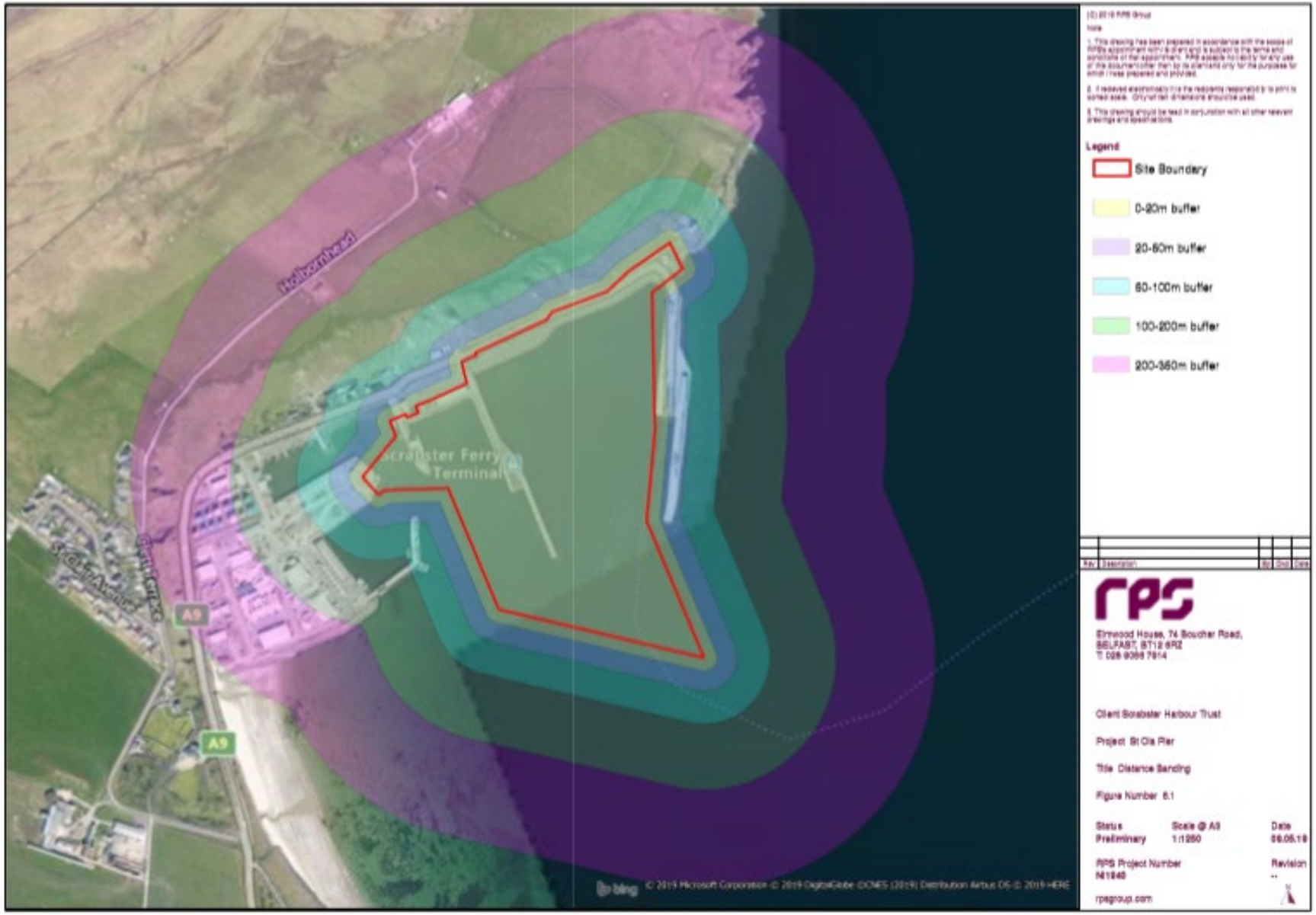
APPENDIX 6.2 CONSTRUCTION PHASE DISTANCE BANDING FIGURE

Introduction

1.1 The study area is dominated by harbour infrastructure and associated commercial services (such as maritime engineering and fish processing). Other land uses / operations within the harbour estate include restaurants, RNLI station, government offices and the former Fisherman's Mission building.

1.2 The wider study area, beyond the harbour estate, is largely agricultural land use with residential properties (approximately 70) at St. Clair Avenue, Holburn Place, Clett Terrace and Holburn Head; a number of residential properties are also located within the harbour, along the A9 road. Consideration shall be given to the potential impact of the proposed development upon the residential properties and ecological receptors within the study area.

1.3 The figure presented in this appendix details the Construction Phase: IAQM (2014): Guidance on the Assessment of Dust from Demolition and Construction distance bandings used in the assessment.


Legend
Site Boundary
0-20m buffer
20-60m buffer
60-100m buffer
100-200m buffer
200-360m buffer
Scrabster Ferry Terminal
A9
A9
Elmwood House, 74 Boucher Road,
BELFAST, BT12 6RZ
T: 028 9066 7914
Client Scrabster Harbour Trust
Project St Ola Pier
Title Distance Banding
Figure Number 6.1
Status
Preliminary
Scale @ A3
1:1250
Date
09.05.19
RPS Project Number
NI1848
Revision
--
rpsgroup.com

Appendix 6.3 Draft Dust Management Plan

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APPENDIX 6.3 DRAFT DUST MANAGEMENT PLAN

Introduction

1.1 Emissions from traffic generated by the construction phase of the proposed redevelopment are not anticipated to create any significant effects. Exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic are highly unlikely to make a significant impact on local air quality. Similarly, emissions form dredging machinery and associated vessel movement is not predicted to be significant. Construction traffic movements (including dredger) and construction plant emissions are temporary, intermittent (exhaust emissions only when plant or traffic is running) and associated only with the specific construction phase of the proposed development. In order to ensure control of emissions this draft dust management plan details mitigation and management measures.

1.2 Normal demolition and construction techniques conforming to health and safety protocols will be in place to appropriately manage any potential adverse impact to amenity during these phases of redevelopment. Mitigation measures for the demolition and construction phase for air quality and dust are detailed in the following sections.

1.3 The following are general good practice measures that will be implemented onsite to control dust and vehicle emissions.

1.4 The IAQM guidance outlines a number of mitigation measures for reducing impacts of fugitive dust from construction sites. Adoption of a number of these measures at the project site would reduce dust impacts to both personnel working at the site and off-site receptors. The mitigation measures are broken down in the following sections.

Communications

1.5 With respect to communications, the following will be implemented:

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the HSSE Manger or the Site Manager;
- Appropriate training will be provided to all staff to ensure that they are aware of and understand the dust control and other environmental control measures; and,
- Display the head or regional office contact information.

To be implemented before works commence on site and training given as appropriate by the appointed contractor.

Site Management

1.6 With respect to site management, the following will be implemented:

- Weekly visual inspections of the site and site boundary for evidence of dust depositions will be made. A weekly dust inspection of the site will be undertaken by a suitable person, trained and nominated by the site manager. Increase frequency of site inspections will be undertaken when activities with a high potential to produce dust are being carried out, such as breaking up of concrete, power tool use and during prolonged windy or dry condition (Please refer to end of this plan for an example visual inspection template);
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- Make the complaints record available to the relevant regulatory authorities when asked;
- Record any exceptional incidents that cause dust and/or air emissions, either on or offsite, and the action taken to resolve the situation in an environmental log book;
- Avoid site runoff of water or mud;
- Use covered skips;
- No bonfires and burning of waste materials on site.

To be implemented during works as required by the appointed contractor.

Demolition

1.7 Demolition is planned as part of the redevelopment. Demolition of the concrete structures will be carried out by means of excavator mounted rock breaker, concrete sawing, or a combination of these methods. With respect to demolition, the following should be implemented:

- Ensure effective water suppression is used during demolition operations (especially breakup of concrete). Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.

To be implemented during demolition by the appointed contractor.

Earthworks

1.8 Earthworks are planned as part of the scheme including foundations (and associated excavation/dredging) and potential stockpiling. With respect to earthworks, the following will be implemented:

- Minimise drop heights from loading or handling equipment/materials and use fine water sprays on such equipment wherever appropriate;
- Dampening methods will be used where necessary; and,
- Methods and equipment will be in place for immediate clean-up of spillages of dusty or potentially dusty materials.

To be implemented during earthworks by the appointed contractor.

Construction

1.9 A rock armour revetment is to be placed to the front of the reclamation area. The existing rock armour facing of the current revetment will be removed prior to reclamation construction and stored for reuse in the new revetment if suitable. The remainder of the rock armour required for the new revetment will be imported inert stone. Geotextile membrane will be laid between the fill and rock armour material as part of the revetment construction. The rock armour will likely be landed on one of the existing piers, St. Ola, Jubilee or Ice Pier and then stored within the Contractors compound for use. Smaller underlayer armour or infill may be sourced locally and would likely be brought to site by road. Foundations for barriers or fencing will be precast, lifted into position and placed behind the rock armour and backfilled. With respect to construction, the following will be implemented:

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- Ensure bulk cement and other fine powder materials are delivered enclosed;
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust;
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems; and,
- Cleaning of hard stand areas by personnel only or if required mechanical road sweepers (with water suppressant fitted) to clean any site hard stand area.

To be implemented during construction period by the appointed contractor.

Vehicle Movement and Vehicle Emissions

1.10 As with any construction site, there are associated vehicle movement, emissions and plant use. With respect to vehicle movement and vehicle emissions, the following will be implemented:

- Transportation of aggregates and fine materials will be conducted in enclosed or sheeted vehicles;
- An onsite speed limit (to be displayed) will be implemented by the main contractor that will be appropriate to the types of construction plant utilised;
- Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions;
- Ensure all vehicles switch off engines when stationary and not in immediate use - no idling vehicles (emissions to air controlled);
- All plant utilised should be regularly inspected (emissions to air controlled);
- Visual monitoring of plant will include: Ensuring no black smoke is emitted other than during ignition (emissions to air controlled);
- Ensuring exhaust emissions are maintained to comply with the appropriate manufacturers limits (emissions to air controlled); and,
- Vehicle exhausts will be directed away from the ground and other surfaces and preferably upwards to avoid road dust being re-suspended to the air.

To be implemented throughout by the appointed contractor.

Tarmac Laying and the Use of Bitumen

1.11 With respect to tarmac laying and use of bitumen, the following will be implemented:

- Do not overheat bitumen and cover pots.
- Use great care in all processes to prevent spillages and extinguish any accidental fires immediately.

To be implemented during earthworks by the appointed contractor.

Environmental Inspection Schedule

Note : This form is designed for general use and may not be exhaustive. Modifications and additions may be necessary to suit individual projects and to address specific environmental issues and associated mitigation measures.

Project :			Site Location :	
Demolition Phase / Construction Phase :				
Inspection Date :			Time :	
Inspected by :			Weather :	
Inspection Items	Yes	No*	N/A	REMARKS (i.e. specify location, good practices, problem observed, possible cause of nonconformity and/or proposed corrective/preventative actions)
Air Pollution and Dust Control	✓	×		
Are stockpiles of dusty materials (size with more than 20 bags cement) covered appropriately ?				
Notable dusty activities taking place ?				
Are all vehicles carrying dusty loads covered over prior to leaving the site?				
Specifically, are demolition work areas watered? (e.g. trimming activities by using breaker, internal demolitions or cutting of materials being undertaken)				
Are dusty roads notable outside site footprint ?				
Are dusts controlled during any onsite fabrication or cutting of materials ?				

Are plant and equipment well maintained? (any black smoke observed, please indicate the plant/equipment and location)				
Is dark smoke controlled from any plant?				
Are there enclosures around the main dust-generating activities?				
Hoarding/screening provided along boundaries and properly maintained (any damage / opening observed, please indicate the location).				
Are speed control measures applied? (e.g. speed limit sign)				
Has site inspection on peripheries of the site been undertaken – any visible dust noted on cars, windows, window sills ?				
Are any skips on site covered ?				
Are chutes enclosed and in use ? Any visible dust from chute ?				
Is site fencing, barriers and scaffolding clean ?				
Others (please specify)				

*Any “No” recorded represents the potential breach of mitigation advice and an improvement is potentially needed and details of nonconformity (NC) shall be recorded in the Remarks column.

Sketch of Site visit if required

Site Operative Signature		Date	
Reviewed by Project Manager (if not undertaken by Project Manager)		Date	

PLEASE KEEP ON FILE with other completed environmental inspection schedule

Appendix 7.1 Calibration Certificates

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Certificate of Calibration

Certificate No.: 4715719250

Object:	Sound Analyser Nor140
Supplier:	Norsonic AS
Type:	Nor140
Serial number:	1406914
Client:	AIR560

This instrument is tested and calibrated in accordance to the Norsonic production standard set for Nor140, ensuring that the instrument conforms to the following standards;

IEC 61672-1:2002 class 1
IEC 61260-1 class 1 Ed 1.0 2014-02
ANSI S1.4-1983 (R2001) with amd. S1.4A-1985 class 1
ANSI S1.43-1997 (R2002) class 1
ANSI S1.11-2004 class 1
DIN 45 657, Applicable parts
IEC 61094 part 4

Instrumentation used for calibration traceable to:

Electrical Parameters: IKM, Norway
Acoustical Parameters: PTB, Germany
Environmental Parameters: Justervesenet. Norway

Adjustments: None

Comments: None

Date of calibration:	**Calibration interval recommended**
2017-06-08	2 years

The environmental parameters applicable to this calibration are kept well within limits ensuring negligible deviation on obtained measurement results.

[Redacted]

rsonic
SKOGEN, NORWAY
35 89 00

Norsonic AS, P.B 24, 3421 Lierskogen. Visitor address: Gunnersbråtan 2, Tranby, Norway.
Phone +47 32858900 Fax.: +47 32852208. email: info@norsonic.com

Warranty

Norsonic products are thoroughly inspected before they leave the factory. Carefully check the shipment for any physical damage in transit. Notify the factory or the distributor and file the claim with the carrier if there is any such damage.

Product type: Sound Analyser Nor140

Serial no.: 1406914

Power: 11-15 Volt DC

Option included: 69

Option description:

00: Tmax 5 and Leql according to German standards
01: 1/1 octave real time frequency filters 0,5 - 16.000Hz
02: Reference spectrum comparison with digital Go/No Go TTL output
03: 1/3 octave real time filters 0,4 - 20.000Hz, require opt 2
04: Statistical Calculations for weighting network and 1/n octave filters
05: Parallel calculation of F, S, I time constants
06: Profile. L/t measuring mode w / multi spectrum if opt 2 or 3 are installed
07: Enhanced profile including 4 markers and time resolution from 50ms
08 Sound recording
09: Reverberation time decay and calculation of T20 and T30
10: Noise generator with pink or white noise
11: Building acoustic mode according to ISO140, ISO10052 and ISO717/1 & /2
12: SweptSine measurement technique
13: Speech Transmission Index mode
14: FFT measuring mode with absolute units 8000 lines,
15: Survey Sound Power mode for LwA measurements according to ISO-3746
16: Enhanced global trigger
17: Audiometer calibration with measurement of Lzeq, frequency and distortion
18: Extended measurement range to 150dBpeak including self noise compensation
19: Special options for Noise Monitoring

Application version: 4.0.1120 2017-03-23 10:33r

Id no.: 15719250

Accessories:

Preamplifier	1209	Serial No.: 21121
Microphone	1225	Serial No.: 212990

[Redacted]

Related to order: SO17

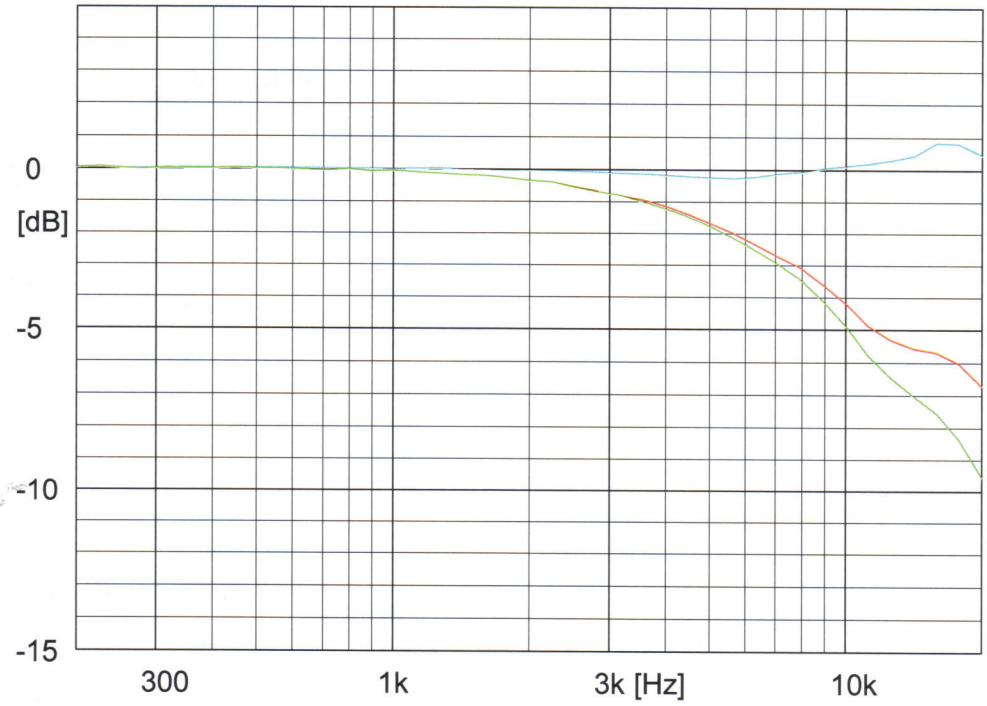
Checked and approved b **Date:** 2017-06-08

Norsonic
N-3420 LIERSKOGEN, NORWAY
TEL: +47 32 85 89 00

Warranty statement

Norsonic products are warranted against defects in material and workmanship. This warranty applies to 36 months from date of delivery.
Norsonic AS will repair or replace equipment, which proves to be defective during the warranty period. This warranty includes labour and parts. Equipment returned to the factory, for repair must be shipped freight prepaid. Repair due to misuse of the equipment and/or use of hardware, software or interfacing not provided by Norsonic AS are not covered by this warranty.
No other warranty is expressed or implied, included, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.
Norsonic AS shall not be liable for consequential damages

Microphone Calibration Certificate



Norsonic
Type: 1225

Serial no: 212990

Sensitivity: 52,80 mV/Pa
-25,55 dB re. 1 V/Pa
Capacitance: 22,19 pF
Date: 2[Redacted]

Signatu

Measurei

Polarisation voltage:	200,0 V
Pressure:	97,60 kPa
Temperature:	23,1 °C
Relative humidity:	44,0 %RH

Results are normalized to the reference conditions.

Free field response
Diffuse field response
Pressure (Actuator) response

Norsonic AS
www.norsonic.com

Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM6 1HD
www.campbell-associates.co.uk
Phone 01371 871030 Facsimile 01371879106

Certificate of Calibration and Conformance

CALIBRATION

0789

Certificate No.: U26097

Test object:	**Sound Level Meter, BS EN IEC 61672-1:2003 Class 1 (Precision)**
Manufacturer:	**Norsonic**
Type:	**140**
Serial no:	**1405074**
Customer:	**The Airshed Ltd**
Address:	**5 Lauder Place, East Linton, East Lothian. EH40 3DB.**
Contact Person:	**Hilary Fraser**
Order No:	**AS 17-04**

Method :
Calibration has been performed as set out in CA Technical Procedures TP01 & 02 as appropriate. These are based on the procedures for periodic verification set out in BS EN IEC 61672-3:2006. Results and conformance statement are overleaf and detailed results are in the attached Test Report.

	Producer:	Type:	Serial No:	Certificate number
Microphone	GRAS	40AF	114655	26096
Calibrator*	Norsonic	1251	31060	U25588
Preamplifier	Norsonic	1209	21254	Included

Additional items that also have been submitted for verification

Wind shield	None
Attenuator	None
Extension cable	None

These items have been taken into account wherever appropriate.

Environmental conditions:	Pressure:	Temperature:	Relative humidity:
Reference conditions:	101.325 kPa	23.0 °C	50 %RH
Measurement conditions:	101.33 ± 0.01kPa	21.4 ± 0.2°C	51.3 ± 2%RH

Date received :	11/07/2017
Date of calibration:	17/07/2017
Date of issue:	18/07/2017

Engineer [Redacted]

Supervisor

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognized national standards, and to the units of measurement realized at the National Physical Laboratory or other recognized national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Certificate of Calibration and Conformance

UKAS Laboratory Number 0789

Certificate No.: U26097

Conformance

From markings on the sound level meter or by reference to the manufacturer's published literature it has been determined that the instrument submitted for verification was originally manufactured to BS EN IEC 61672-1:2002 and similarly that the associated sound calibrator conforms to BS EN IEC 60942.

Statement of conformance

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of BS EN IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available[1], from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with BS EN IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in BS EN IEC 61672-1:2002, and that the sound level meter submitted for testing conforms to the class 1 requirements of BS EN IEC 61672-1:2003.

[1] This evidence is held on file at the calibration laboratory

Measurement Results:

Indication at the calibration check frequency - IEC61672-3 Ed.1 #9	Passed
Self-generated noise - IEC 61672-3 Ed.1 #10	Passed
Acoustical signal tests of a frequency weighting - IEC 61672-3 Ed.1 #11	Passed
Frequency weightings: A Network - IEC 61672-3 Ed.1 #12.3	Passed
Frequency weightings: C Network - IEC 61672-3 Ed.1 #12.3	Passed
Frequency weightings: Z Network - IEC 61672-3 Ed.1 #12.3	Passed
Frequency and time weightings at 1 kHz IEC 61672-3 Ed.1 #13	Passed
Level linearity on the reference level range - IEC 61672-3 Ed.1 #14	Passed
Toneburst response - IEC 61672-3 Ed.1 #16	Passed
Peak C sound level - IEC 61672-3 Ed.1 #17	Passed
Overload indication - IEC 61672-3 Ed.1 #18	Passed
Electrical signal tests of frequency weightings - IEC 61672-3 Ed.1 #12	Passed

Comment

Correct level with associated calibrator is 113.9dB(A).

Observations

No information on the uncertainty of measurement, required by 11.7 of BS EN IEC 61672-3:2006 of the adjustment data given in the instruction manual or obtained from the manufacturer of supplier of the sound level meter, or the manufacturer of the microphone, or the manufacturer of the electrostatic actuator was published in the instruction manual or made available by the manufacturer or supplier. The uncertainty of measurement of the adjustment data has therefore been assumed to be numerically zero for the purposes of this periodic test. If these uncertainties are not actually zero, there is a possibility that the frequency response of the sound level meter may not conform to the requirements of BS EN IEC 61672-1:2003.

The details of the uncertainty for each measurement is available from the Calibration Laboratory on request and is based on the standard uncertainty multiplied by a coverage factor K=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements. Details on the sources of corrections and their associated uncertainties that relate to this verification are contained the detailed test report accompanying this certificate.

Calibration Report

Certificate No.:26096

Manufacturer: GRAS
Type: 40AF
Serial no: 114655

Customer: The Airshed Ltd
Address: 5 Lauder Place, East Linton, East Lothian. EH40 3DB.
Order No: AS 17-04
Contact Person: Hilary Fraser

Measurement Results:

	Sensitivity: (dB re 1V/Pa)	Capacitance: (pF)
1:	-26.70	22.3
2:	-26.70	22.3
3:	-26.71	22.3
Result (Average):	**-26.71**	**22.3**
Expanded Uncertainty:	0.10	2.00
Degree of Freedom:	>100	>100
Coverage Factor:	2.00	2.00

The following correction factors have been applied during the measurement:
Pressure:-0.010 dB/kPa Temperature:-0.007 dB/°C Relative humidity:0.000 dB/%RH

Reference Calibrator: WSC1 - Nor1253-24269 Volume correction: 0.000 dB
Records:K:\C A\Calibration\Nor-1504\Nor-1017 MicCal\2017\GRAS40AF_114655_M1.nmf
Measurement procedure: TP05
All results quoted are directly traceable to National Physical Laboratory, London

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA publication EA-4/02.

Comment:

Environmental conditions:

Pressure:	Temperature:	Relative humidity:
101.591 ± 0.042 kPa	22.4 ± 0.1 °C	44.1 ± 0.8 %RH

Date of calibration: 17/07/2017
Date of issue: 17/07/2017

Supervisor : Darren Batten TechIOA
Engineer :

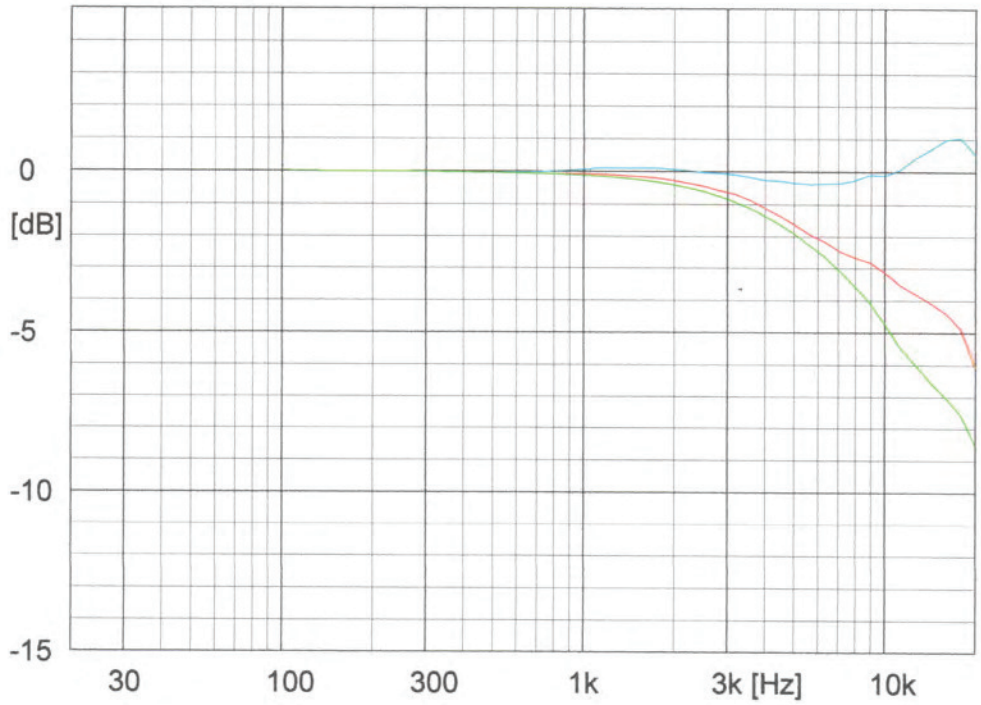
[Redacted]

Campbell Associates
www.campbell-associates.co.uk

Palan

Software version: 6.0h

Microphone Calibration Certificate



GRAS
Type: 40AF

Serial no: 114655

Sensitivity: 46.21 mV/Pa
-26.71 ±0.10 dB re. 1 V/Pa
Capacitance: 22.3 ±2.0 pF
Date: 17/07/2017
[Redacted]
Signatur

Measurement conditions:

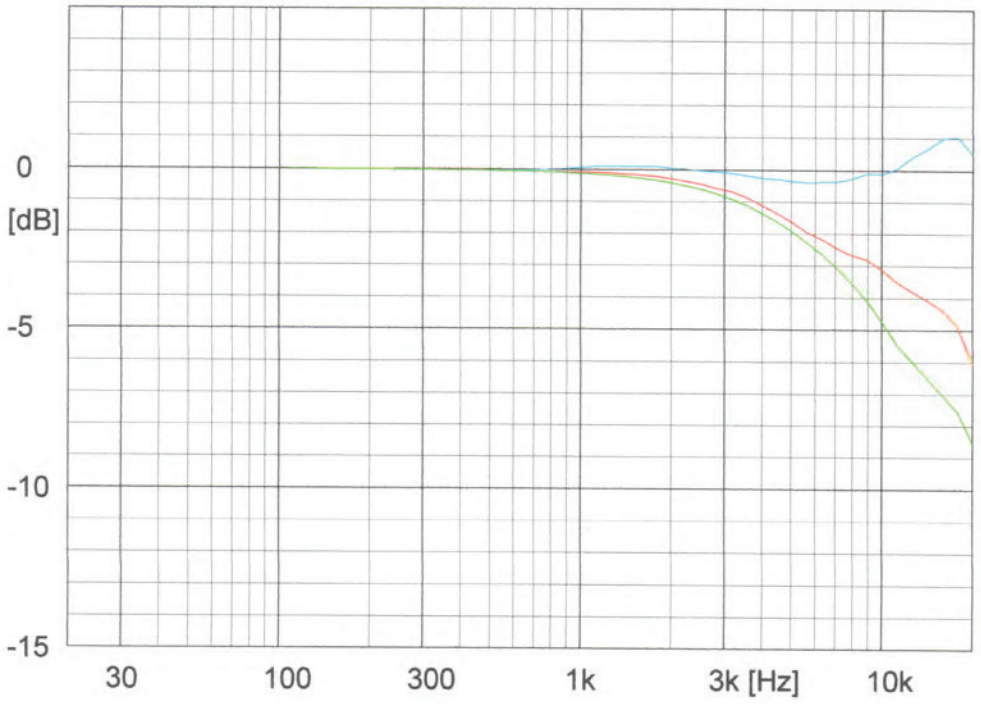
Polarisation voltage:	200.0 V
Pressure:	101.59 ±0.04 kPa
Temperature:	22.4 ±0.1 °C
Relative humidity:	44.1 ±0.8 %RH

Results are normalized to the reference conditions.

Free field response
Diffuse field response
Pressure (Actuator) response

Campbell Associates
www.campbell-associates.co.uk

Microphone Calibration Certificate



GRAS
Type: 40AF

Serial no: 114655

Sensitivity: 46.21 mV/Pa
-26.71 ±0.10 dB re. 1 V/Pa
Capacitance: 22.3 ±2.0 pF
Date: 17/07/2017
[Redacted]
Signatu

Measurement conditions:

Polarisation voltage:	200.0 V
Pressure:	101.59 ±0.04 kPa
Temperature:	22.4 ±0.1 °C
Relative humidity:	44.1 ±0.8 %RH

Results are normalized to the reference conditions.

Free field response
Diffuse field response
Pressure (Actuator) response

Campbell Associates
www.campbell-associates.co.uk

Comment:

Norsonic

Certificate of Calibration

Certificate No.: Cal 022-2017-7814

NORWEGIAN ACCREDITATION CAL 022

Test object:	Sound Calibrator
Manufacturer:	Norsonic
Type:	1251
Serial no:	34961
Customer:	CA stock
Order No:	SO1703010

All tests are performed according to IEC 60942 : 2003, Annex B.

The stated levels are relative to 20µPa. The distortion value (in %) is the signal to total noise ratio.

The calibrator was placed on top of the reference microphone, only held in place by gravity. At least three repetitions have been performed. The submitted adapter ring marked Nor1443 was used to obtain half inch configuration.

	Level	Level stability	Frequency	Frequency stability	Distortion
Nominal	114 dB		1 kHz		
Result (Average):	**114,02 dB**	**0,04 dB**	**999,99 Hz**	**0,00 %**	**0,52 %**
Expanded Uncertainty:	0,09 dB	0,02 dB	1,00 Hz	0,10 %	0,30 %

The calibrator level was not adjusted.

Statement of Conformity. This test object is type approved. Reference: PTB 21.5 94.04
As public evidence was available, from a testing organization responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

Comment

Date of calibration:	2017-03-28
Date of issue:	2017-03-28

Environmental conditions:	Pressure:	Temperature:	Relative humidity:
Reference conditions:	101,325 kPa	23,0 °C	50 %RH
Measurement conditions:	98,90 ± 0,05 kPa	23,2 ± 0,5 °C	37,0 ± 3,0 %RH

Supervisor [Redacted]
Engineer

This certificate of calibration is issued by a laboratory accredited by Norwegian Accreditation (NA). NA is one of the signatories to the EA Multilateral Agreement for mutual recognition of calibration certificates (European Co-operation for Accreditation). The accreditation states that the laboratory meets the NA requirements concerning competence and calibration system for all the calibrations contained in the accreditation. It also states that the laboratory has a satisfactory quality assurance system and traceability to accredited or national calibration laboratories. This certificate may not be reproduced other than in full.

The stated level is valid at reference conditions.
The following correction factors have been applied during the measurement: Pressure:0,0005 dB/kPa Temperature:0,000 dB/°C Relative humidity:0,000 dB/%RH Load volume:0,0003 dB/mm3

Records: L:\PROJECTS\CALLAB\PROGRAM\Cal\2017\NOR1251_34961_M1.nmf

The verification measurements were performed using the calibration system Nor1504A with software type Nor1018, software version: 6.2NCL_02. As acoustical reference was used PRM1 - B&K4134-1743770 with sensitivity: 10,7 mV/Pa.

A detailed description of the calibration procedure is separately available. NTQ-L-002: Procedure for Calibration of Acoustic Calibrators

A complete list of instruments, hardware and software, that has been used for this calibration is separately available from the calibration laboratory.

Traceability
The measured values are traceable to the following laboratories:

Sound Pressure Level:	PTB, Germany
Voltage:	IKM Laboratorium Norway
Frequency:	IKM Laboratorium Norway
Ambient Pressure:	Justervesenet, Norway
Temperature:	Justervesenet, Norway
Relative Humidity:	Justervesenet, Norway

Street address: Gunnersbråtan 2, N-3409 Tranby, Norway
Tel.: +47 32858914 email: ncl@norsonic.com

Appendix 7.2 Photographs of Noise Monitoring Locations

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Photograph 7.2.1: Noise Monitoring Location 1

Photograph 7.2.2: Noise Monitoring Location 2

Appendix 7.3 Noise Monitoring Survey Results

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Figure 7.3.1: Noise Monitoring Location 1 Daytime Results (07/02/2019)

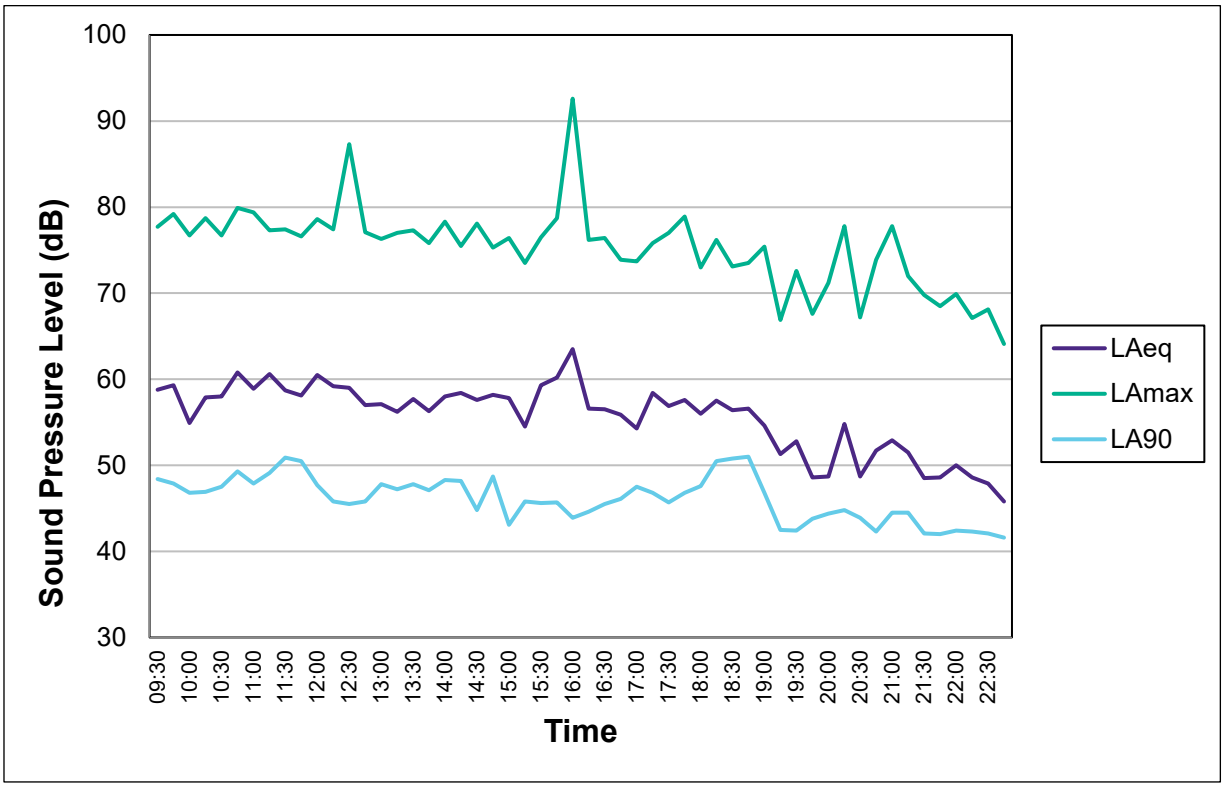


Figure 7.3.2: Noise Monitoring Location 2 Daytime Results (07/02/2019)

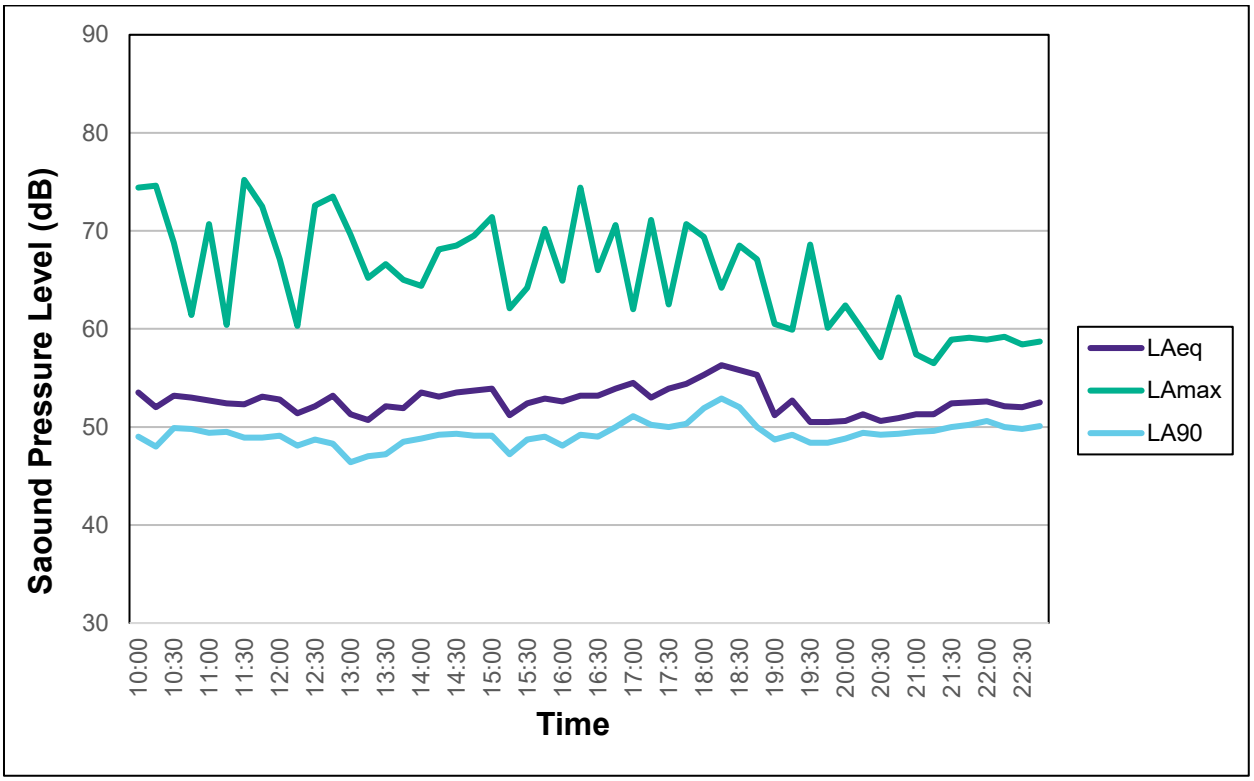


Figure 7.3.3: Noise Monitoring Location 1 Daytime Results (08/02/2019)

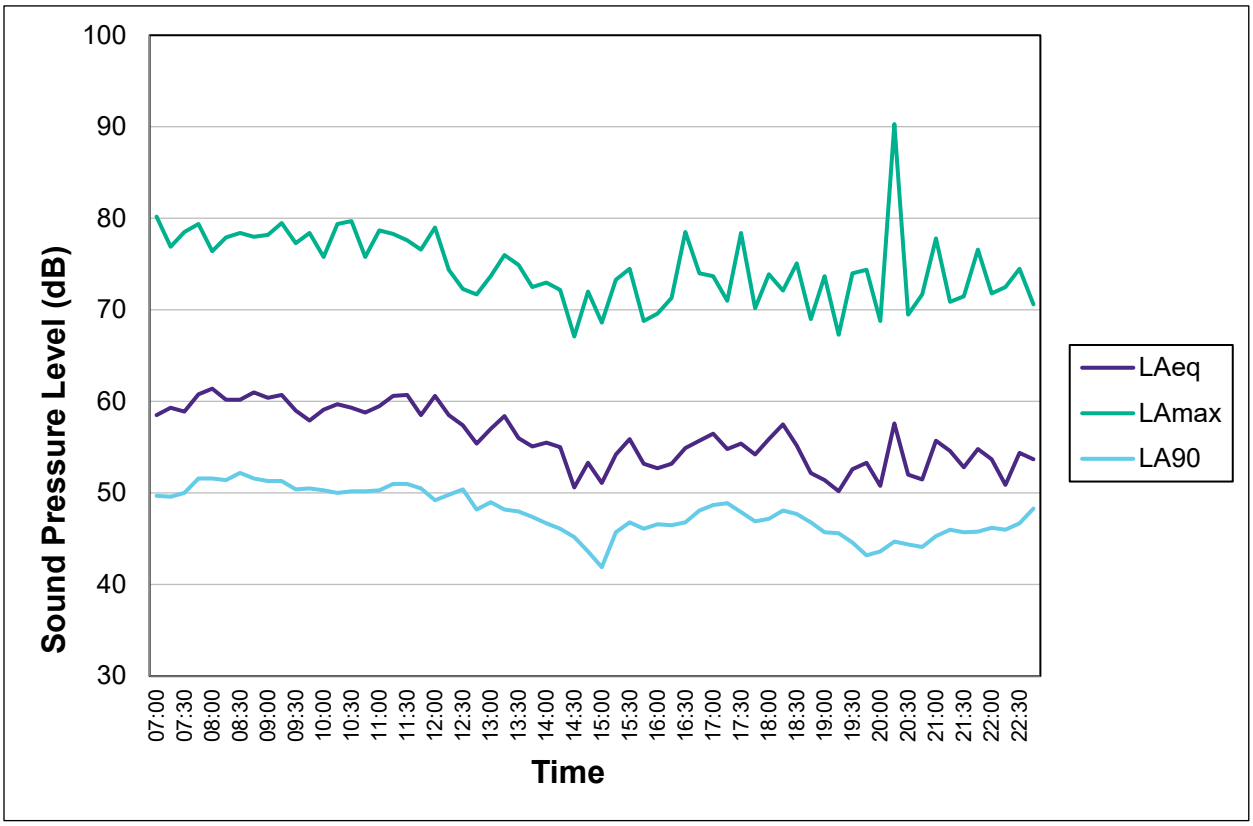


Figure 7.3.4: Noise Monitoring Location 2 Daytime Results (08/02/2019)

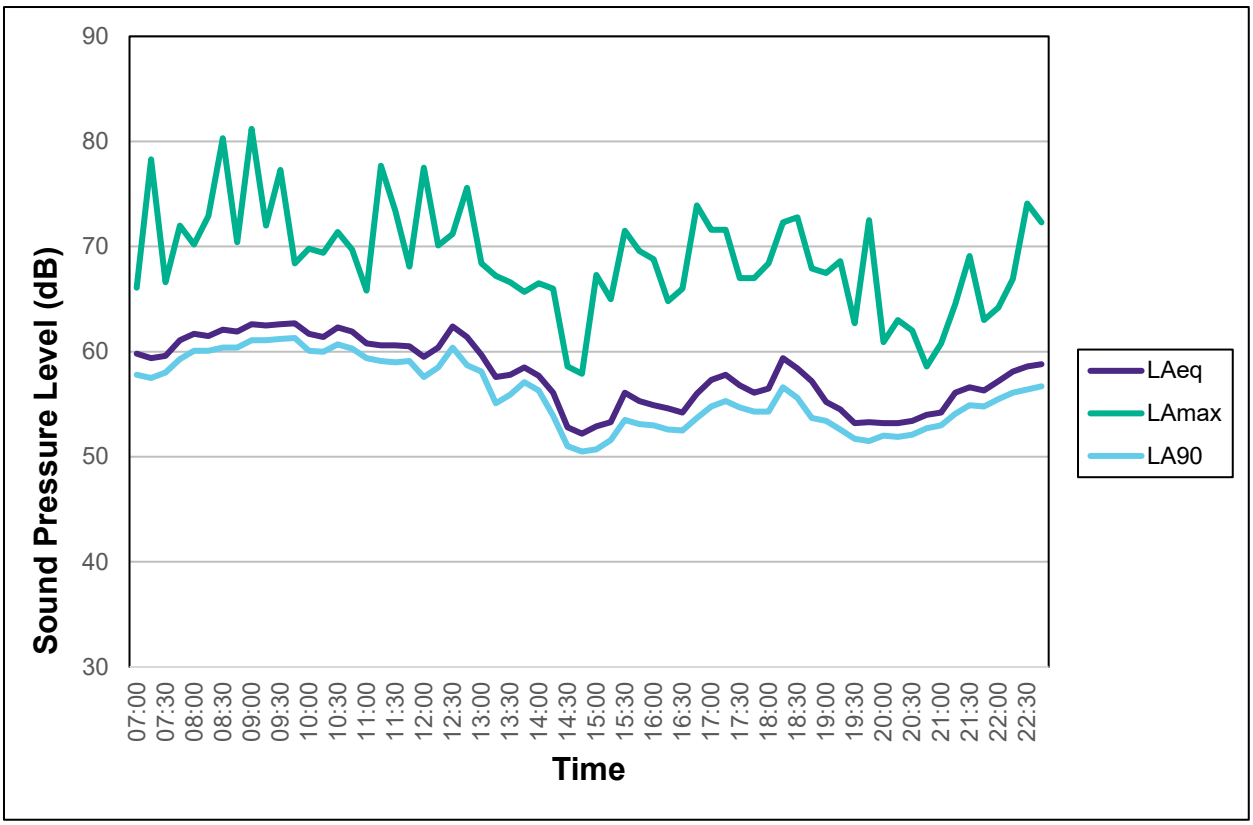


Figure 7.3.5: Noise Monitoring Location 1 Night-time Results (07/02/2019)

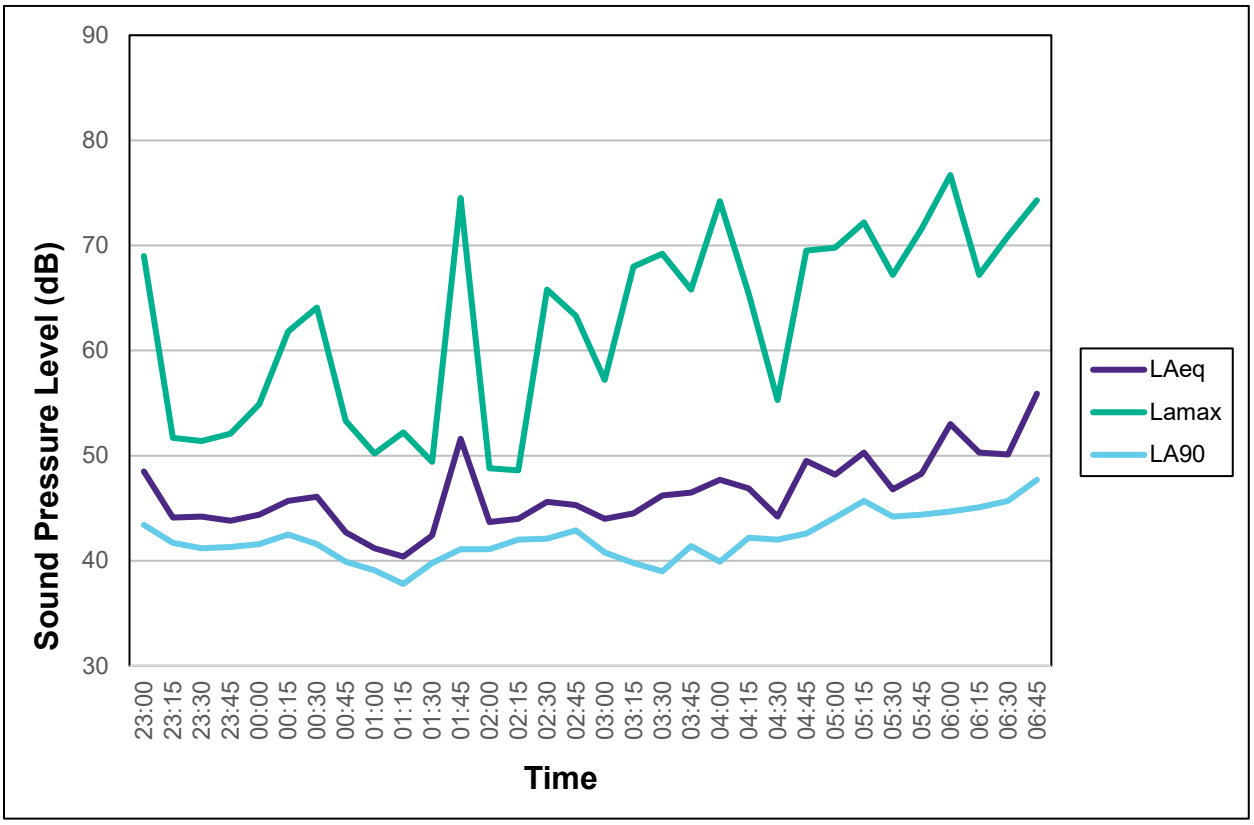


Figure 7.3.6: Noise Monitoring Location 2 Night-time Results (07/02/2019)

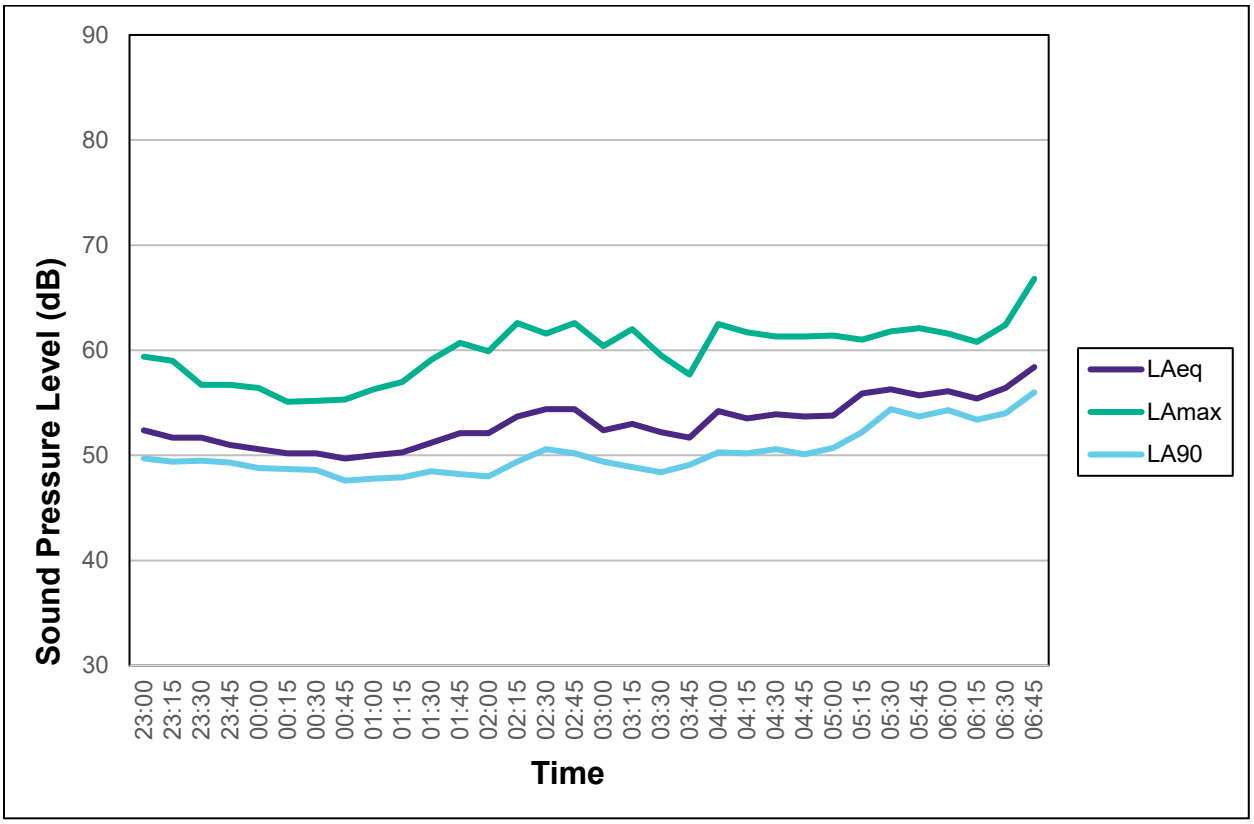


Figure 7.3.7: Noise Monitoring Location 1 Night-time Results (08/02/2019)

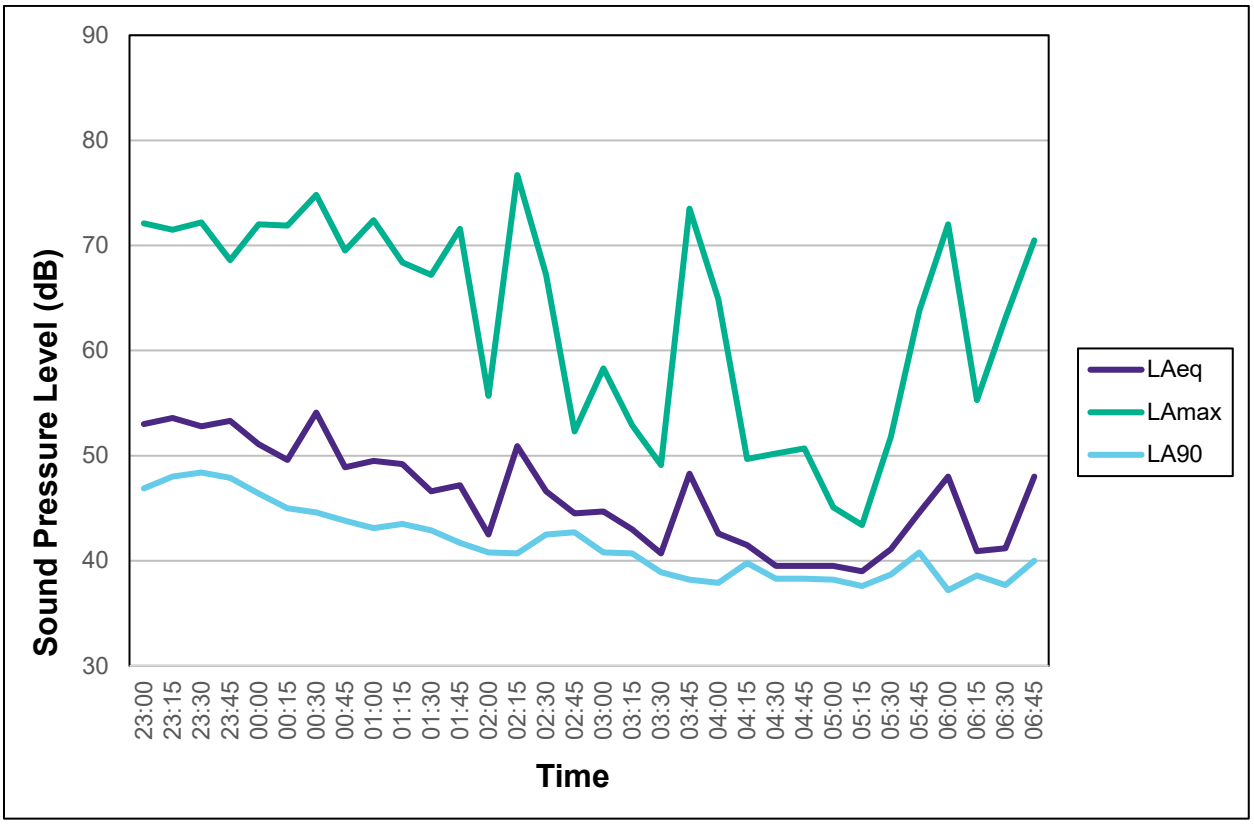


Figure 7.3.8: Noise Monitoring Location 2 Night-time Results (08/02/2019)

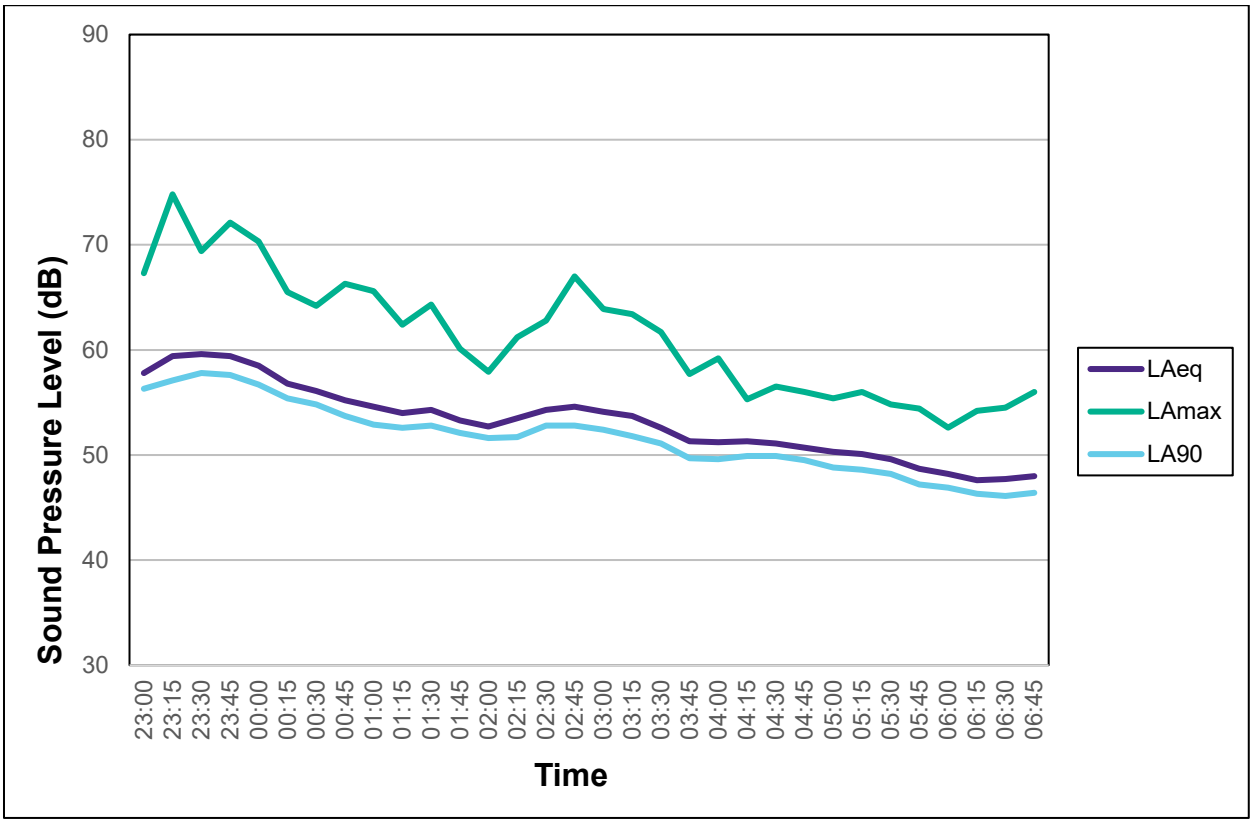


Figure 7.3.9: Daytime L_{Aeq} (1 hour)

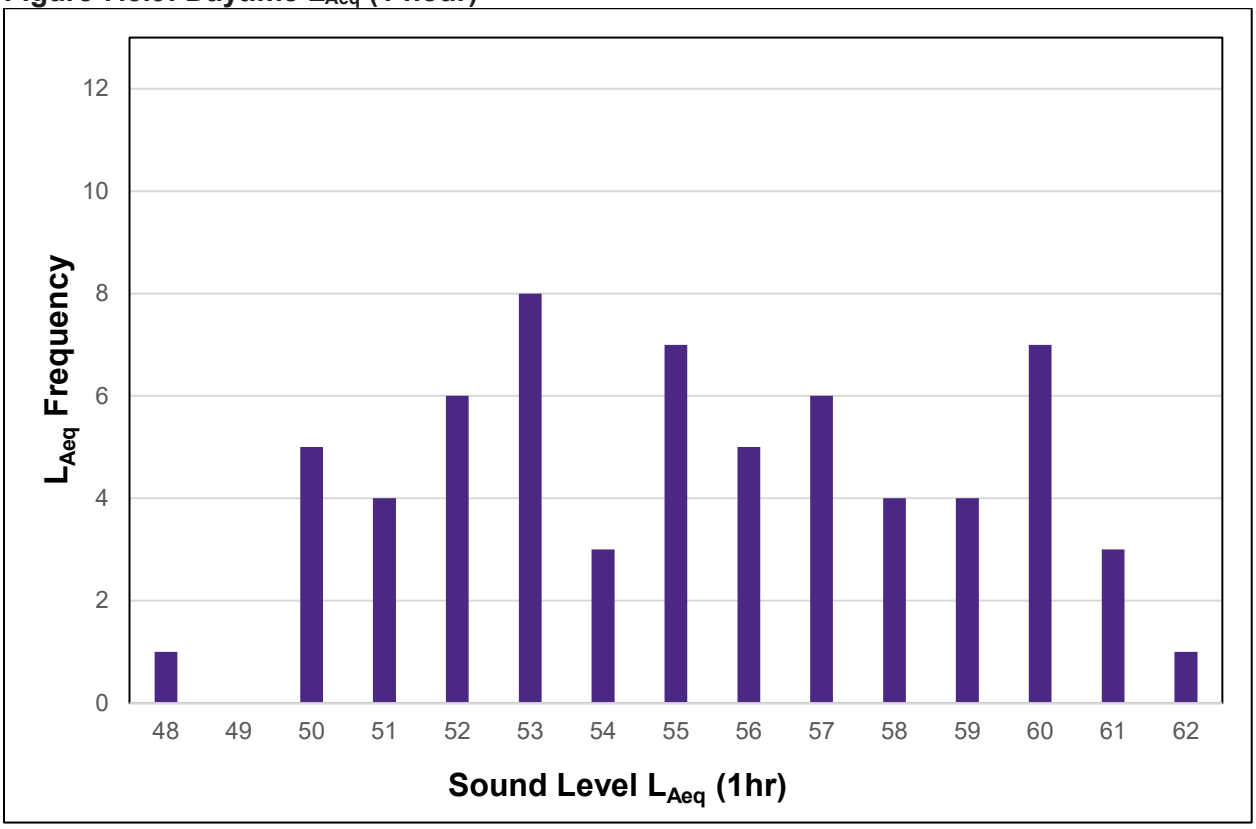


Figure 7.3.10: Daytime L_{A90} (1 hour)

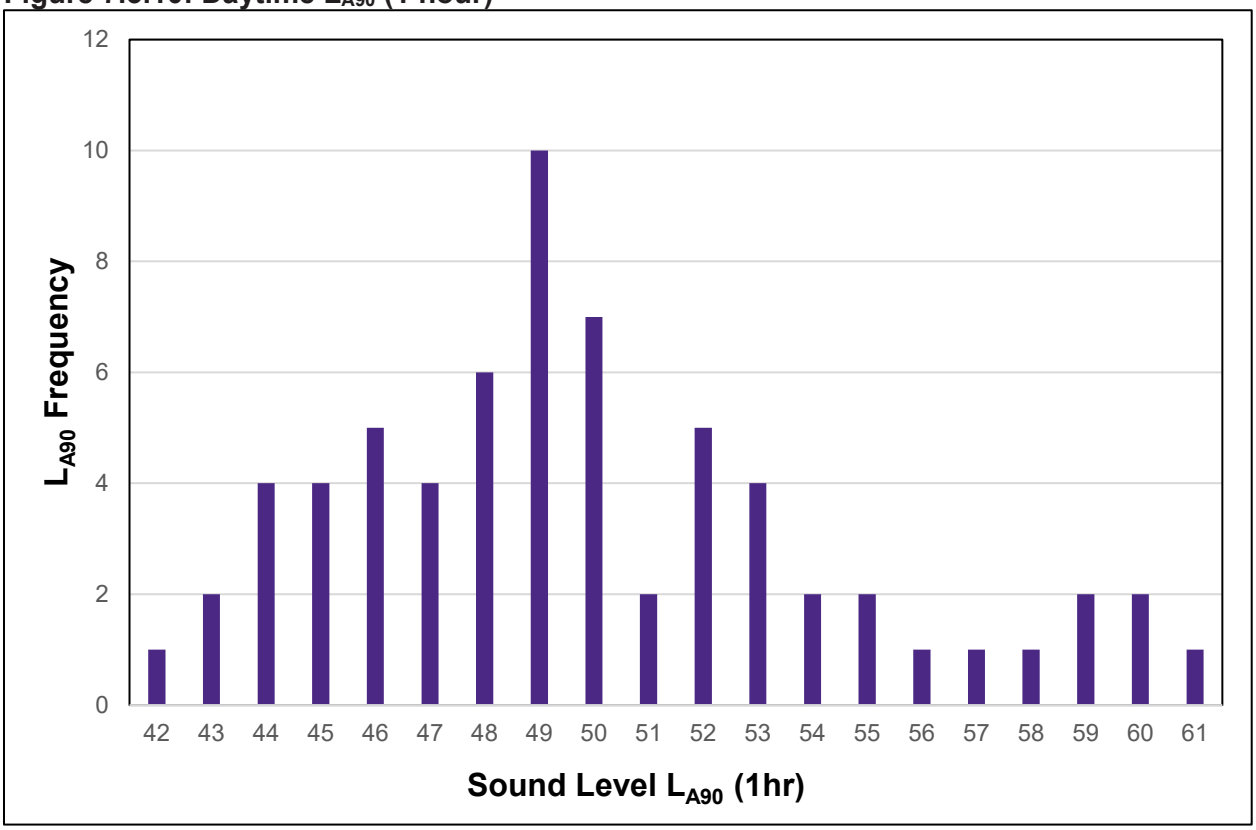


Figure 7.3.11: Night-time L_{Aeq} (15mins)

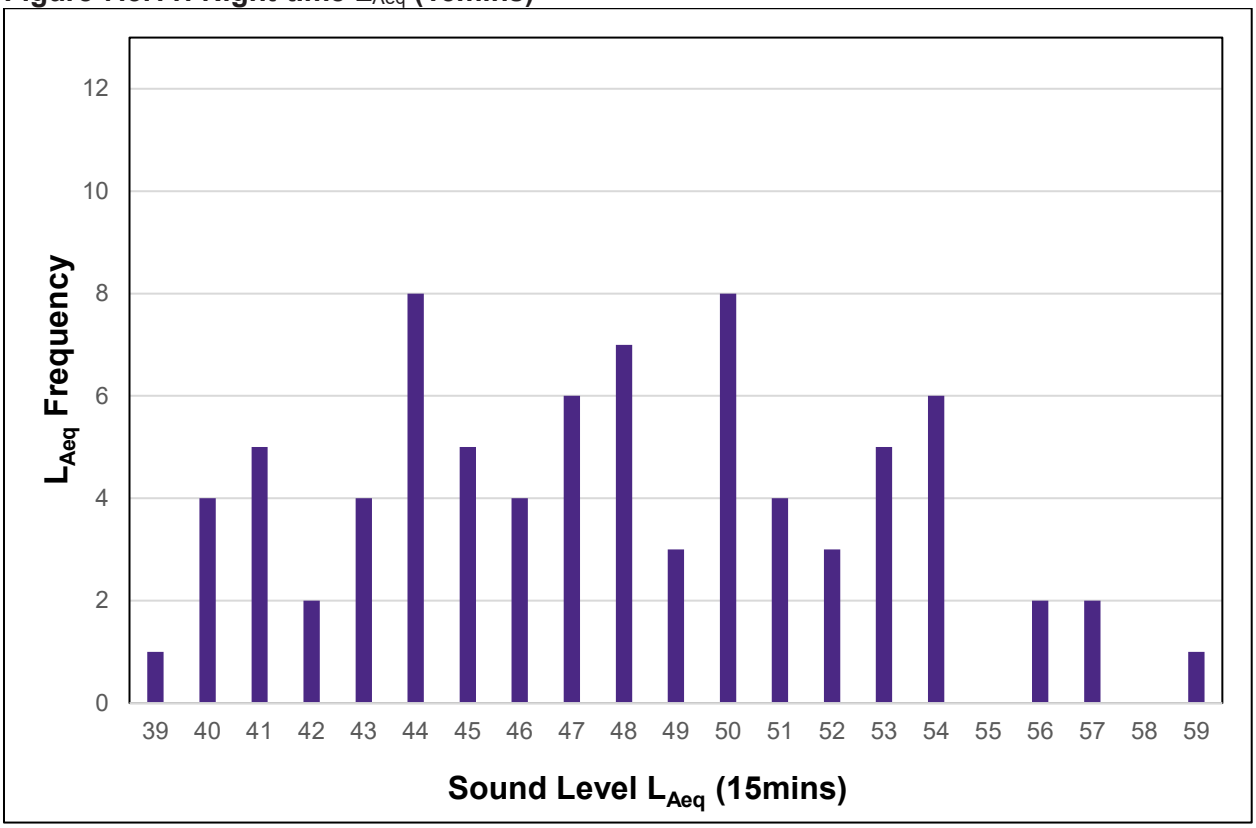
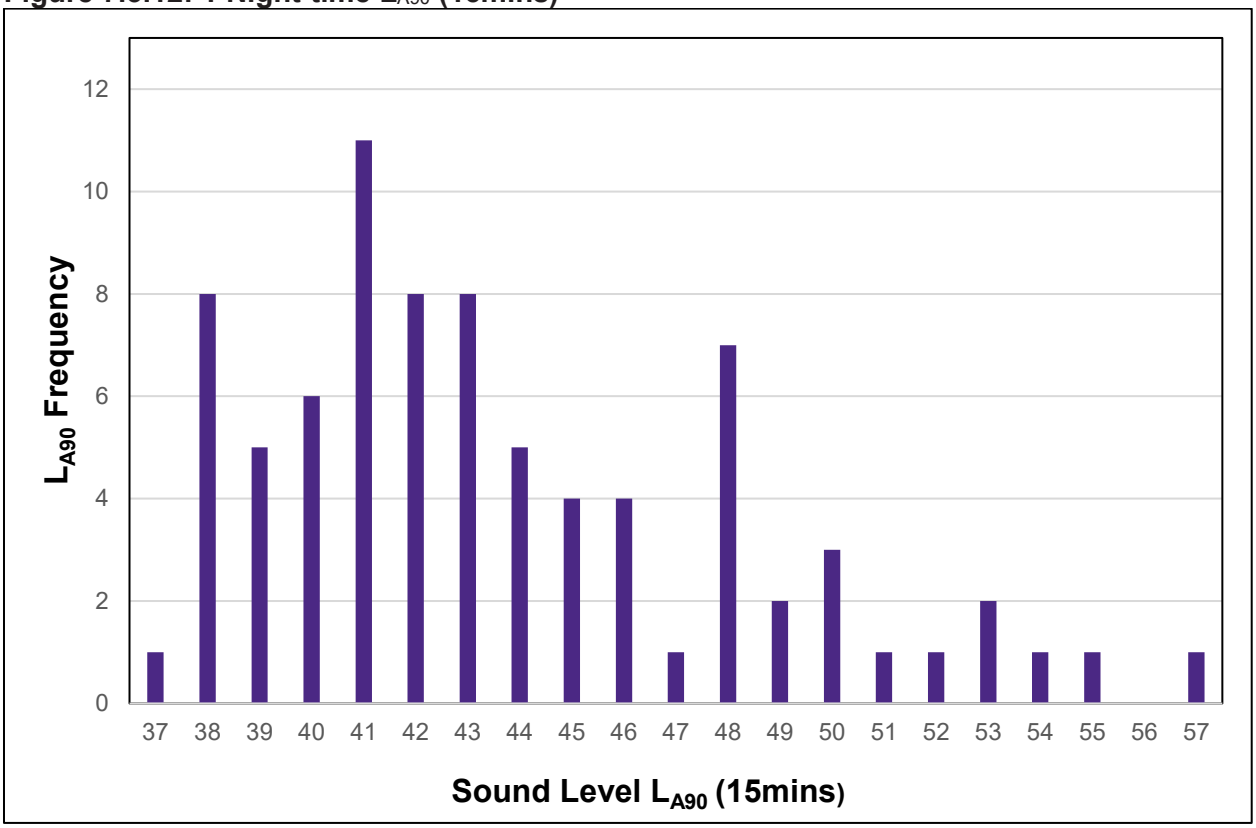


Figure 7.3.12: 1 Night-time L_{A90} (15mins)



Appendix 8.1 Preliminary Risk Assessment Report

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ST OLA PIER DESK STUDY

Scrabster Harbour Trust

IBR1139
St Ola Pier Desk Study
Final
18 March 2019

www.rpsgroup.com

Document Status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
Final	Preliminary Risk Assessment (Desk Study) Report	J. Fullerton, Graduate engineer	D. Telford, Project scientist	J. McGrath, Associate	April 2019

Approval for issue

[Redacted]

J McGrath, Associate 2019-04-30

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Prepared for:

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Contents

1 INTRODUCTION 1
1.1 Report Objectives and Scope 1
1.2 Sources of Information 1
1.3 Limitations 1
2 SITE DESCRIPTION 2
2.1 Introduction 2
2.1.1 Study Area 3
2.1.2 Surrounding Land Use 3
2.1.3 Proposed Development 4
3 HISTORICAL DEVELOPMENT OF THE SITE 5
3.1 Envirocheck Report 6
4 SITE GEOLOGY AND HYDROGEOLOGY 7
4.1 Site Geology 7
4.1.1 Solid Geology 7
4.1.2 Drift Geology 8
4.1.3 Hydrogeology and Groundwater Vulnerability 9
4.1.4 Surface Water Hydrology 10
5 PREVIOUS GROUND INVESTIGATION 11
6 OVERVIEW OF POTENTIAL CONTAMINATION 12
6.1 Introduction 12
6.2 On Site Sources 12
6.2.1 Current Land Use 12
6.2.2 Previous Land Use- Historical Development 12
6.2.3 Ground Borne Gases 12
6.2.4 Radon Gas 12
6.3 Off Site Sources 12
6.3.1 Surrounding Land Uses-Current 12
6.3.2 Surrounding Land Uses- Historical 12
7 CONCEPTUAL MODEL AND RISK ASSESSMENT 13
7.1 Conceptual Site Model 13
8 CONCLUSIONS AND RECOMMENDATIONS 15
8.1 Conclusions 15

Tables

Table 2.1 Surrounding Land Use 4
Table 3.1 Historical Development 5
Table 7.1 Conceptual Site Model 14

Figures

Figure 2.1 Site Location 2
Figure 4.1 Solid Geology 7
Figure 4.2 Drift Geology 8
Figure 4.3 Hydrogeology 9
Figure 4.4 Surface Waters 10

Appendices

Appendix A Envirocheck Report

1 INTRODUCTION

RPS was appointed by Scrabster Harbour Trust to undertake a Desk Study Report for the proposed redevelopment of St Ola Pier.

This report describes the research and assessments undertaken to assess the ground conditions and potential for any ground contamination that may have arisen from the site's present and historical use.

1.1 Report Objectives and Scope

- Collate desk study information regarding the site and surrounds to allow the identification of potential contaminant sources, potential pathways and potential receptors in accordance with DEFRA's Contaminated Land Report 11. This will form the basis of the Preliminary Risk Assessment and production of a Conceptual Site Model (CSM).
- Collation of existing geo-environmental data to facilitate a risk assessment with regards to potential risks to human health and environmental risks.
- Assessment of the above to determine if intrusive investigation and further assessment will be necessary.

1.2 Sources of Information

Sources of information used in the production of this report include:

- Internet based aerial photography
- Envirocheck report number 191090468_1 (included in Appendix A)
- Public Health England UK maps of radon (http://www.ukradon.org/information/ukmaps)

1.3 Limitations

This report is for the use of Scrabster Harbour Trust only and should not be relied upon by other parties unless specifically advised by RPS in writing. Furthermore, new information, design changes, changed practices or new legislation may necessitate revised interpretation of the report after its date of submission.

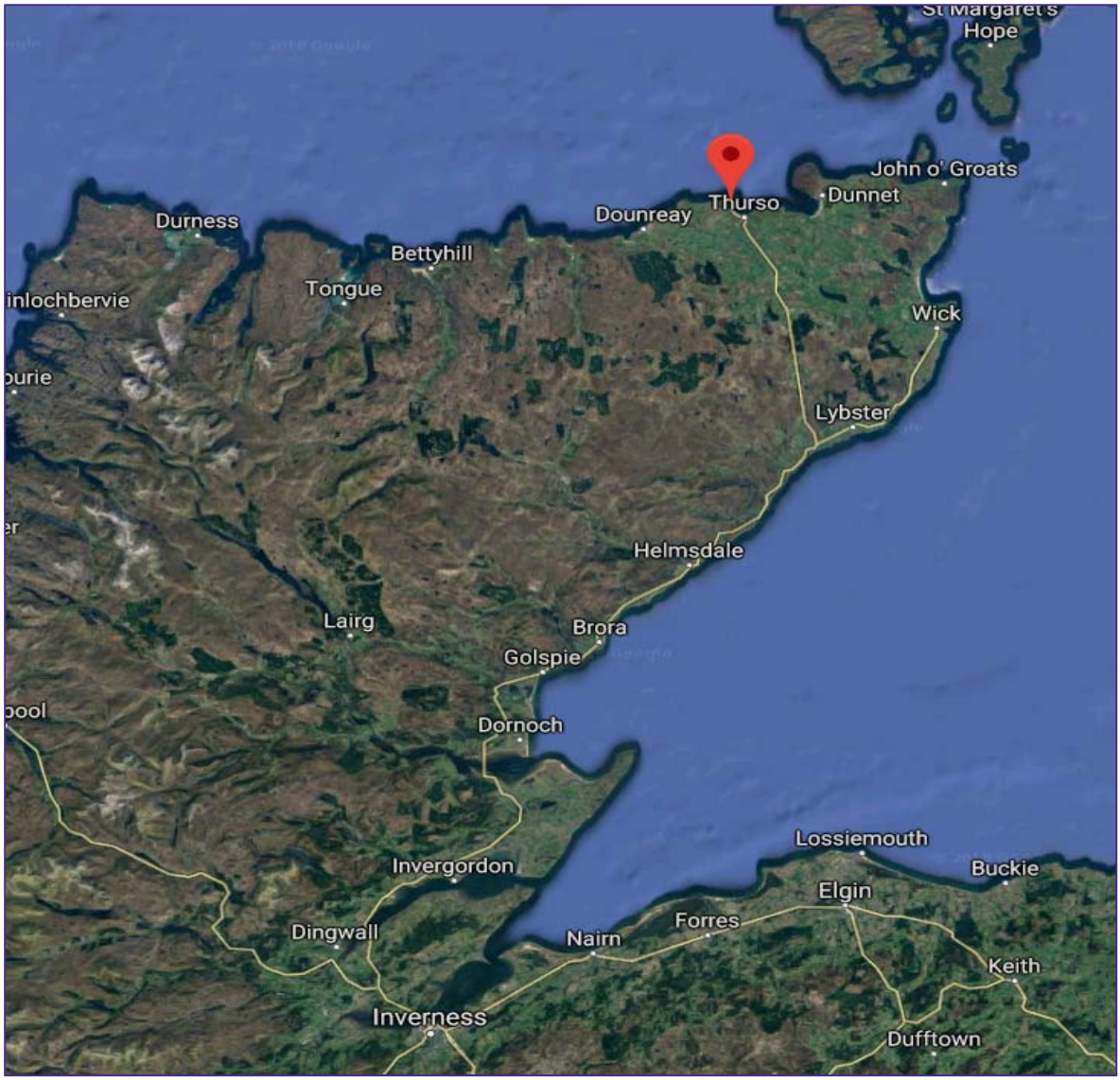
This report has been prepared by RPS on the basis of the available information received during the study period. Although every reasonable effort has been made to obtain all relevant information, all potential contaminants, environmental constraints or liabilities associated with the site may not necessarily have been revealed.

2 SITE DESCRIPTION

2.1 Introduction

As shown on Figure 1, the St Ola Pier site is located at Thurso Bay on the north coast of Scotland, at the small coastal fishing settlement of Scrabster. Located some 180km North of Inverness and 437km North of Edinburgh. The site is used as a terminal for the Stromness-Scrabster Ferry.

Figure 2.1 Site Location



2.1.1 Study Area

Figure 2.2 Site Layout

St. Ola Pier is located at the centre of a busy operational harbour. It was constructed in 1972 and incorporates a 100m long berth face to the southwest, a linkspan and a further 115m berth which was used by the Orkney Ferry prior to the Queen Elizabeth Pier being constructed in 2003

2.1.2 Surrounding Land Use

The pertinent surrounding land uses of the site are given in Table 2.1.

Table 2.1 Surrounding Land Use

Boundary	Surrounding Land Uses of the Proposed Development
North	The north of the site is directly bound by a historical quarry operational from the early 1870's according to historical mapping. Further north at a distance of 161m a small residential property is located. Consultation with aerial imagery reveals a farm located at 325m and an associated residential property.
East	To the east of the site another pier is located at a distance of 248m. Further beyond this extensive open water is located.
South	At a distance of 930m to the south Thurso Bay beach is located, beyond this an area of residential housing known as 'Burnside' makes up the land-use. The larger town of Thurso is located further beyond this to the south-east at approximately 2km.
West	To the east of the site a small dockland/port occupies the land associated with the primary industry of fishing, with JPL Shellfish located at 288m west of the site and a fish shop at 400m. Simpson Oils is located 270m from the site. Some 430m from the site to the west a small collection of houses make up the land. Scrabster Loch is located 1.25km to the west. Extensive agricultural fields make up the majority of the land-use here.

2.1.3 Proposed Development

The proposed project is a redevelopment of the existing St. Ola Pier. The pier will be widened and the existing linkspan will be removed. Partial demolition of the existing pier will be required to allow for the construction of the new pier walls and decking. Pier quay walls will likely comprise steel tubular piles with interlocking steel sheet piles. The works may also include for reclamation & revetment of 0.84ha (plan area of both) at the root of the pier. The reclamation area will provide storage space for cargo handling, and may possibly house a number of fuel tanks which will allow for the refuelling of vessels on St. Ola Pier.

3 HISTORICAL DEVELOPMENT OF THE SITE

A review of available historical ordnance survey maps was undertaken to ascertain the development history of the site. Table 3.1 provides a summary of potentially contaminating activities during the history of the site and its surrounding area; the maps are included in Appendix A.

Table 3.1 Historical Development

Date	Site History	Surrounding Land Use History
1872-1873	The site is somewhat developed, there is a Quay located on the current footprint of the northern section of the site. A pier to the west of the site exists at this time. An Ice House is located on site.	Within this particular epoch the quarry can be seen to the north of the site on historical mapping. A decommissioned quarry labelled 'old quarry' can be seen further to the north. To the west of the site at approximately 200m the Scrabster Hotel is located, along with a Lifeboat House and a Custom House. The wider surrounding area remains largely undeveloped with the exception of a few isolate residential dwellings to the north of the site.
1877-1906	As above	The surrounding area remains largely unchanged, one noticeable difference from the previous period is the introduction and establishment of a Flagstone works to the north-western boundary of the site. To the south-west at a distance of some 550m Scrabster House can be seen on historical mapping.
1906-1965	As above	Historical mapping coverage was relatively poor within this epoch with discrepancies in tiles.
1967-1976	The western pier on the site is present on historical mapping; two unnamed buildings are now established. The longer pier can now be seen. A slipway and life boat station are now located to the east of the site.	This period sees the western area of the site experience increased development and infrastructure, with the introduction of further piers which give rise to a harbour, including an inner and outer basin. At 250m an Oil Depot is now present on mapping. Cottages and two cattle grids are located at approximately 430m. Other unnamed buildings are present to the west of the site locate beside the Scrabster hotel.
1983-1994	The site remains unchanged.	Continuity can be seen from the previous period concerning the surrounding land uses in the immediate area around the site. The west does see a further pier constructed forming a second harbour. Two unnamed buildings are present some 310m south west of the site.
2003-2009	As above	This period gives rise to an increase in infrastructure in the dockland area to the west of the site; the industries associated with fishing trade are established. Further west at 470m a residential area is located.

3.1 Envirocheck Report

A number of environmental directories are consulted within the Envirocheck Report to assess the presence of potentially contaminating land uses. The key findings within a 1000m buffer of the site are contained within Appendix A.

4 SITE GEOLOGY AND HYDROGEOLOGY

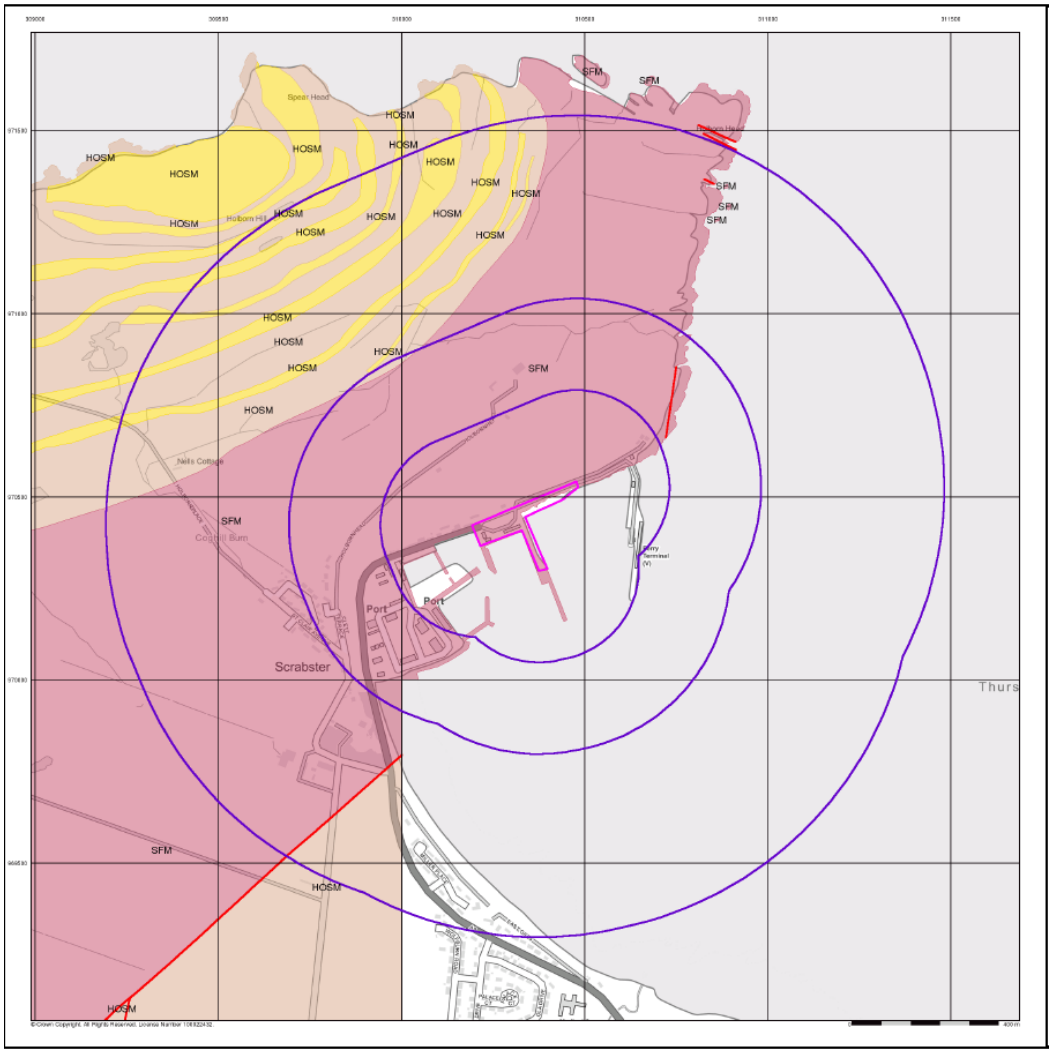
4.1 Site Geology

4.1.1 Solid Geology

A desk study of published material held on British Geological Survey's (online portal) was undertaken to provide an initial overview of ground conditions at the site. The following describes the findings of this preliminary research.

The bedrock geology anticipated in the vicinity of the site is shown on Figure 4.1. The site overlies Middle Old Red Sandstone (Undifferentiated)

Figure 4.1 Solid Geology

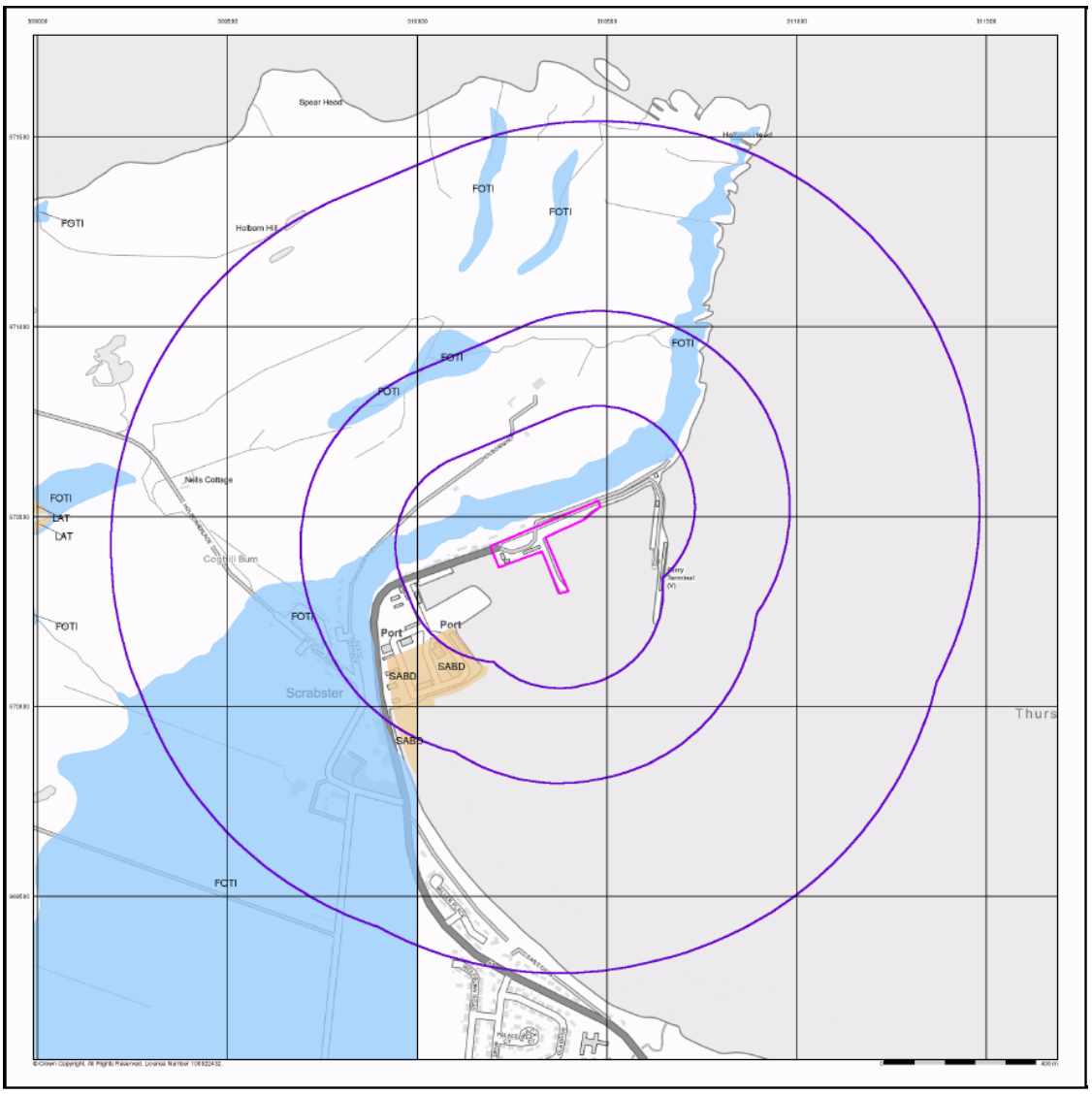


Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	SFM	Scrabster Flagstone Member	Siltstone and Sandstone	Mid Devonian - Mid Devonian
	HOSM	Holborn Sandstone Member	Sandstone and Siltstone, Interbedded	Mid Devonian - Mid Devonian
	HOSM	Holborn Sandstone Member	Sandstone	Mid Devonian - Mid Devonian
	Fault			

4.1.2 Drift Geology

As shown on Figure 4.2, the site is anticipated to not be underlain by any specific alluvial deposits, however bounding the site to the north a strip of diamicton, clay, sand and gravel makes up the superficial deposits.

Figure 4.2 Drift Geology

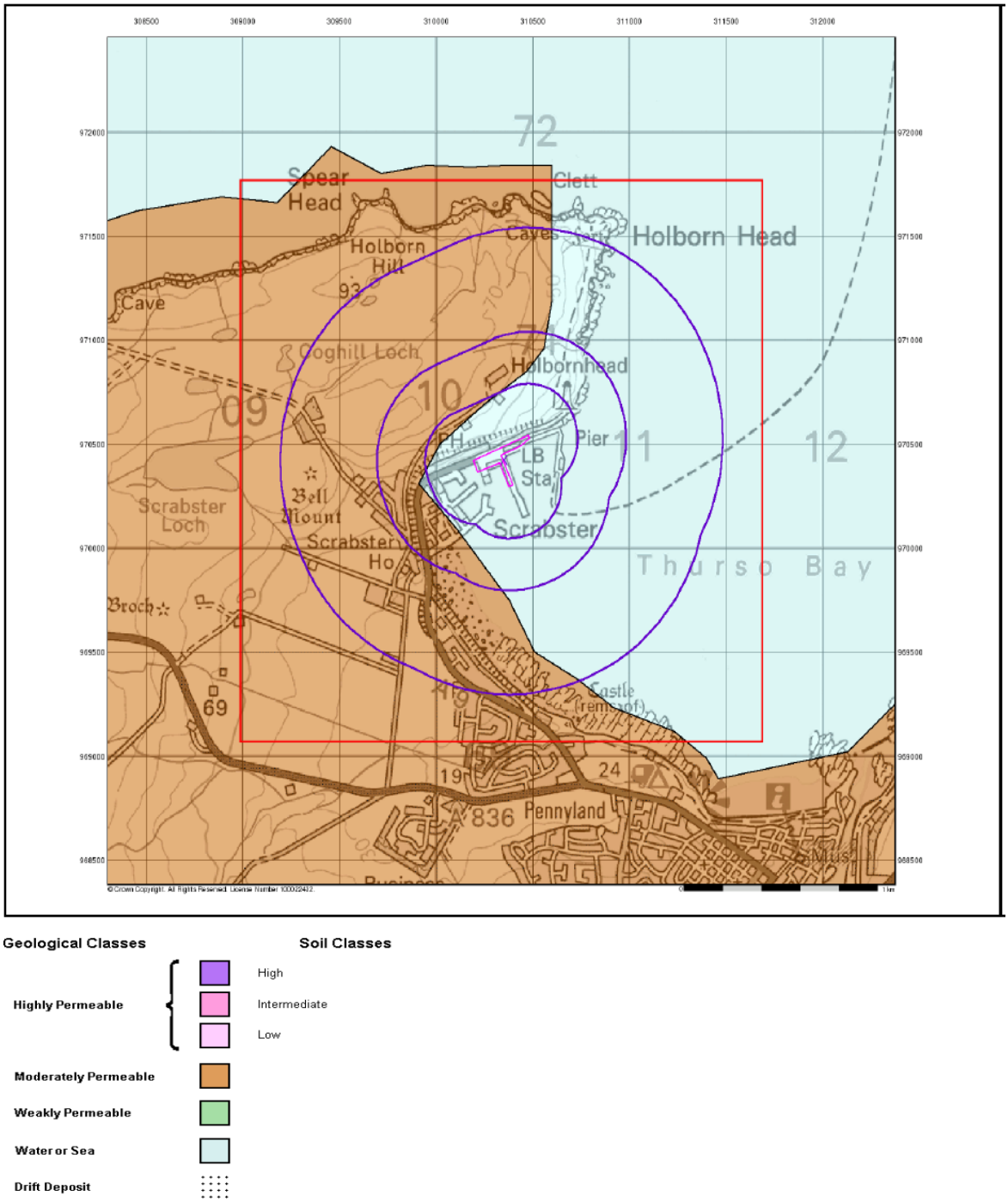


Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	SABD	Shoreface and Beach Deposits (Undifferentiated)	Sand	Holocene - Saalian
	FOTI	Forse Till Member	DIAMICTON, CLAY, SAND AND GRAVEL	Devensian - Ipswichian
	LAT	Lacustrine Alluvium	Clay, Silt and Sand	Quaternary - Ryazanian

4.1.3 Hydrogeology and Groundwater Vulnerability

In accordance with the Water Framework Directive (2000/60/EC) it is necessary to understand the groundwater vulnerability of the site, which is defined as the tendency and likelihood for general contaminants to reach the water table after introduction at the ground surface. It can be seen in Figure 4.3 that the site is not classified as it has been historically infilled and reclaimed from the sea. The surrounding area is classified as being of moderate permeability.

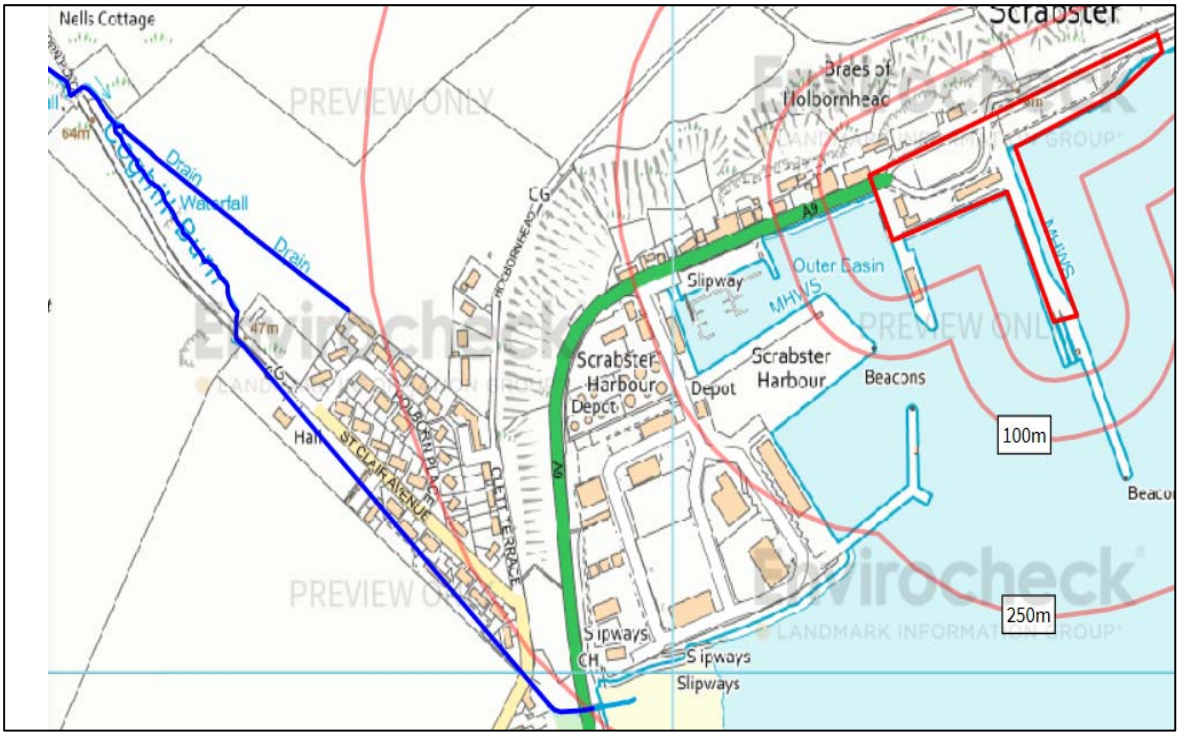
Figure 4.3 Hydrogeology



4.1.4 Surface Water Hydrology

As shown on Figure 4.4, Thurso Bay water body is located directly south of the site. The Coghill Burn River is located east of the site inland at a distance of some 650m. Scrabster Loch is located up gradient some 1.5km west of the site.

Figure 4.4 Surface Waters



Detailed River Network Data

- Primary River
- Secondary River
- Tertiary River
- Canal
- Canal Tunnel
- Undefined River
- Lake/Reservoir
- Offline Drainage Feature
- Extended Culvert (greater than 50m)
- Underground River (inferred)
- Underground River (local knowledge)
- Downstream of High Water Mark
- Downstream of Seaward Extension
- Not assigned River feature

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height 167.3
- MLWS Mean Low Water Springs
- MHWS Mean High Water Springs

5 PREVIOUS GROUND INVESTIGATION

Consultation with the British Geological Survey's (BGS) borehole dataset represents a compendium of digital records of boreholes and wells systematically catalogued for the whole of Great Britain, with records dating back to the 1860s. Research from this source concluded that no previous ground investigation has occurred. Subsequently there are no borehole records at or within the vicinity of the site.

6 OVERVIEW OF POTENTIAL CONTAMINATION

6.1 Introduction

The nature of potential contamination that may have arisen from the past activities on and surrounding the site is considered below.

6.2 On Site Sources

6.2.1 Current Land Use

The site currently consists of St Ola Pier. No sources of above ground contamination are present. The pier has been infilled with fill material.

6.2.2 Previous Land Use- Historical Development

The site has been historically reclaimed from the sea and therefore no historic contamination sources are likely to be present prior to the construction of the Pier.

6.2.3 Ground Borne Gases

Made ground or organic rich alluvial soils underlying the site would have the potential to generate elevated concentrations of ground gases. The known nearby ground conditions demonstrate that made ground is likely to be present on the site.

6.2.4 Radon Gas

As demonstrated on the UK Radon maps, the site is located in a 1km grid square where some parts have elevated radon potential. Maximum radon potential is 1-3%.

6.3 Off Site Sources

6.3.1 Surrounding Land Uses-Current

A port and dockland area makes up the land use to the west of the site. An oil storage terminal is located 375m to the west of St Ola Pier.

6.3.2 Surrounding Land Uses- Historical

The site is located in an area which was once heavily associated with quarrying. There are a total of 12 general quarrying sites from 0-100m from the site, mainly to the north.

7 CONCEPTUAL MODEL AND RISK ASSESSMENT

7.1 Conceptual Site Model

Risk estimation involves detailed evaluation of source - pathway - receptor scenarios to determine whether a linkage exists between any sources of contamination and potential receptors. A risk exists where a receptor is exposed to a source of contamination, via a pathway. If any element of the source-pathway-target linkage is absent, then no risk is present.

In order to consider potential risks at the site, a conceptual site model was developed, to examine the potential source - pathway - receptor linkages that may exist on the site. The conceptual model and the risk assessment for the site are illustrated in Table 7.1.

Table 7.1 Conceptual Site Model

Source	Potential pathway(s)	Potential receptors(s)	Relevant Source – Pathway – Receptor Linkage		Further investigation required
On Site Sources					
No existing contamination sources present. Site has historically been constructed with infill material.	Dermal contact, ingestion of/and direct inhalation of potential contaminants present within soil	Humans in form of future site users (commercial, site workers)	The pier is covered in hardstanding with no pathways to affect human health.		**No**
	Subsurface infiltration, leaching from sub-soils and groundwater flow	Scrabster Harbour	The area is reclaimed from the sea and therefore groundwater receptors are not present.		
Soil gas: Made Ground or highly organic soils may contain high organic content that is degrading and producing Methane, Carbon dioxide and depleted Oxygen gases	Migration along cracks in foundations and service trenches Breaking ground surface to facilitate works	Humans in the form of future site users.	Made Ground or highly organic soils underlying the site could contain high organic content that can degrade and produce Methane, Carbon dioxide and depleted Oxygen gases.		**No** No buildings are present on St Ola Pier therefore no receptor is present.
Off Site Sources					
Simpsons Oil manufacturers are located in the dockland area to the west of the site.	Subsurface infiltration, leaching from sub-soils and groundwater flow.	Scrabster Harbour	There are no direct pathways for contamination from this source to impact St Ola Pier.		**No**

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

- The desk study has highlighted the potential contamination sources, pathways and receptors which are likely to be present on the site.
- No source-pathway-receptor linkages could be identified and in accordance with CLR11, no further assessment is required.

Appendix A Envirocheck Report

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
191090468_1_1

Customer Reference:
IBR1139

National Grid Reference:
310350, 970430

Slice:
A

Site Area (Ha):
1.67

Search Buffer (m):
1000

Site Details:

The Peerie Cafe, Scrabster
THURSO
KW14 7UJ

Client Details:

Mr J McGrath
RPS Consultants
Elmwood House
74 Boucher Road
Belfast
Antrim
BT12 6RZ

Contents

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	13
Hazardous Substances	14
Geological	15
Industrial Land Use	20
Sensitive Land Use	23
Data Currency	24
Data Suppliers	28
Useful Contacts	29

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.
In this datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Report Version v53.0

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility	pg 1	Yes	Yes	Yes	n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 2	1	1	3	8
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls					
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 5	Yes			
Pollution Incidents to Controlled Waters					
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances					
River Quality					
Substantiated Pollution Incident Register					
Water Abstractions					
Water Industry Act Referrals					
Groundwater Vulnerability	pg 5	Yes	n/a	n/a	n/a
Drift Deposits			n/a	n/a	n/a
Source Protection Zones					
River Flood Data (Scotland)				n/a	n/a
OS Water Network Lines	pg 6			19	43
Waste					
BGS Recorded Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Landfill Coverage	pg 13	1	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)	pg 13		1		4
Potentially Infilled Land (Water)	pg 13	2	7		
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)	pg 14			1	
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents	pg 14			1	
Planning Hazardous Substance Enforcements					
Geological					
BGS 1:625,000 Solid Geology	pg 15	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 15	Yes	Yes	Yes	Yes
BGS Recorded Mineral Sites	pg 16		3	4	4
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain	pg 18	Yes	Yes	n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 18	Yes	Yes	n/a	n/a
Potential for Compressible Ground Stability Hazards				n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 18	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 19	Yes	Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 19	Yes	Yes	n/a	n/a
Radon Potential - Radon Affected Areas			n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 20	2	2	4	
Fuel Station Entries					
Points of Interest - Commercial Services	pg 20	4	1	2	
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 21			14	4
Points of Interest - Public Infrastructure					
Points of Interest - Recreational and Environmental	pg 22				2
Gas Pipelines					

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Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Ancient Woodland					
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
National Scenic Areas					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones					
Ramsar Sites					
Sites of Special Scientific Interest	pg 23			1	1
Special Areas of Conservation					
Special Protection Areas	pg 23		1		
World Heritage Sites					

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13NE (N)	0	1	310352 970500
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13NW (W)	24	1	310200 970450
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NW (NW)	31	1	310300 970500
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (N)	38	1	310352 970550
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NW (NW)	50	1	310250 970500
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (N)	58	1	310350 970550
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NE (N)	59	1	310400 970600
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13NW (W)	93	1	310100 970425
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NE (NE)	111	1	310500 970650
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (NE)	175	1	310550 970700
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13SW (SW)	179	1	310050 970300
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NW (W)	193	1	310000 970425
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13SW (W)	194	1	310000 970400
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A13SW (W)	225	1	310000 970300
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A13NE (NE)	235	1	310650 970700
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12SE (W)	244	1	309950 970400
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A13NE (NE)	272	1	310650 970750
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A14NW (NE)	274	1	310700 970700
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A12SE (W)	294	1	309900 970400
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12SE (W)	302	1	309900 970350
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18SE (NE)	312	1	310650 970800
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A19SW (NE)	342	1	310700 970800

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12SE (SW)	383	1	309900 970150
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A8NW (SW)	385	1	310100 970000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A8NW (SW)	426	1	310000 970000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A18SW (NW)	431	1	310100 970850
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18SW (N)	438	1	310200 970900
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A12NE (NW)	440	1	309900 970750
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A18SE (NE)	444	1	310650 970950
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A7NE (SW)	448	1	309900 970050
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A17SE (NW)	450	1	309950 970800
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18SW (NW)	451	1	310050 970850
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A19SW (NE)	466	1	310700 970950
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A18SW (NW)	470	1	310000 970850
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A12SE (W)	475	1	309750 970250
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A17SE (NW)	479	1	309900 970800
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A7NE (SW)	484	1	309900 970000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A7NE (SW)	495	1	309950 969950
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A12SE (W)	498	1	309700 970350
1	**Discharge Consents** Operator: Unknown Operator Property Type: Septic Tank Location: Scrabster (No 1/Village/Harbour), SCRABSTER Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 76 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 3rd October 1988 Revocation Date: Not Supplied Discharge Type: Septic tank Discharge Environment: Tidal Waters Receiving Water: Thurso Bay **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A13SW (SW)	0	2	310300 970400

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
2	**Discharge Consents** Operator: Unknown Operator Property Type: Surface Water Drainage System Location: Robertson Oils, The Harbour, SCRABSTER, Caithness, KW14 7UL Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 30 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 2nd June 1997 Revocation Date: Not Supplied Discharge Type: Other Matter Effluent Discharge Discharge Environment: Tidal Waters Receiving Water: Thurso Bay **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A13SW (SW)	69	2	310200 970300
3	**Discharge Consents** Operator: Unknown Operator Property Type: Domestic Property (Single) Location: The Bothy, Holborn Head Farm , Scrabster, THURSO , Caithness Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 27 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 1st March 1988 Revocation Date: Not Supplied Discharge Type: Septic tank Discharge Environment: Groundwater Receiving Water: Soakaway **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A18SW (N)	307	2	310300 970800
4	**Discharge Consents** Operator: Unknown Operator Property Type: Surface Water Drainage System Location: Scrabster Harbour Surface Water, SCRABSTER, Caithness Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 59 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 2nd November 1992 Revocation Date: Not Supplied Discharge Type: Other Matter Effluent Discharge Discharge Environment: Tidal Waters Receiving Water: Thurso Bay **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A8NW (SW)	384	2	310100 970001
4	**Discharge Consents** Operator: Unknown Operator Property Type: Storm Sewage Overflow Location: Sewage Pumping Station, SCRABSTER HARBOUR, Caithness Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 60 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 2nd November 1992 Revocation Date: Not Supplied Discharge Type: Public Sewage: Emergency Overflow Discharge Environment: Tidal Waters Receiving Water: Thurso Bay **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A8NW (SW)	389	2	310100 969996

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
5	**Discharge Consents** Operator: Unknown Operator Property Type: Public Sewerage System Location: Clett Terrace Emergency, SCRABSTER, Caithness Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 103 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 1st June 1990 Revocation Date: Not Supplied Discharge Type: Septic tank Discharge Environment: Freshwater Stream/River Receiving Water: Coghill Burn **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A7NE (SW)	625	2	309800 969900
6	**Discharge Consents** Operator: Unknown Operator Property Type: Public Sewerage System Location: St. Clair Avenue, SCRABSTER, Caithness Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 23 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 3rd April 1995 Revocation Date: Not Supplied Discharge Type: Septic tank Discharge Environment: Freshwater Stream/River Receiving Water: Scrabster Burn **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A7NE (SW)	763	2	309705 969800
6	**Discharge Consents** Operator: Unknown Operator Property Type: Public Sewerage System Location: Clett Terrace, SCRABSTER, Caithness Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 102 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 2nd July 1990 Revocation Date: Not Supplied Discharge Type: Septic tank Discharge Environment: Freshwater Stream/River Receiving Water: Scrabster Burn **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A7NE (SW)	767	2	309700 969800
6	**Discharge Consents** Operator: Unknown Operator Property Type: Public Sewerage System Location: St Clair Avenue, SCRABSTER, Caithness Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 101 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 2nd July 1990 Revocation Date: Not Supplied Discharge Type: Septic tank Discharge Environment: Freshwater Stream/River Receiving Water: Scrabster Burn **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A7NE (SW)	767	2	309705 969795

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
6	**Discharge Consents** Operator: Unknown Operator Property Type: Public Sewerage System Location: Clett Terrace, SCRABSTER, Caithness Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 24 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 3rd April 1995 Revocation Date: Not Supplied Discharge Type: Septic tank Discharge Environment: Freshwater Stream/River Receiving Water: Scrabster Burn **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A7NE (SW)	770	2	309700 969795
7	**Discharge Consents** Operator: Unknown Operator Property Type: Not Given Location: Nell's House, Holborn Head Farm, Scrabster, THURSO, Caithness Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 32 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 1st May 1987 Revocation Date: Not Supplied Discharge Type: Unknown Discharge Environment: Freshwater Stream/River Receiving Water: Coghill Burn (Nd 099700) **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A12NW (W)	841	2	309400 970700
8	**Discharge Consents** Operator: Unknown Operator Property Type: Septic Tank Location: Scrabster (No 3/Miller Pl), SCRABSTER Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 69 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 1st November 1988 Revocation Date: Not Supplied Discharge Type: Septic tank Discharge Environment: Tidal Waters Receiving Water: Thurso Bay **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A3NW (S)	901	2	310300 969400
8	**Discharge Consents** Operator: Unknown Operator Property Type: Storm Sewage Overflow Location: Scrabster (No 3) 6 Dry Weather, Flow Storm Water Overflow, SCRABSTER Authority: Scottish Environment Protection Agency, North Region Catchment Area: Not Given Reference: 77 Permit Version: Not Supplied Effective Date: Not Supplied Issued Date: 1st November 1988 Revocation Date: Not Supplied Discharge Type: Storm Sewage - Screening Discharge Environment: Tidal Waters Receiving Water: Thurso Bay **Status: Not Supplied** Positional Accuracy: Located by supplier to within 100m	A3NW (S)	906	2	310300 969395
	Nearest Surface Water Feature	A13SW (W)	0	-	310203 970401
	Groundwater Vulnerability Geological Classification: Inland water or sea Soil Classification: Not classified Map Sheet: Sheet 54 Map Of Scotland Scale: 1:625,000	A13NE (SW)	0	3	310352 970425

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Drift Deposits None				
	River Flood Data (Scotland) None				
9	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 93.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A18SE (N)	331	4	310423 970868
10	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 86.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A12NE (NW)	391	4	309953 970731
11	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 88.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A12NE (NW)	393	4	309913 970698
12	**OS Water Network Lines** Watercourse Form: Lake Watercourse Length: 14.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A12NE (NW)	393	4	309923 970709
13	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 153.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A18SE (N)	403	4	310474 970944
14	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 360.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A18SW (N)	411	4	310213 970932
15	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 54.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A17SE (NW)	421	4	309967 970777
16	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 165.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A18SE (NE)	443	4	310645 970950

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
17	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 92.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 2	A18SE (NE)	455	4	310605 970978
18	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 147.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A17SE (NW)	466	4	309965 970831
19	**OS Water Network Lines** Watercourse Form: Tidal river Watercourse Length: 21.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Coghill Burn Catchment Name: Not Supplied Primacy: 1	A7NE (SW)	466	4	309961 969977
20	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 112.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A17SE (NW)	469	4	309989 970850
21	**OS Water Network Lines** Watercourse Form: Tidal river Watercourse Length: 21.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Coghill Burn Catchment Name: Thurso Coastal Primacy: 1	A7NE (SW)	481	4	309941 969973
22	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 11.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A18SW (NW)	483	4	310124 970917
23	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 50.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A12NE (NW)	483	4	309827 970735
24	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 3.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A18SW (NW)	489	4	310131 970926
25	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 103.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A18SW (NW)	491	4	310127 970927

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
26	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 9.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A18SW (NW)	491	4	310127 970927
27	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 9.4 Watercourse Level: Underground Permanent: True Watercourse Name: Coghill Burn Catchment Name: Thurso Coastal Primacy: 1	A7NE (SW)	496	4	309920 969969
28	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 35.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Coghill Burn Catchment Name: Thurso Coastal Primacy: 1	A7NE (SW)	503	4	309911 969968
29	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 233.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A12NE (NW)	512	4	309779 970721
30	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 667.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Coghill Burn Catchment Name: Thurso Coastal Primacy: 1	A7NE (SW)	518	4	309877 969972
31	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 364.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A18SW (NW)	523	4	310026 970919
32	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 14.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 2	A12SE (W)	527	4	309679 970307
33	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 2.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 2	A12SE (W)	537	4	309667 970315
34	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 263.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 2	A12SE (W)	539	4	309665 970316

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
35	**OS Water Network Lines** Watercourse Form: Tidal river Watercourse Length: 32.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A8NW (SW)	601	4	310019 969799
36	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 5.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A7NE (SW)	629	4	309996 969777
37	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 34.4 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A7NE (SW)	631	4	309991 969778
38	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 223.5 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A7NE (SW)	665	4	309978 969746
39	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 312.4 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A7NE (SW)	665	4	309978 969746
40	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 556.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A17SE (NW)	666	4	309858 970997
41	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 68.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A12NW (W)	670	4	309597 970729
42	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 557.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A18NE (N)	675	4	310341 971202
43	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 161.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A12NW (W)	684	4	309558 970675

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
44	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 48.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Coghill Burn Catchment Name: Thurso Coastal Primacy: 1	A12NW (W)	746	4	309448 970463
45	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 7.4 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A7NW (SW)	773	4	309651 969840
46	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 192.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A7NW (SW)	773	4	309650 969841
47	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 302.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A18NE (N)	774	4	310524 971321
48	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 46.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A7NW (SW)	779	4	309649 969833
49	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 10.1 Watercourse Level: Underground Permanent: True Watercourse Name: Coghill Burn Catchment Name: Thurso Coastal Primacy: 1	A12NW (W)	781	4	309416 970496
50	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 123.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Coghill Burn Catchment Name: Thurso Coastal Primacy: 1	A12NW (W)	789	4	309407 970491
51	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 59.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A12NW (W)	801	4	309412 970600
52	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 159.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A12NW (W)	812	4	309406 970621

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
53	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 314.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A8SW (S)	859	4	310004 969524
54	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 97.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A8SW (S)	859	4	310004 969524
55	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 3.6 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A7NW (SW)	877	4	309471 969906
56	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 97.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A7NW (SW)	879	4	309467 969907
57	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 254.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A18NW (N)	885	4	310089 971338
58	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 143.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A12NW (W)	888	4	309369 970750
59	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 144.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Coghill Burn Catchment Name: Thurso Coastal Primacy: 1	A11NE (W)	889	4	309312 970533
60	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 5.1 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A8SW (S)	918	4	310051 969439
61	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 187.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A8SW (S)	921	4	310054 969434

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
62	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 227.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A24SW (N)	928	4	310695 971443
63	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 11.5 Watercourse Level: Underground Permanent: True Watercourse Name: Coghill Burn Catchment Name: Thurso Coastal Primacy: 1	A11NE (W)	928	4	309296 970658
64	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 271.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Coghill Burn Catchment Name: Thurso Coastal Primacy: 1	A11NE (W)	929	4	309298 970669
65	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 9.2 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A7NW (SW)	942	4	309376 969942
66	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 56.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A7NW (SW)	948	4	309367 969945
67	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 207.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A23SW (N)	950	4	310191 971447
68	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 119.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A23SW (N)	961	4	310319 971489
69	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 36.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 2	A6NE (SW)	987	4	309314 969964
70	**OS Water Network Lines** Watercourse Form: Inland river Watercourse Length: 47.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Thurso Coastal Primacy: 1	A6NE (SW)	987	4	309314 969964

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority Landfill Coverage Name: The Highland Council - Data has not been requested from this authority		0	5	310352 970425
71	**Potentially Infilled Land (Non-Water)** Bearing Ref: NW Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A13NW (NW)	216	-	310143 970634
72	**Potentially Infilled Land (Non-Water)** Bearing Ref: NW Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A17SE (NW)	606	-	309840 970914
73	**Potentially Infilled Land (Non-Water)** Bearing Ref: NW Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A17NE (NW)	766	-	309966 971157
74	**Potentially Infilled Land (Non-Water)** Bearing Ref: W Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A12NW (W)	776	-	309420 970491
75	**Potentially Infilled Land (Non-Water)** Bearing Ref: W Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A12NW (W)	890	-	309359 970731
76	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A13NE (W)	0	-	310341 970421
77	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A13SE (SW)	0	-	310345 970417
78	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1877	A13SW (SW)	31	-	310242 970344
79	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1907	A13SW (SW)	61	-	310202 970308
80	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A13SW (SW)	118	-	310110 970314
81	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A13SW (SW)	122	-	310145 970266
82	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A13SW (W)	137	-	310067 970366
83	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1907	A13SW (W)	216	-	310010 970297
84	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1877	A13SW (SW)	233	-	310004 970270

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
85	**Control of Major Accident Hazards Sites (COMAH)** Name: Oil And Storage Services Limited Location: Scrabster Depot, The Harbour, Scrabster, Caithness, KW14 7UL Reference: Not Supplied Type: Lower Tier **Status: Active** Positional Accuracy: Manually positioned to the address or location	A12SE (SW)	281	6	309964 970242
86	**Planning Hazardous Substance Consents** Name: Bp Oil Uk Ltd Location: Scabster Depot, The Harbour, Scrabster, Caithness, Kw14 7ul Authority: The Highland Council, Planning Department Application Ref: 03/00026/HSCCA Hazardous Substance: Combination of Dangerous Substances Maximum Quantity: 4902 Application date: 13th January 2003 **Decision: Deemed Consent GrantedGranted** Positional Accuracy: Manually positioned to the address or location	A12SE (SW)	274	7	309966 970254

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Middle Old Red Sandstone (Undifferentiated)	A13NE (SW)	0	1	310352 970425
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: no data Cadmium Concentration: no data Chromium Concentration: no data Lead Concentration: <100 mg/kg Nickel Concentration: no data	A13NE (SW)	0	1	310352 970425
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (N)	0	1	310349 970434
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 60 - 90 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13SW (W)	138	1	310083 970327
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18SE (N)	459	1	310352 971000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: no data Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A19SW (NE)	538	1	310757 971000
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18NW (N)	636	1	310269 971144

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Sediment Arsenic Concentration: <15 mg/kg Cadmium Concentration: no data Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A18NW (N)	705	1	310135 971162
87	**BGS Recorded Mineral Sites** Site Name: Scrabster Quay Location: Scrabster, Thurso, Caithness-Shire Source: British Geological Survey, National Geoscience Information Service Reference: 84917 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Devonian Geology: Scrabster Flagstone Member Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	22	1	310275 970480
88	**BGS Recorded Mineral Sites** Site Name: Holbornhead Location: Scrabster, Thurso, Caithness-Shire Source: British Geological Survey, National Geoscience Information Service Reference: 84916 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Devonian Geology: Scrabster Flagstone Member Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A13NE (N)	164	1	310360 970670
89	**BGS Recorded Mineral Sites** Site Name: Braes Of Holbornhead Location: Scrabster, Thurso, Caithness-Shire Source: British Geological Survey, National Geoscience Information Service Reference: 84912 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Devonian Geology: Scrabster Flagstone Member Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A13NW (NW)	229	1	310135 970645
90	**BGS Recorded Mineral Sites** Site Name: Holbornhead Location: Scrabster, Thurso, Caithness-Shire Source: British Geological Survey, National Geoscience Information Service Reference: 84915 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Devonian Geology: Scrabster Flagstone Member Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A18SE (N)	295	1	310380 970820
91	**BGS Recorded Mineral Sites** Site Name: Holbornhead Location: Scrabster, Thurso, Caithness-Shire Source: British Geological Survey, National Geoscience Information Service Reference: 84914 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Devonian Geology: Scrabster Flagstone Member Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A18SW (N)	304	1	310215 970760

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
92	**BGS Recorded Mineral Sites** Site Name: Holbornhead Location: Scrabster, Thurso, Caithness-Shire Source: British Geological Survey, National Geoscience Information Service Reference: 84918 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Devonian Geology: Scrabster Flagstone Member Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A18SE (NE)	354	1	310630 970860
93	**BGS Recorded Mineral Sites** Site Name: Holbornhead Location: Scrabster, Thurso, Caithness-Shire Source: British Geological Survey, National Geoscience Information Service Reference: 84919 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Devonian Geology: Scrabster Flagstone Member Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A18SE (NE)	410	1	310620 970925
94	**BGS Recorded Mineral Sites** Site Name: Holbornhead Location: Scrabster, Thurso, Caithness-Shire Source: British Geological Survey, National Geoscience Information Service Reference: 84913 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Devonian Geology: Holborn Sandstone Member Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A17SE (NW)	614	1	309835 970920
95	**BGS Recorded Mineral Sites** Site Name: Bell Mount Location: Scrabster, Thurso, Caithness-Shire Source: British Geological Survey, National Geoscience Information Service Reference: 84911 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Devonian Geology: Scrabster Flagstone Member Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A12SW (W)	679	1	309530 970275
96	**BGS Recorded Mineral Sites** Site Name: Coghill Burn Location: Scrabster, Thurso, Caithness-Shire Source: British Geological Survey, National Geoscience Information Service Reference: 84910 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Devonian Geology: Scrabster Flagstone Member Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A12NW (W)	777	1	309420 970500
97	**BGS Recorded Mineral Sites** Site Name: Coghill Location: Scrabster, Thurso, Caithness-Shire Source: British Geological Survey, National Geoscience Information Service Reference: 84909 Type: Opencast **Status: Ceased** Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Devonian Geology: Holborn Sandstone Member Commodity: Sandstone Positional Accuracy: Located by supplier to within 10m	A12NW (W)	895	1	309355 970735

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Measured Urban Soil Chemistry No data available				
	BGS Urban Soil Chemistry Averages No data available				
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Non Coal Mining Areas of Great Britain Risk: Rare Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	1	310349 970434
	Non Coal Mining Areas of Great Britain Risk: Rare Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	193	1	310000 970425
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	1	310349 970434
	Potential for Collapsible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (W)	138	1	310083 970327
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	193	1	310000 970425
	Potential for Collapsible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (W)	224	1	310000 970302
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	1	310349 970434
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	193	1	310000 970425
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	1	310349 970434
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	193	1	310000 970425
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	1	310349 970434
	Potential for Landslide Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	1	310347 970487
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NW (NW)	30	1	310268 970485
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	90	1	310326 970586
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	97	1	310333 970592
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13NW (NW)	117	1	310237 970567
	Potential for Landslide Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	193	1	310000 970425
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A13SW (W)	198	1	310000 970380

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SW (W)	199	1	310000 970374
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	200	1	310000 970471
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A12SE (W)	244	1	309966 970334
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	1	310349 970434
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	1	310347 970487
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	97	1	310333 970592
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13SW (W)	138	1	310083 970327
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	193	1	310000 970425
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (W)	198	1	310000 970380
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	200	1	310000 970471
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A13SW (W)	224	1	310000 970302
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	1	310349 970434
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NE (N)	0	1	310347 970487
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (N)	97	1	310333 970592
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	193	1	310000 970425
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SW (W)	198	1	310000 970380
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NW (W)	200	1	310000 970471
	Radon Potential - Radon Affected Areas Affected Area: The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). Source: British Geological Survey, National Geoscience Information Service	A13NE (SW)	0	1	310352 970425
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13NE (SW)	0	1	310352 970425

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
98	**Contemporary Trade Directory Entries** Name: Asco Uk Location: Scrabster Harbour, Scrabster, Thurso, Caithness, KW14 7UJ Classification: Freight Forwarders **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SW (W)	0	-	310303 970414
98	**Contemporary Trade Directory Entries** Name: Northwoods Ltd Location: Scrabster Harbour, Scrabster, Thurso, KW14 7UJ Classification: Road Haulage Services **Status: Active** Positional Accuracy: Automatically positioned to the address	A13SW (W)	0	-	310303 970414
99	**Contemporary Trade Directory Entries** Name: John S Duncan Location: Scrabster Pier, Scrabster, Thurso, Caithness, KW14 7UG Classification: Chandlers **Status: Inactive** Positional Accuracy: Manually positioned to the address or location	A13SW (SW)	50	-	310238 970322
100	**Contemporary Trade Directory Entries** Name: Scrabster Harbour Trust Location: Scrabster, Thurso, Caithness, KW14 7UJ Classification: Ports, Docks & Harbours **Status: Active** Positional Accuracy: Automatically positioned to the address	A12SE (W)	233	-	309997 970289
100	**Contemporary Trade Directory Entries** Name: Seawire Services Ltd Location: Scrabster Harbour, Scrabster, Thurso, Caithness, KW14 7UX Classification: Chandlers **Status: Inactive** Positional Accuracy: Manually positioned within the geographical locality	A12SE (W)	269	-	309960 970282
101	**Contemporary Trade Directory Entries** Name: E & M Engineering Location: Unit 3, Scrabster Business Centre, Scrabster, Thurso, Caithness, KW14 7UJ Classification: Marine Engineering Equipment Manufacturers **Status: Active** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	283	-	309981 970209
101	**Contemporary Trade Directory Entries** Name: M P A Engineering Ltd Location: Unit 3, Scrabster Business Centre, Scrabster, Thurso, Caithness, KW14 7UJ Classification: Marine Engineers **Status: Active** Positional Accuracy: Automatically positioned to the address	A12SE (SW)	283	-	309981 970209
102	**Contemporary Trade Directory Entries** Name: D Steven & Son Location: Scrabster Business Park, Scrabster, Thurso, Caithness, KW14 7UJ Classification: Road Haulage Services **Status: Inactive** Positional Accuracy: Automatically positioned to the address	A13SW (SW)	301	-	310090 970094
103	**Points of Interest - Commercial Services** Name: Northwards Ltd Location: Scrabster Harbour, Scrabster, Thurso, KW14 7UJ Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A13SW (W)	0	8	310303 970414
103	**Points of Interest - Commercial Services** Name: Scrabster Port Services Ltd Location: Scrabster Harbour, Scrabster, Thurso, KW14 7UJ Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A13SW (W)	0	8	310303 970414
103	**Points of Interest - Commercial Services** Name: Northwoods Ltd Location: Scrabster Harbour, Scrabster, Thurso, KW14 7UJ Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A13SW (W)	0	8	310302 970413
103	**Points of Interest - Commercial Services** Name: Asco UK Location: Scrabster Harbour, Scrabster, Thurso, KW14 7UJ Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A13SW (W)	0	8	310302 970413

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
104	**Points of Interest - Commercial Services** Name: North Woods Ltd Location: Scrabster, Thurso, KW14 7UJ Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A12SE (W)	233	8	309997 970289
105	**Points of Interest - Commercial Services** Name: D Steven & Son Location: Scrabster Business Park, Scrabster, Thurso, KW14 7UJ Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A13SW (SW)	301	8	310090 970094
105	**Points of Interest - Commercial Services** Name: D Steven & Son Location: Alexander Building Scrabster Business Centre, Scrabster, Thurso, KW14 7UJ Category: Transport, Storage and Delivery Class Code: Distribution and Haulage Positional Accuracy: Positioned to address or location	A13SW (SW)	301	8	310090 970094
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	259	8	309982 970257
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	260	8	309989 970241
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	271	8	309970 970253
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	274	8	309975 970236
106	**Points of Interest - Manufacturing and Production** Name: Tanks Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A12SE (SW)	283	8	309963 970241
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	290	8	309953 970246
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	292	8	309958 970230
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	307	8	309936 970241
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	309	8	309943 970223

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	321	8	309923 970236
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	324	8	309929 970217
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	334	8	309911 970232
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	335	8	309918 970214
106	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A12SE (SW)	350	8	309904 970209
107	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A7NE (SW)	771	8	309678 969815
108	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A12NW (W)	806	8	309389 970477
109	**Points of Interest - Manufacturing and Production** Name: Tank Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A7NW (SW)	963	8	309355 969935
109	**Points of Interest - Manufacturing and Production** Name: Tanks Location: KW14 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A7NW (SW)	974	8	309348 969926
110	**Points of Interest - Recreational and Environmental** Name: Playground Location: Not Supplied Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A12SE (W)	502	8	309743 970196
110	**Points of Interest - Recreational and Environmental** Name: Playground Location: Holborn Place, KW14 Category: Recreational Class Code: Playgrounds Positional Accuracy: Positioned to an adjacent address or location	A12SE (W)	502	8	309744 970195

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
111	**Sites of Special Scientific Interest** Name: Holborn Head Multiple Areas: Y Total Area (m2): 1345712.29 Source: Scottish Natural Heritage Reference: 789 Designation Details: Mixed Designation Date: 23rd November 1984 Date Type: Designated	A18SE (NE)	296	9	310662 970771
112	**Sites of Special Scientific Interest** Name: Pennylands Multiple Areas: Y Total Area (m2): 213938.33 Source: Scottish Natural Heritage Reference: 1278 Designation Details: Geological Designation Date: 23rd March 1988 Date Type: Designated	A8SW (S)	724	9	310323 969576
113	**Special Protection Areas** Name: North Caithness Cliffs Multiple Areas: Y Total Area (m2): 146287881.07 Source: Scottish Natural Heritage Reference: 8554 Designation Date: 25th September 2009	A14NW (NE)	228	9	310690 970621

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices		
The Highland Council	October 2013	Annual Rolling Update
Discharge Consents		
Scottish Environment Protection Agency - North Region	February 1998	Not Applicable
Enforcement and Prohibition Notices		
Scottish Environment Protection Agency - North Region	January 2012	Not Applicable
Integrated Pollution Controls		
Scottish Environment Protection Agency - Head Office	February 1998	Variable
Scottish Environment Protection Agency - North Region	March 2002	Variable
Local Authority Pollution Prevention and Controls		
Scottish Environment Protection Agency - North Region	March 2002	Not Applicable
Local Authority Pollution Prevention and Control Enforcements		
Scottish Environment Protection Agency - North Region	June 2001	Variable
Nearest Surface Water Feature		
Ordnance Survey	September 2017	
Prosecutions Relating to Authorised Processes		
Scottish Environment Protection Agency - North Region	March 2007	Not Applicable
Prosecutions Relating to Controlled Waters		
Scottish Environment Protection Agency - North Region	March 2007	Annual Rolling Update
Registered Radioactive Substances		
Scottish Environment Protection Agency - North Region	February 1998	Not Applicable
Scottish Environment Protection Agency - Head Office	January 1998	Not Applicable
River Quality		
Scottish Environment Protection Agency - Head Office	December 1990	Not Applicable
Scottish Environment Protection Agency - North Region	December 1990	Not Applicable
Water Abstractions		
Scottish Government - Agriculture, Environment and Fisheries Department	December 1997	Not Applicable
Water Industry Act Referrals		
Scottish Environment Protection Agency - North Region	April 1996	As Designated
Groundwater Vulnerability		
Scottish Environment Protection Agency - Head Office	December 1995	Not Applicable
Scottish Environment Protection Agency - North Region	December 1995	Not Applicable
Drift Deposits		
Scottish Environment Protection Agency - Head Office	December 1995	Not Applicable
Scottish Environment Protection Agency - North Region	December 1995	Not Applicable
OS Water Network Lines		
Ordnance Survey	October 2018	Quarterly
BGS Groundwater Flooding Susceptibility		
British Geological Survey - National Geoscience Information Service	May 2013	Annually

Waste	Version	Update Cycle
BGS Recorded Landfill Sites		
British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Integrated Pollution Control Registered Waste Sites		
Scottish Environment Protection Agency - North Region	February 1998	Not Applicable
Scottish Environment Protection Agency - Head Office	January 1998	Not Applicable
Local Authority Landfill Coverage		
The Highland Council	May 2000	Not Applicable
Local Authority Recorded Landfill Sites		
The Highland Council	May 2000	Not Applicable
Potentially Infilled Land (Non-Water)		
Landmark Information Group Limited	December 1999	Not Applicable
Potentially Infilled Land (Water)		
Landmark Information Group Limited	December 1999	Not Applicable
Registered Landfill Sites		
Scottish Environment Protection Agency - Head Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Aberdeen Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Elgin Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Fort William Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Fraserburgh Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Orkney Islands Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Shetland Islands Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Thurso Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Western Isles Office	December 2005	Not Applicable
Registered Waste Transfer Sites		
Scottish Environment Protection Agency - Head Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Aberdeen Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Elgin Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Fort William Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Fraserburgh Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Orkney Islands Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Shetland Islands Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Thurso Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Western Isles Office	December 2005	Not Applicable
Registered Waste Treatment or Disposal Sites		
Scottish Environment Protection Agency - Head Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Aberdeen Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Elgin Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Fort William Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Fraserburgh Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Orkney Islands Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Shetland Islands Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Thurso Office	December 2005	Not Applicable
Scottish Environment Protection Agency - North Region - Western Isles Office	December 2005	Not Applicable

Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH) Health and Safety Executive	April 2018	Bi-Annually
Explosive Sites Health and Safety Executive	March 2017	Variable
Notification of Installations Handling Hazardous Substances (NIHHS) Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements The Highland Council - Planning Department	April 2016	Variable
Planning Hazardous Substance Consents The Highland Council - Planning Department	April 2016	Variable
Geological	**Version**	**Update Cycle**
BGS 1:625,000 Solid Geology British Geological Survey - National Geoscience Information Service	January 2009	Not Applicable
BGS Estimated Soil Chemistry British Geological Survey - National Geoscience Information Service	October 2015	Annually
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	November 2018	Bi-Annually
CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	Not Applicable
Coal Mining Affected Areas The Coal Authority - Property Searches	March 2014	Annual Rolling Update
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Radon Potential - Radon Affected Areas British Geological Survey - National Geoscience Information Service	July 2011	Annually
Radon Potential - Radon Protection Measures British Geological Survey - National Geoscience Information Service	July 2011	Annually

Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	November 2018	Quarterly
Fuel Station Entries Catalist Ltd - Experian	November 2018	Quarterly
Gas Pipelines National Grid	July 2014	
Points of Interest - Commercial Services PointX	September 2018	Quarterly
Points of Interest - Education and Health PointX	September 2018	Quarterly
Points of Interest - Manufacturing and Production PointX	September 2018	Quarterly
Points of Interest - Public Infrastructure PointX	September 2018	Quarterly
Points of Interest - Recreational and Environmental PointX	September 2018	Quarterly
Sensitive Land Use	**Version**	**Update Cycle**
Ancient Woodland Scottish Natural Heritage	July 2014	Bi-Annually
Environmentally Sensitive Areas Scottish Government	January 2017	
Forest Parks Forestry Commission	April 1997	Not Applicable
Local Nature Reserves The Highland Council	February 2018	Bi-Annually
Marine Nature Reserves Scottish Natural Heritage	August 2018	Bi-Annually
National Nature Reserves Scottish Natural Heritage	November 2018	Bi-Annually
National Parks Scottish Government	December 2013	Bi-Annually
National Scenic Areas Scottish Government	December 2013	Bi-Annually
Nitrate Vulnerable Zones Scottish Government	October 2015	Annually
Ramsar Sites Scottish Natural Heritage	January 2015	Bi-Annually
Sites of Special Scientific Interest Scottish Natural Heritage	November 2017	Bi-Annually
Special Areas of Conservation Scottish Natural Heritage	August 2018	Bi-Annually
Special Protection Areas Scottish Natural Heritage	November 2017	Bi-Annually

Data Suppliers

A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	
Centre for Ecology and Hydrology	
Natural Resources Wales	
Scottish Natural Heritage	
Natural England	
Public Health England	
Ove Arup	
Peter Brett Associates	

Useful Contacts

Contact	Name and Address	Contact Details
1	**British Geological Survey - Enquiry Service** British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
2	**Scottish Environment Protection Agency - North Region** Graesser House, Fodderty Way, Dingwall Business Park, Dingwall, Highland, IV15 9XB	Telephone: 01349 862021 Fax: 01349 863987
3	**Scottish Environment Protection Agency - Head Office** Erskine Court, The Castle Business Park, Stirling, Stirlingshire, FK9 4TR	Telephone: 01786 457700 Fax: 01786 446885
4	**Ordnance Survey** Adanac Drive, Southampton, Hampshire, SO16 0AS	Telephone: 03456 05 05 05 Email: customerservices@ordnancesurvey.co.uk Website: www.ordnancesurvey.gov.uk
5	**The Highland Council** Council Offices, Glenurquhart Road, Inverness, Invernesshire, IV3 5NX	Telephone: 01463 702000 Fax: 01463 702830 Website: www.highland.gov.uk
6	**Health and Safety Executive** 5S.2 Redgrave Court, Merton Road, Bootle, L20 7HS	Website: www.hse.gov.uk
7	**The Highland Council - Planning Department** Council Offices, Glenurquhart Road, Inverness, Invernesshire, IV3 5NX	Telephone: 01463 702000 Fax: 01463 702830 Website: www.highland.gov.uk
8	**PointX** 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk
9	**Scottish Natural Heritage** 12 Hope Terrace, Edinburgh, Midlothian, EH9 2AS	Telephone: 0131 447 4784 Fax: 0131 446 2279
-	**Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.

Geology 1:10,000 Maps Legends

Artificial Ground and Landslip

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	MGR	Made Ground (Undivided)	Artificial Deposit	Holocene - Holocene
	DDGR	Disturbed Ground (Undivided)	Unknown/Unclassified Entry	Holocene - Holocene
	WGR	Worked Ground (Undivided)	Void	Holocene - Holocene

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	SABD	Shoreface and Beach Deposits (Undifferentiated)	Sand	Holocene - Saalian
	FOTI	Forse Till Member	DIAMICTON, CLAY, SAND AND GRAVEL	Devensian - Ipswichian
	LAT	Lacustrine Alluvium	Clay, Silt and Sand	Quaternary - Ryazanian

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	SFM	Scrabster Flagstone Member	Siltstone and Sandstone	Mid Devonian - Mid Devonian
	HOSM	Holborn Sandstone Member	Sandstone and Siltstone, Interbedded	Mid Devonian - Mid Devonian
	HOSM	Holborn Sandstone Member	Sandstone	Mid Devonian - Mid Devonian
	Fault			

RPS

Geology 1:10,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:10,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around a site. This mapping may be more up to date than previously published paper maps.

The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page.

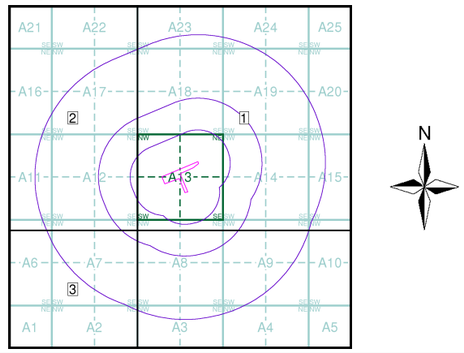
Please Note: Not all of the layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:10,000 Maps Coverage

Map ID:	1	**Map ID:**	2
Map Name:	ND17SW	**Map Name:**	ND07SE
Map Date:	2005	**Map Date:**	2005 B
Bedrock Geology:	Available	**Bedrock Geology:**	Available
Superficial Geology:	Available	**Superficial Geology:**	Available
Artificial Geology:	Available	**Artificial Geology:**	Available
Faults:	Available	**Faults:**	Available
Landslip:	Not Available	**Landslip:**	Not Available
Rock Segments:	Not Available	**Rock Segments:**	Not Available

Map ID:	3
Map Name:	ND06NE
Map Date:	2004
Bedrock Geology:	Available
Superficial Geology:	Available
Artificial Geology:	Available
Faults:	Available
Landslip:	Not Available
Rock Segments:	Not Available

Geology 1:10,000 Maps - Slice A



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Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
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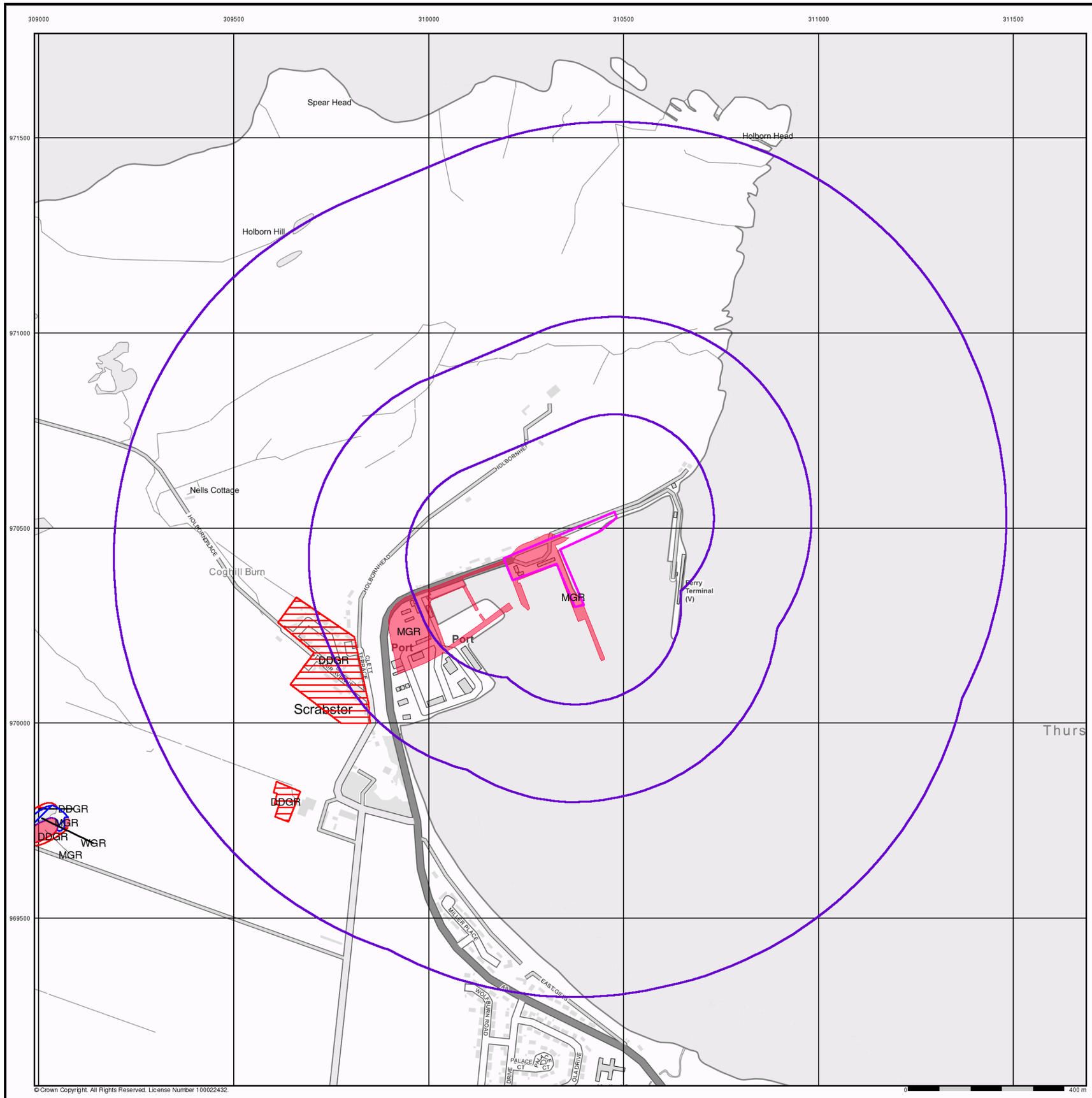
Search Buffer (m):	1000

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ



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Artificial Ground and Landslip

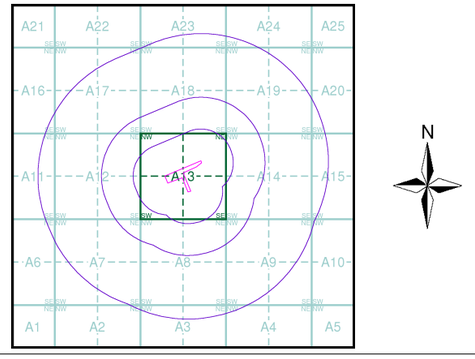
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

Artificial ground includes:

- Made ground - man-made deposits such as embankments and spoil heaps on the natural ground surface.
- Worked ground - areas where the ground has been cut away such as quarries and road cuttings.
- Infilled ground - areas where the ground has been cut away then wholly or partially backfilled.
- Landscaped ground - areas where the surface has been reshaped.
- Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes foundered strata, where the ground has collapsed due to subsidence.

Artificial Ground and Landslip Map - Slice A



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Site Details

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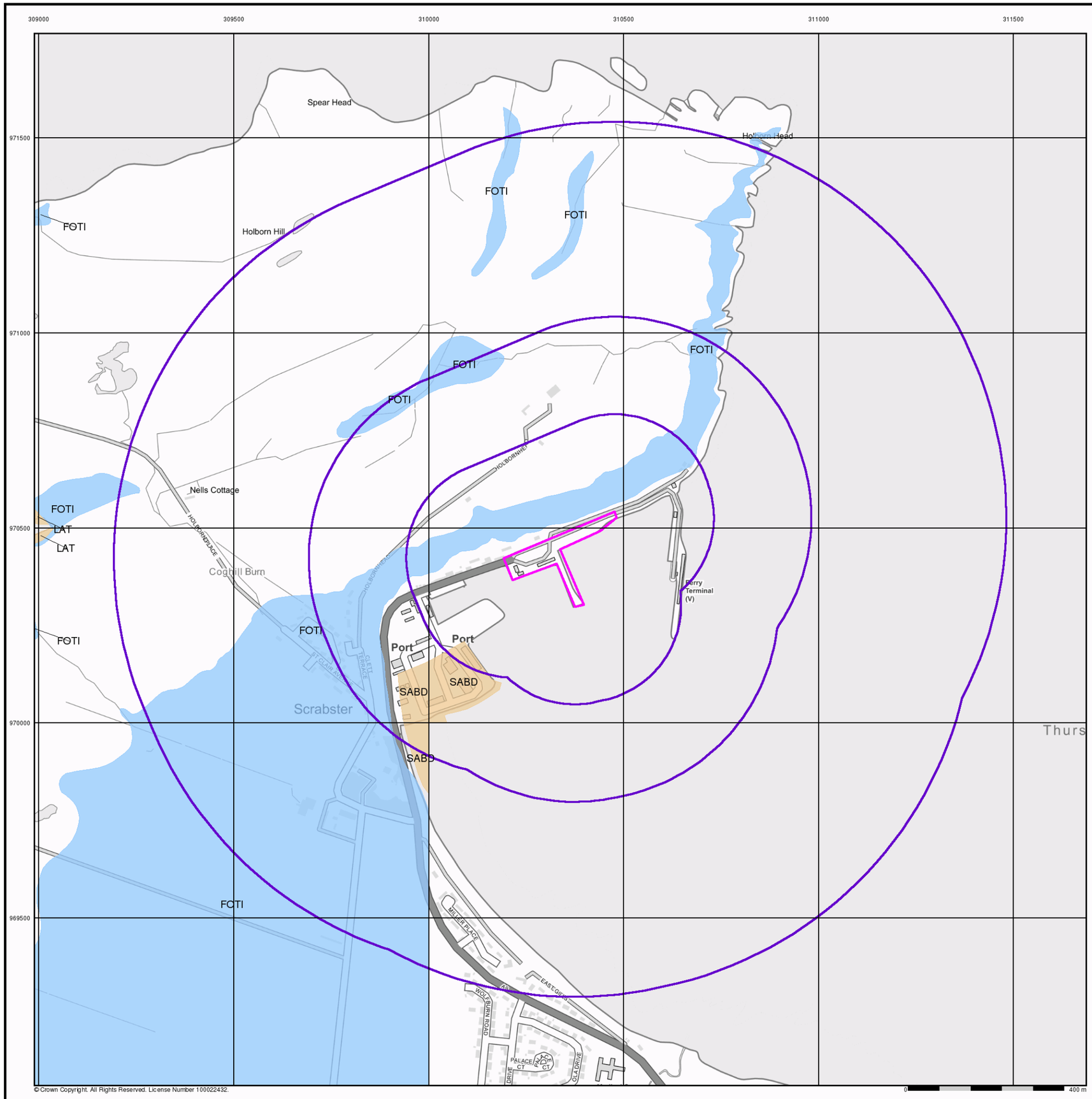
Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



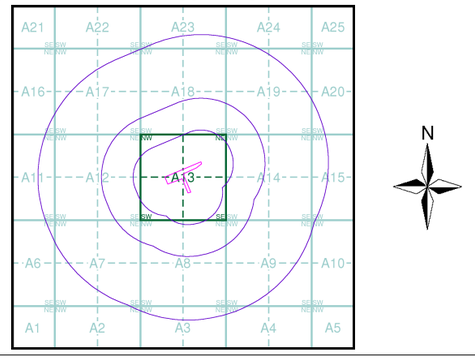
Superficial Geology

BGS 1:10,000 Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, which extends back about 1.8 million years from the present.

They rest on older deposits or rocks referred to as Bedrock. This dataset contains Superficial deposits that are of natural origin and 'in place'. Other superficial strata may be held in the Mass Movement dataset where they have been moved, or in the Artificial Ground dataset where they are of man-made origin.

Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice A



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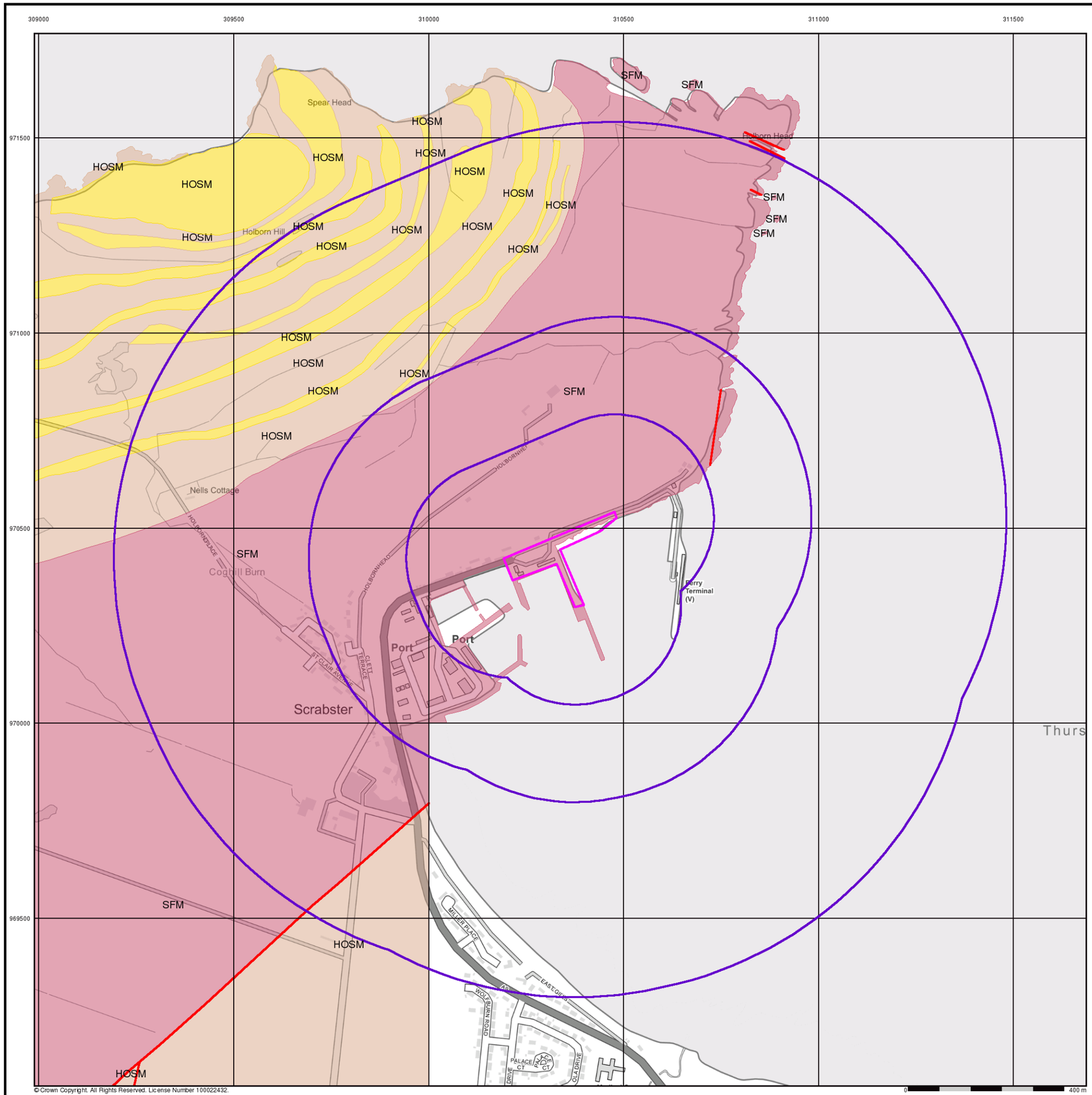

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Bedrock and Faults

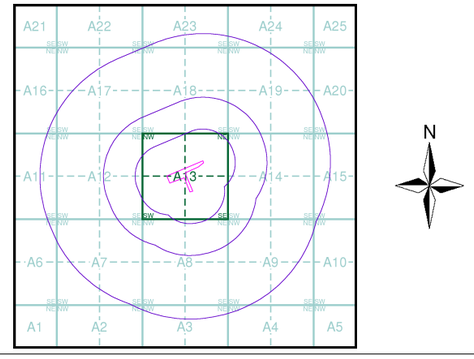
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults and thin beds mapped as lines such as coal seams and mineral veins. These are not restricted by age and could relate to features of any of the 1:10,000 geology datasets.

Bedrock and Faults Map - Slice A



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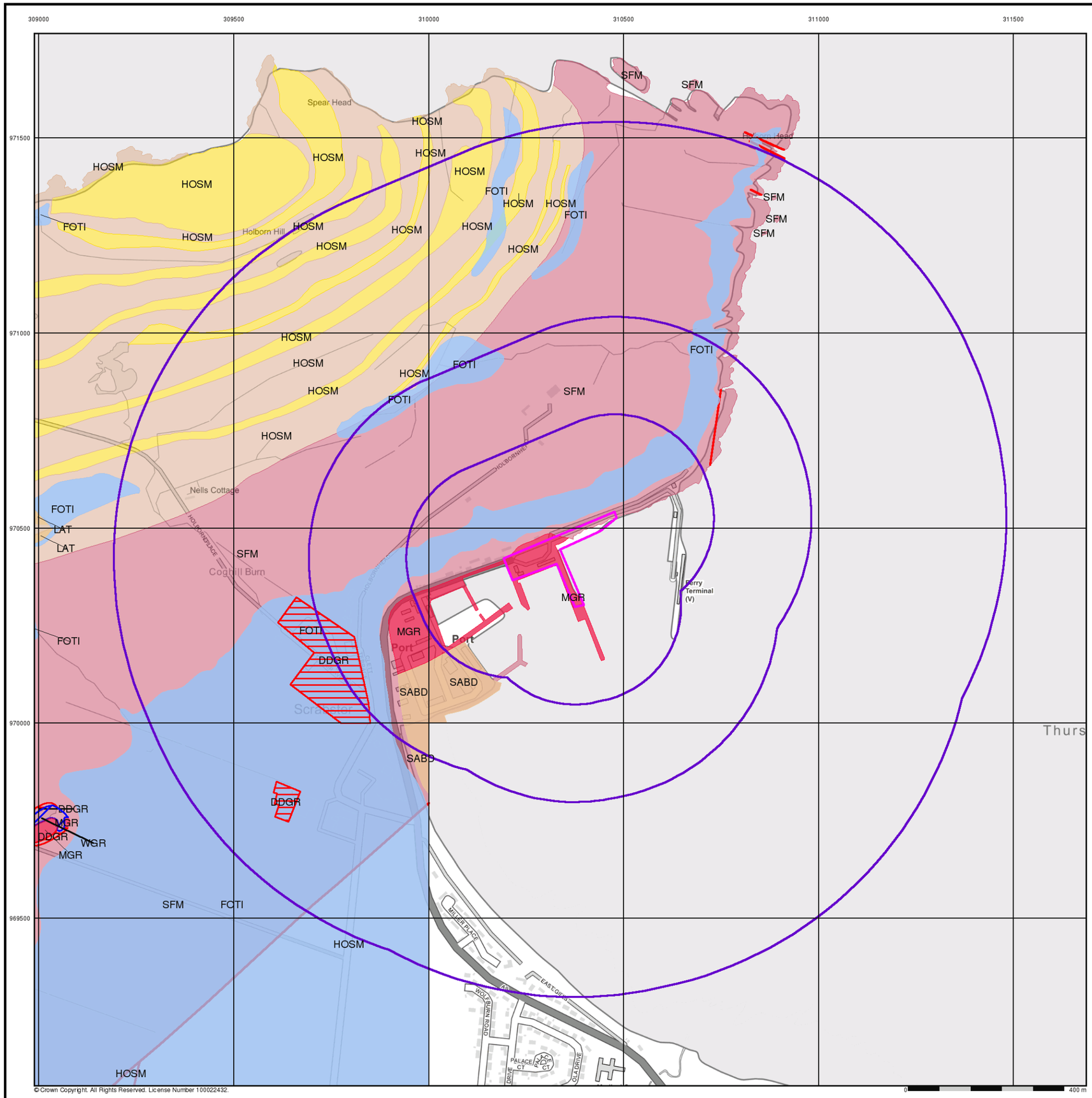

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Combined Surface Geology

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

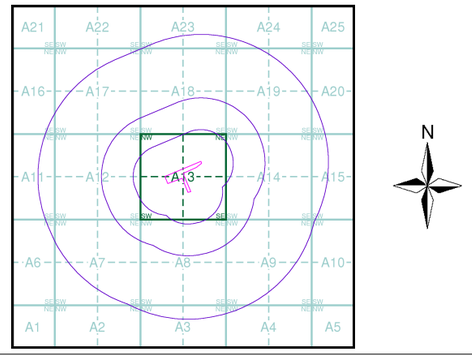
Additional Information

More information on 1:10,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

Contact

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Telephone: 0115 936 3143
Fax: 0115 936 3276
email: enquiries@bgs.ac.uk
website: www.bgs.ac.uk

Combined Geology Map - Slice A



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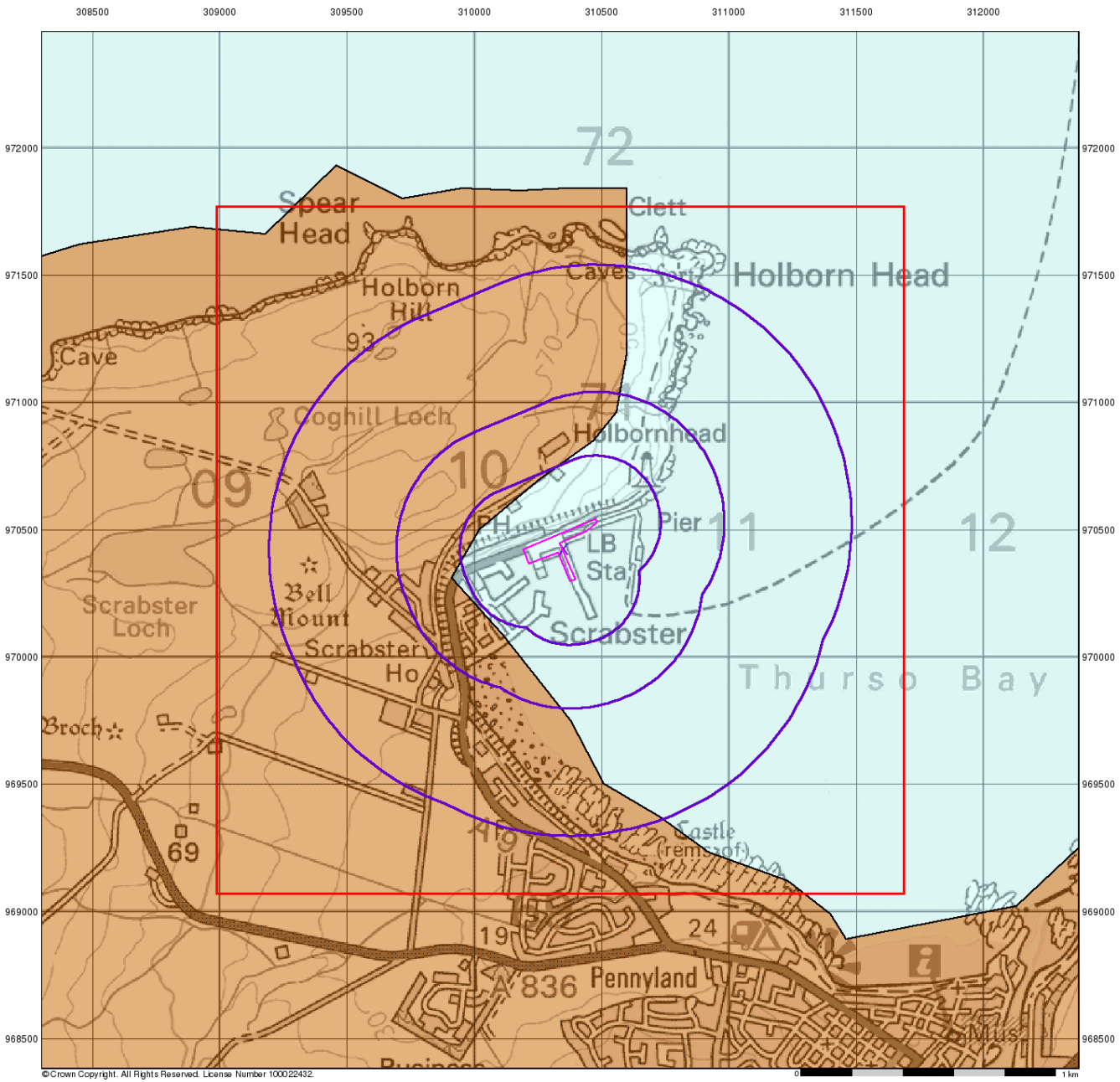


RPS

Groundwater Vulnerability

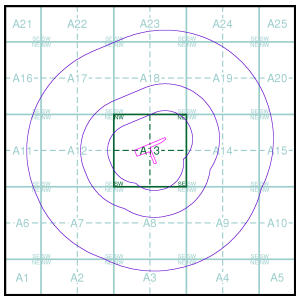
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes	Soil Classes
Highly Permeable	High
	Intermediate
	Low
Moderately Permeable	
Weakly Permeable	
Water or Sea	
Drift Deposit	

Site Sensitivity Context Map - Slice A



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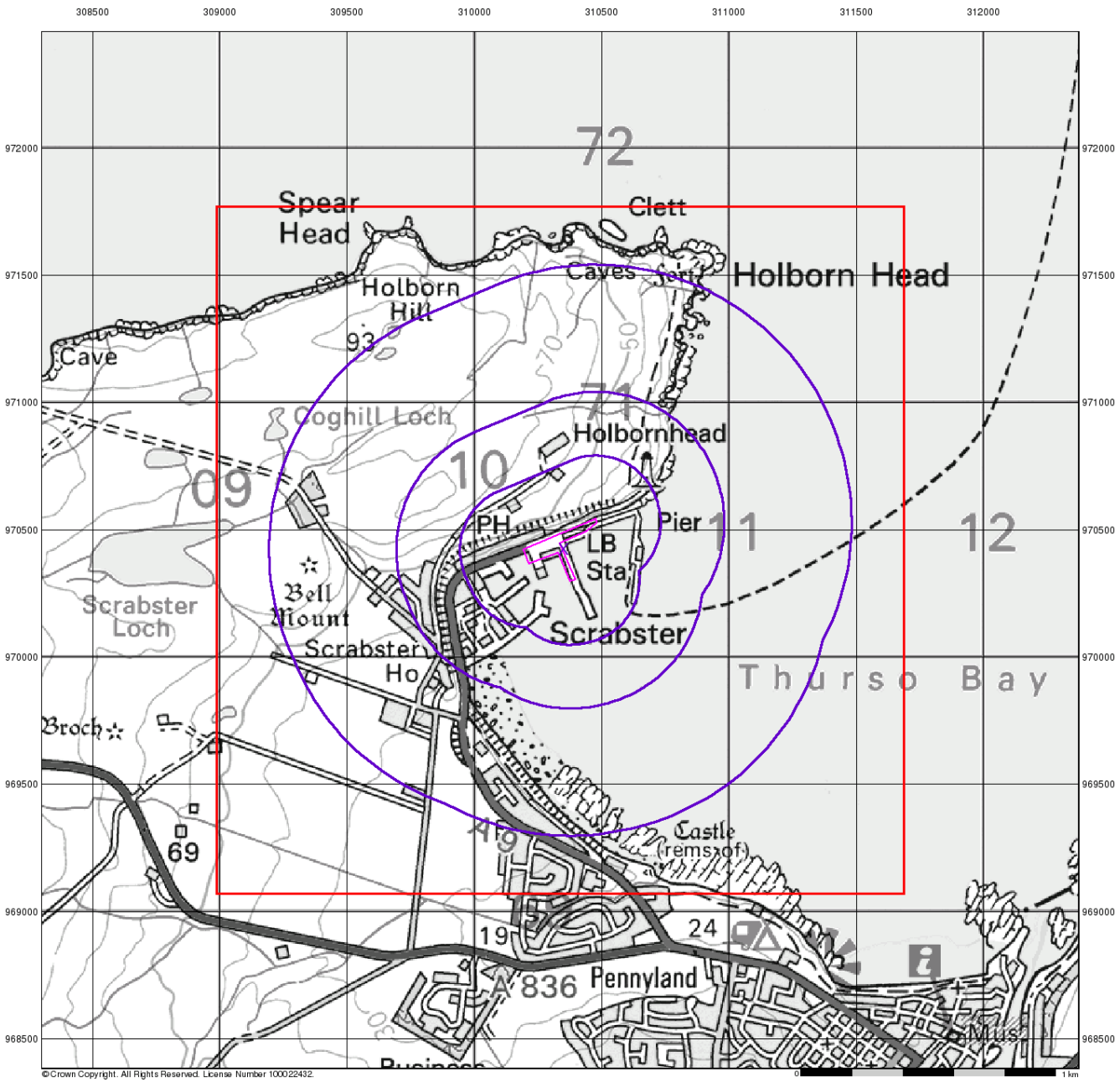


RPS

Source Protection Zones

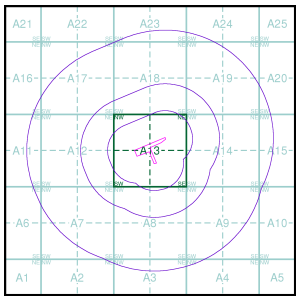
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

- Inner zone (Zone 1)
- Inner zone - subsurface activity only (Zone 1c)
- Outer zone (Zone 2)
- Outer zone - subsurface activity only (Zone 2c)
- Total catchment (Zone 3)
- Total catchment - subsurface activity only (Zone 3c)
- Special interest (Zone 4)

Site Sensitivity Context Map - Slice A



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Sensitive Land Uses

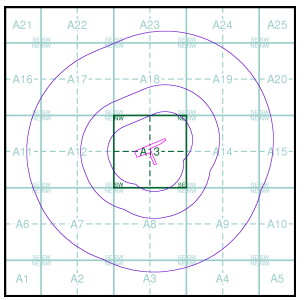
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Sensitive Land Uses

- Ancient Woodland
- Area of Adopted Green Belt
- Area of Unadopted Green Belt
- Environmentally Sensitive Area
- Forest Park
- Local Nature Reserve
- Marine Nature Reserve
- National Nature Reserve
- National Park
- National Scenic Area
- Nitrate Sensitive Area
- Nitrate Vulnerable Zone
- Ramsar Site
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area
- World Heritage Sites

Site Sensitivity Context Map - Slice A



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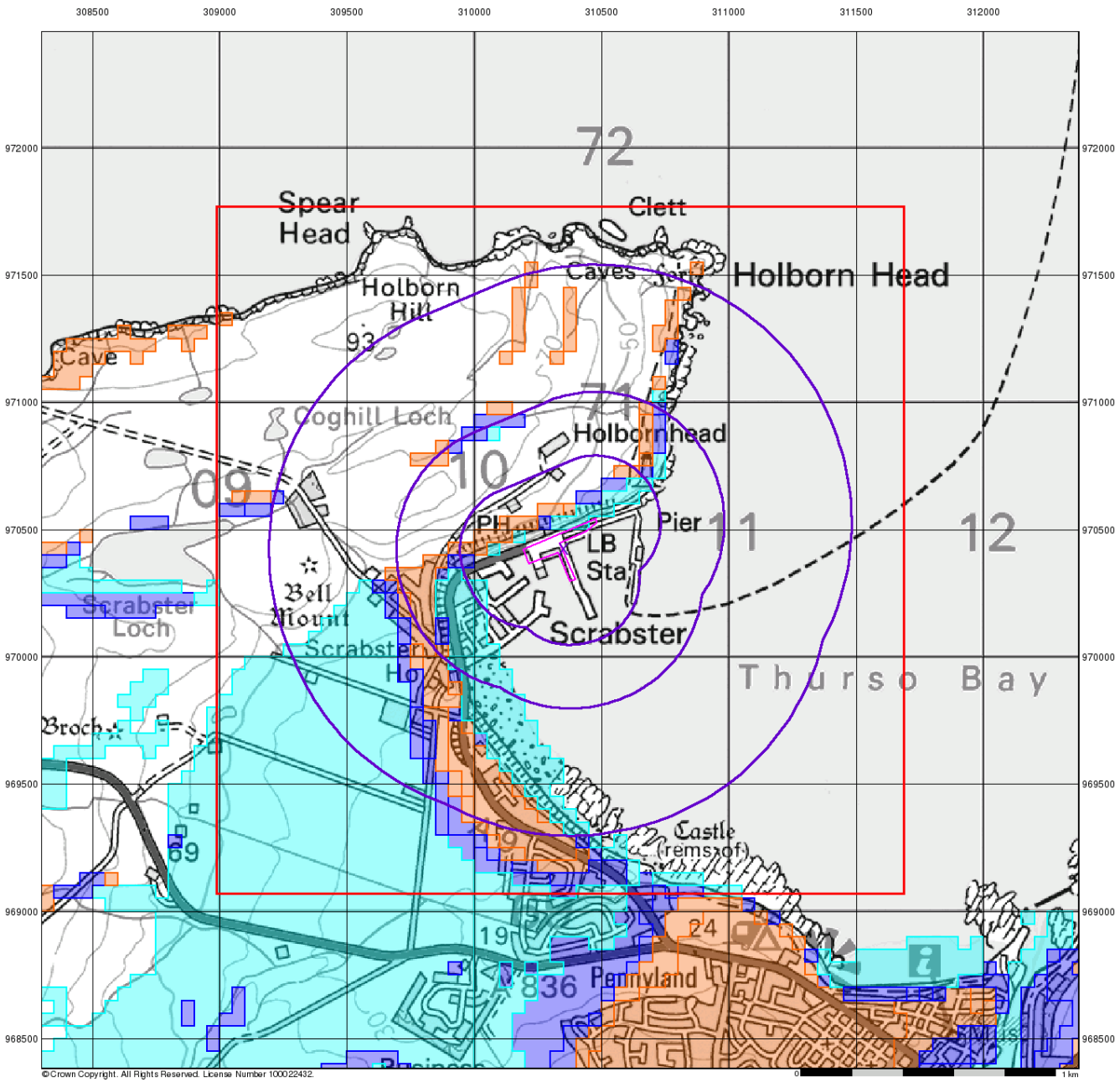


RPS

BGS Flood GFS Data

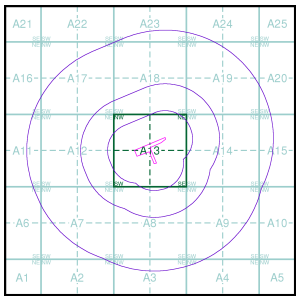
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice

Agency and Hydrological (Flood)

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

Site Sensitivity Context Map - Slice A



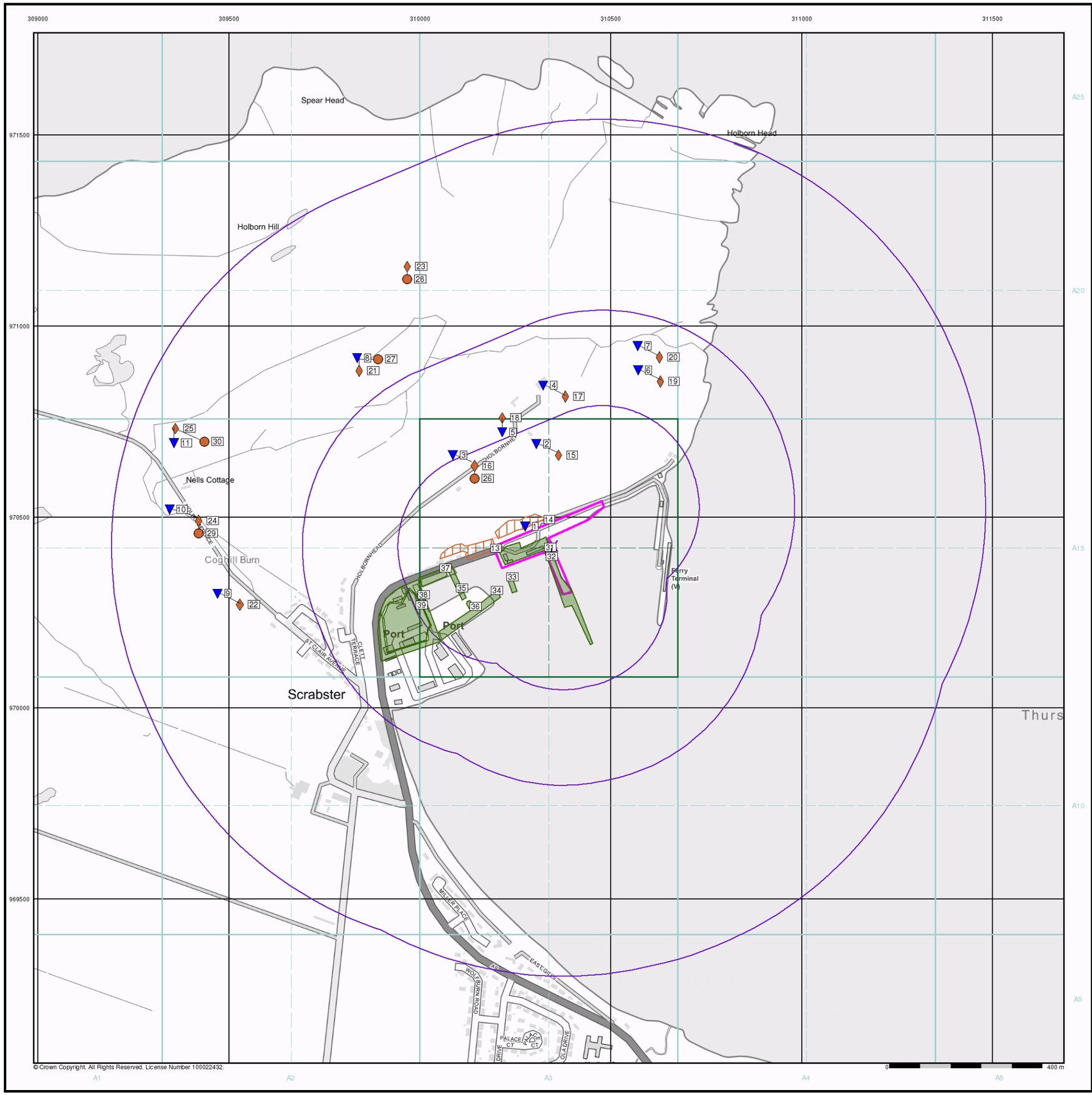
Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	1000

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



RPS

Historical Land Use Information (1:10,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Map ID

Several of Type at Location

Potentially Contaminative Industrial Uses (Past Land Uses - Mining)

	Point	Line	Polygon
Air Shafts	◆		
Disturbed Ground	◆		
General Quarrying	◆		
Heap, unknown constituents	◆		
Mineral Railway	◆		
Mining and Quarrying General	◆		
Mining of Coal & Lignite	◆		
Quarrying of Sand and Clay, Operation of Sand and Gravel Pits	◆		

Historical Land Use

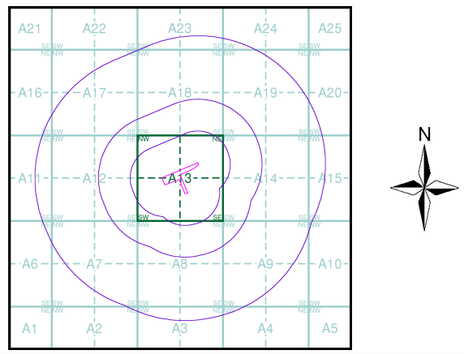
	Point	Line	Polygon
Potentially Infilled Land (Non-Water)	●		
Potentially Infilled Land (Water)	●		
Former Marsh	✠		

Mining Data

Potential Mining Area

BGS Recorded Mineral Site

Mining and Ground Stability - Slice A



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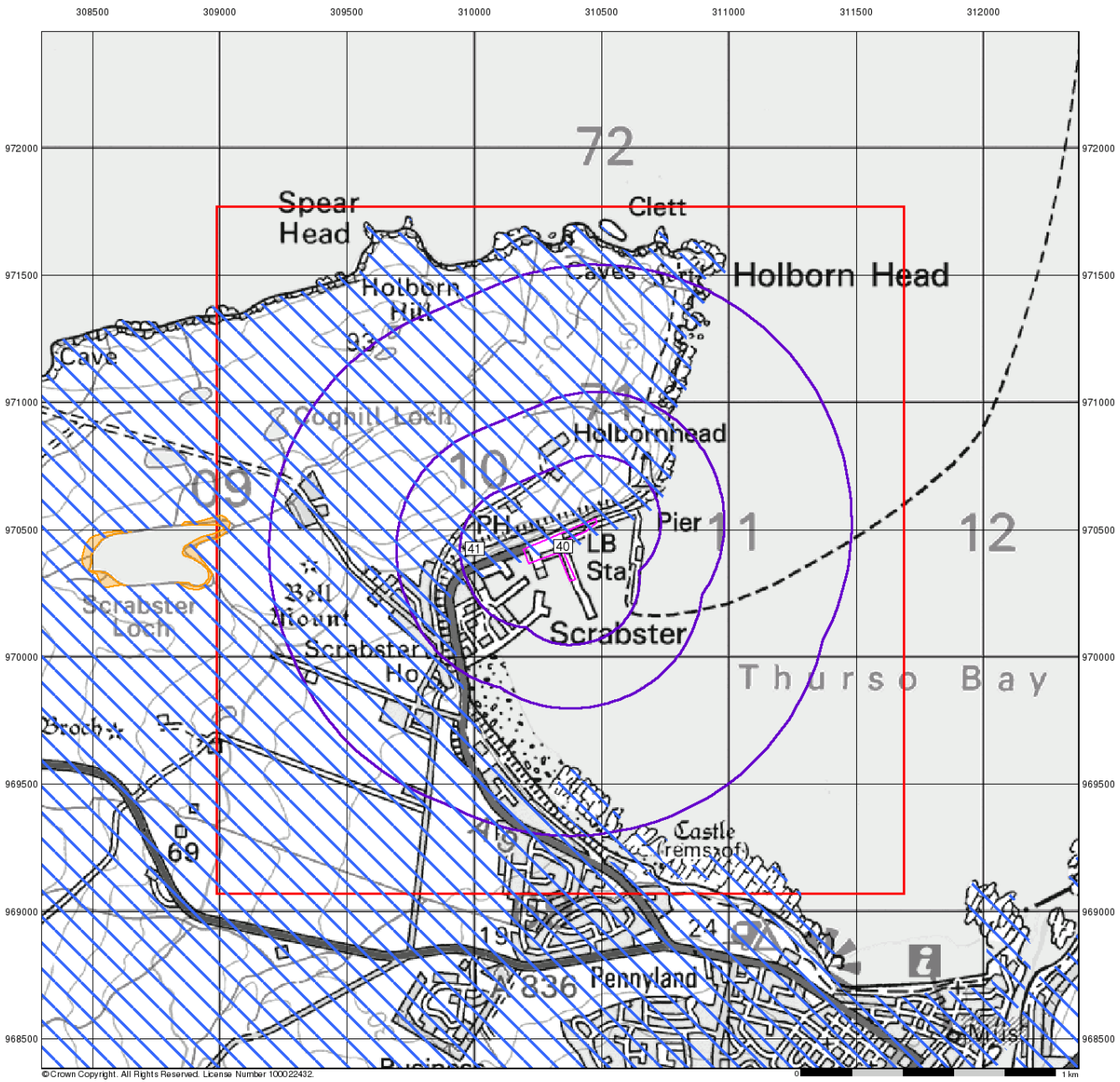


RPS

Ground Stability Data (1:50,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Potential for Compressible Ground Stability Hazards

High | Low | Moderate | Very Low

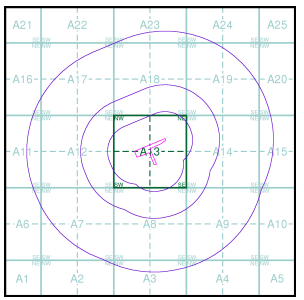
Potential for Collapsible Ground Stability Hazards

High | Low | Moderate | Very Low

Brine Pumping and Salt Mining

	Point	Polygon
Brine Pumping Related Feature	▲	▨
Salt Mining Related Feature	▲	▨

Mining and Ground Stability - Slice A



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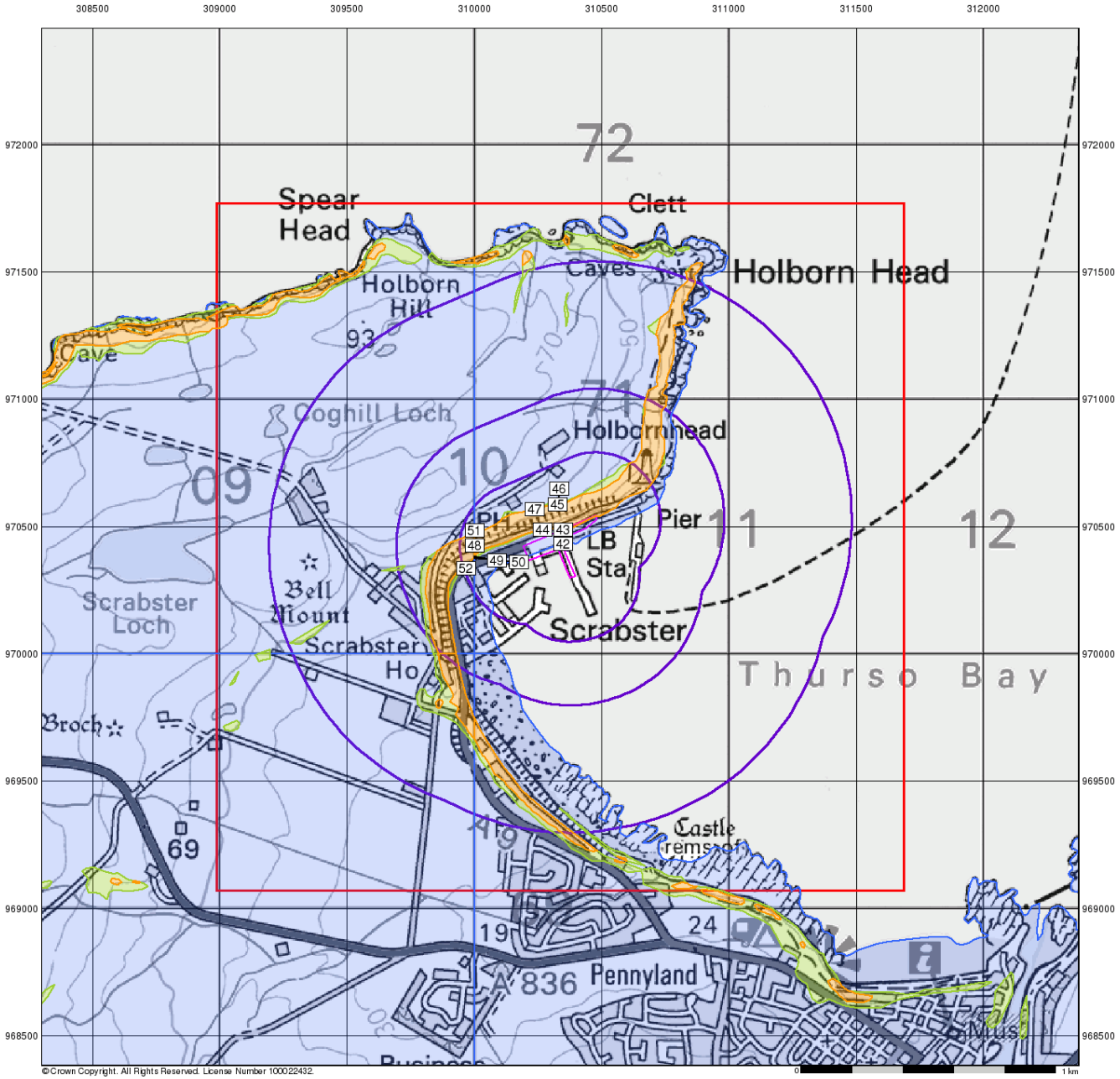


RPS

Ground Stability Data (1:50,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

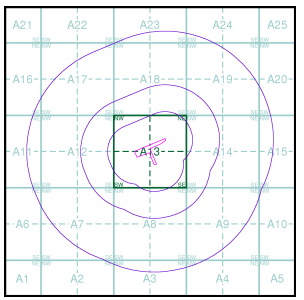
Potential for Landslide Ground Stability Hazards

High | Low | Moderate | Very Low

Potential for Ground Dissolution Stability Hazards

High | Low | Moderate | Very Low

Mining and Ground Stability - Slice A



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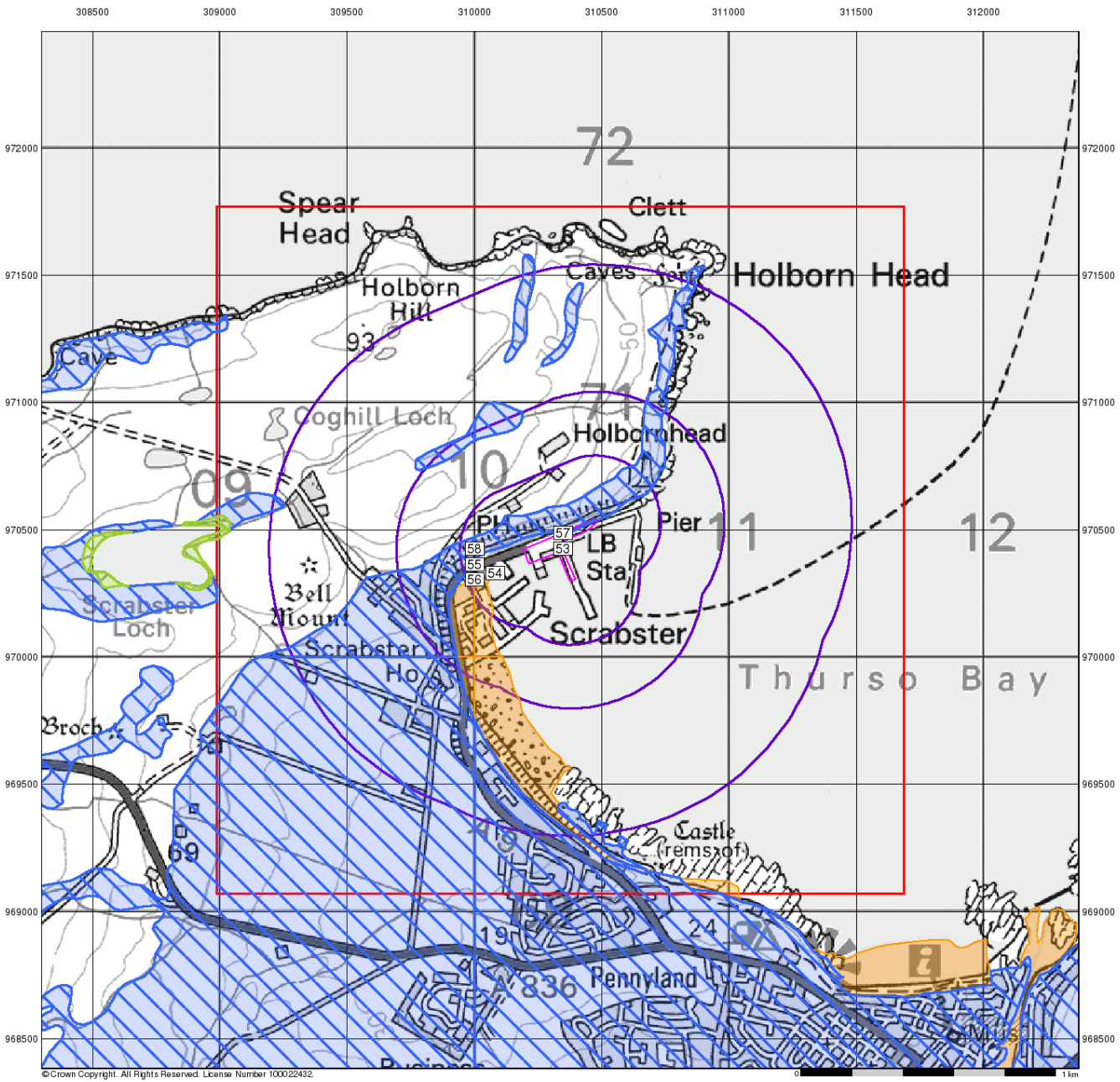


RPS

Ground Stability Data (1:50,000)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

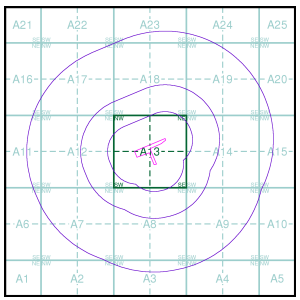
Potential for Running Sand Ground Stability Hazards

High | Low | Moderate | Very Low

Potential for Shrinking or Swelling Clay Ground Stability Hazards

High | Low | Moderate | Very Low

Mining and Ground Stability - Slice A



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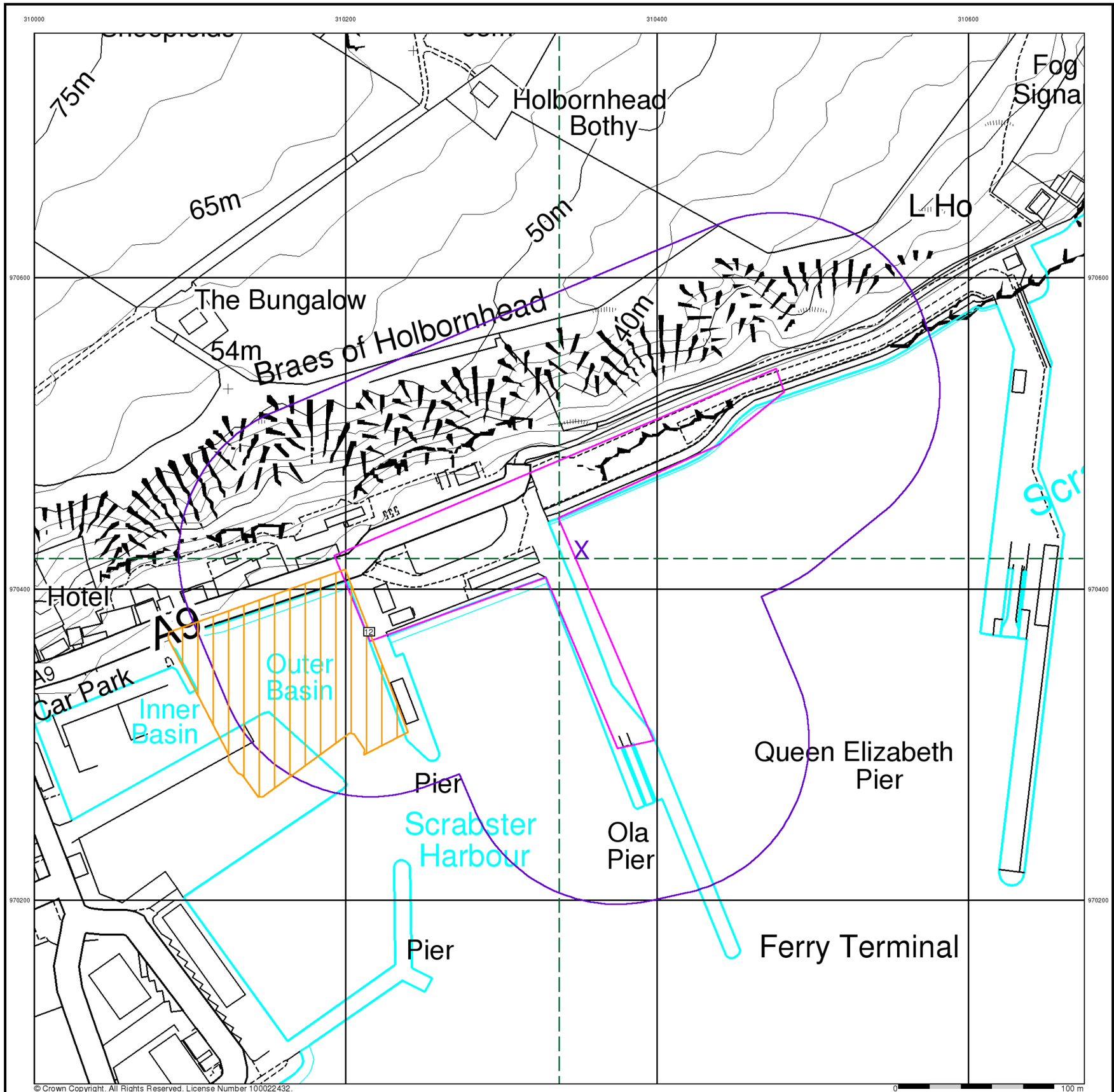

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RPS

Historical Land Use Information (1:2,500)

General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Map ID

Several of Type at Location

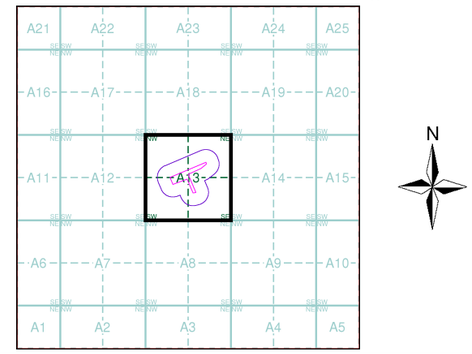
Potentially Contaminative Industrial Uses (Extractive Industries Activity)

	Point	Line	Polygon
Extractive Industries Activity from 1855 - 1909	▲	—	▭
Extractive Industries Activity from 1893 - 1915	▲	—	▭
Extractive Industries Activity from 1906 - 1937	▲	—	▭
Extractive Industries Activity from 1924 - 1949	▲	—	▭
Extractive Industries Activity from 1950 - 1980	▲	—	▭

Subterranean Features

	Point	Line	Polygon
Subterranean Features	▼	- - -	▭

Mining and Ground Stability - Segment A13



Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Plot Buffer (m):	100

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

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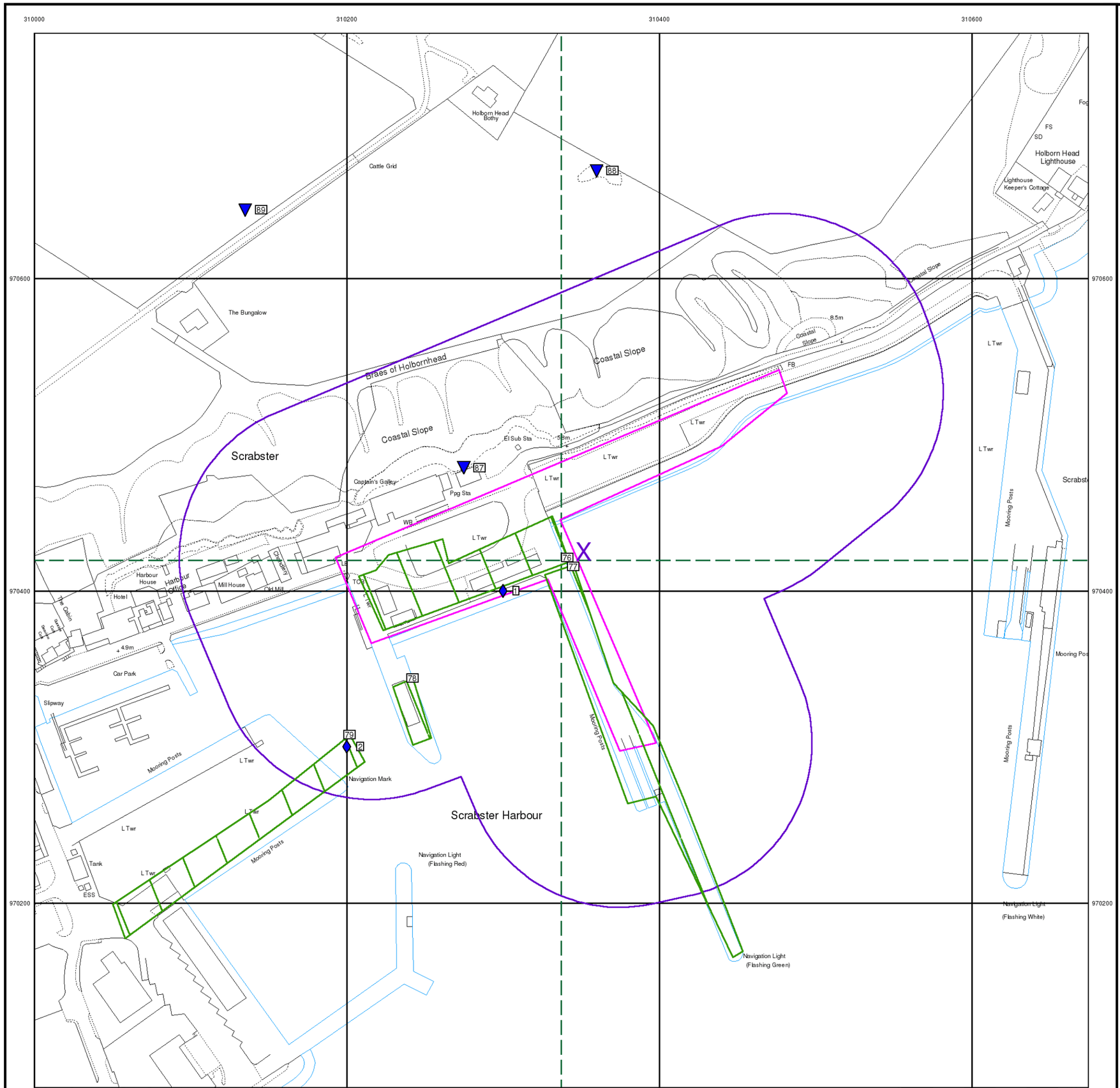


RPS

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location
- Pylon
- Overhead Transmission Line

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

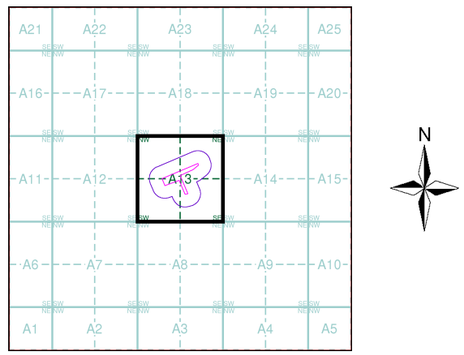
Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- Integrated Pollution Control Registered Waste Site
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Geological

- BGS Recorded Mineral Site

Site Sensitivity Map - Segment A13



Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Plot Buffer (m):	100

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

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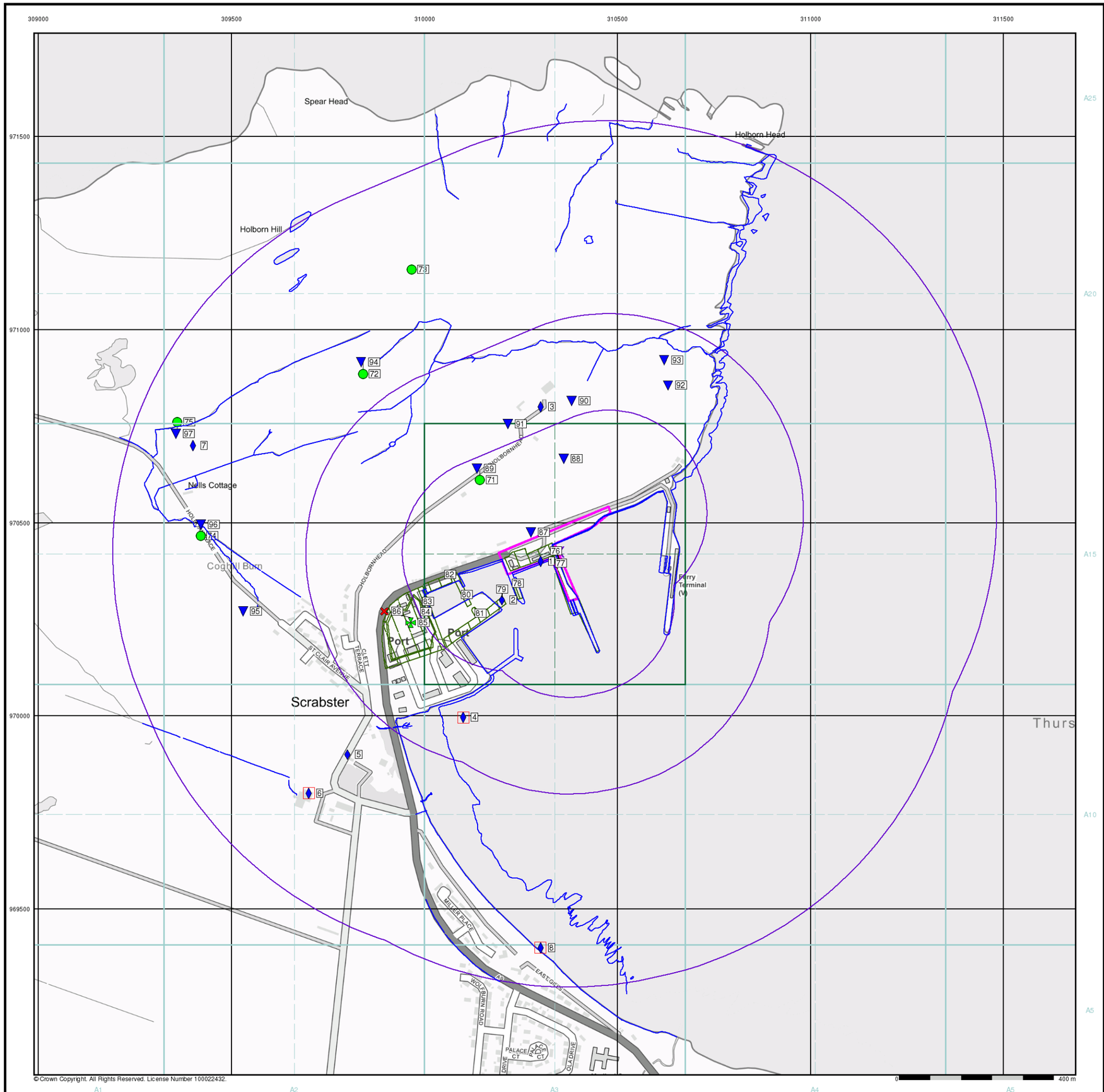

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RPS

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
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Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
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- Local Authority Recorded Landfill Site (Location)
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- Potentially Infilled Land (Non-water)
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- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

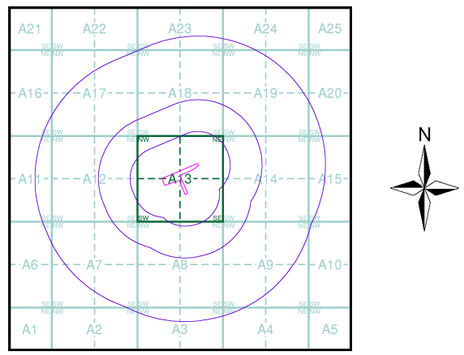
Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Geological

- BGS Recorded Mineral Site

Site Sensitivity Map - Slice A



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Order Number:	191090468_1_1
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National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	1000

Site Details

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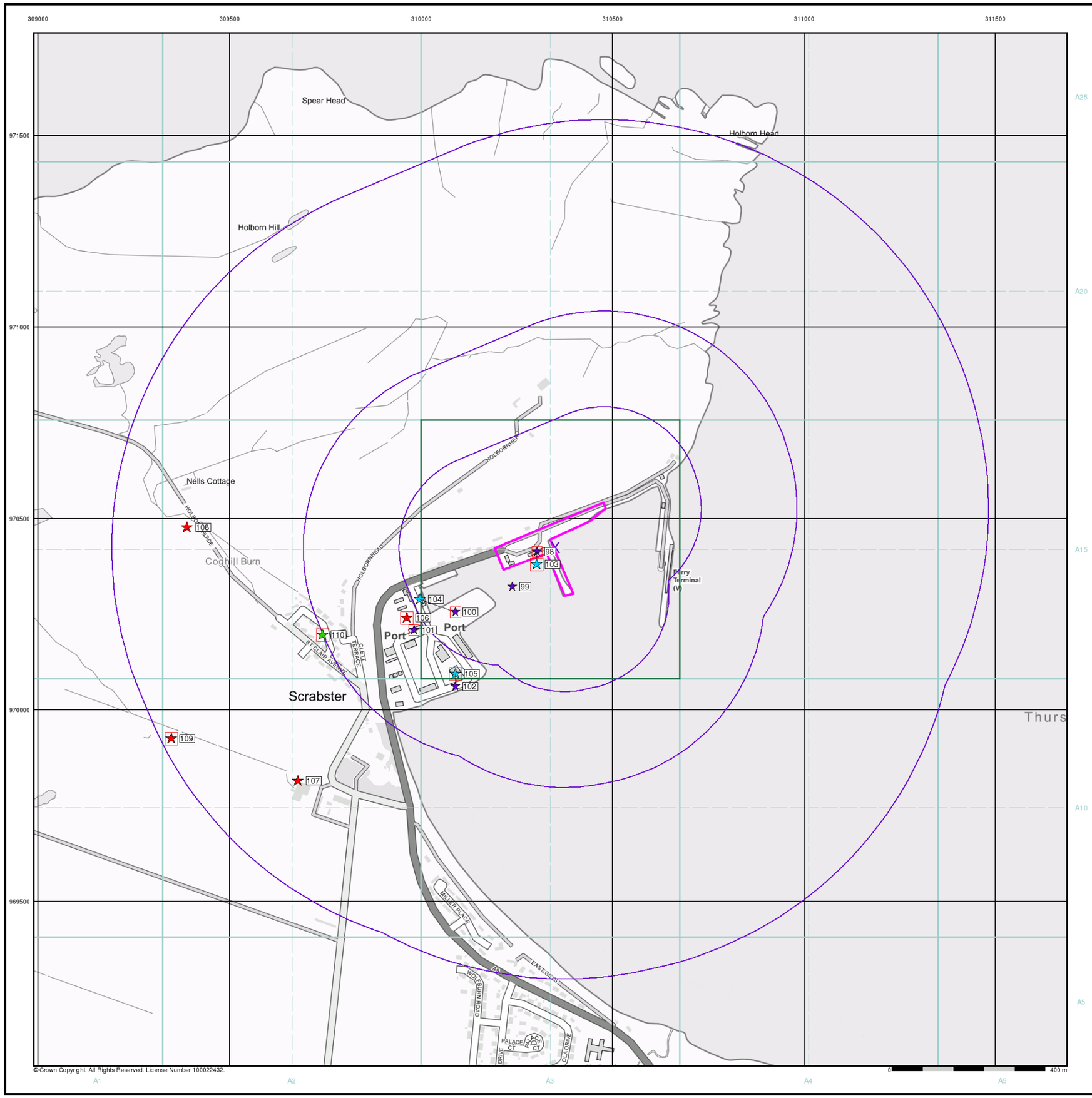

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RPS

Industrial Land Use Map

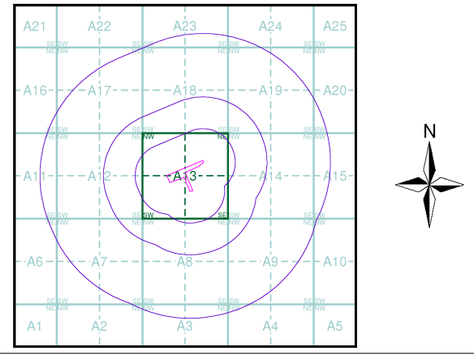
General

Specified Site
Specified Buffer(s)
Bearing Reference Point
Slice
Map ID

Industrial Land Use

Contemporary Trade Directory Entry
Fuel Station Entry
Gas Pipeline
Points of Interest - Commercial Services
Points of Interest - Education and Health
Points of Interest - Manufacturing and Production
Points of Interest - Public Infrastructure
Points of Interest - Recreational and Environmental
Underground Electrical Cables

Industrial Land Use Map - Slice A



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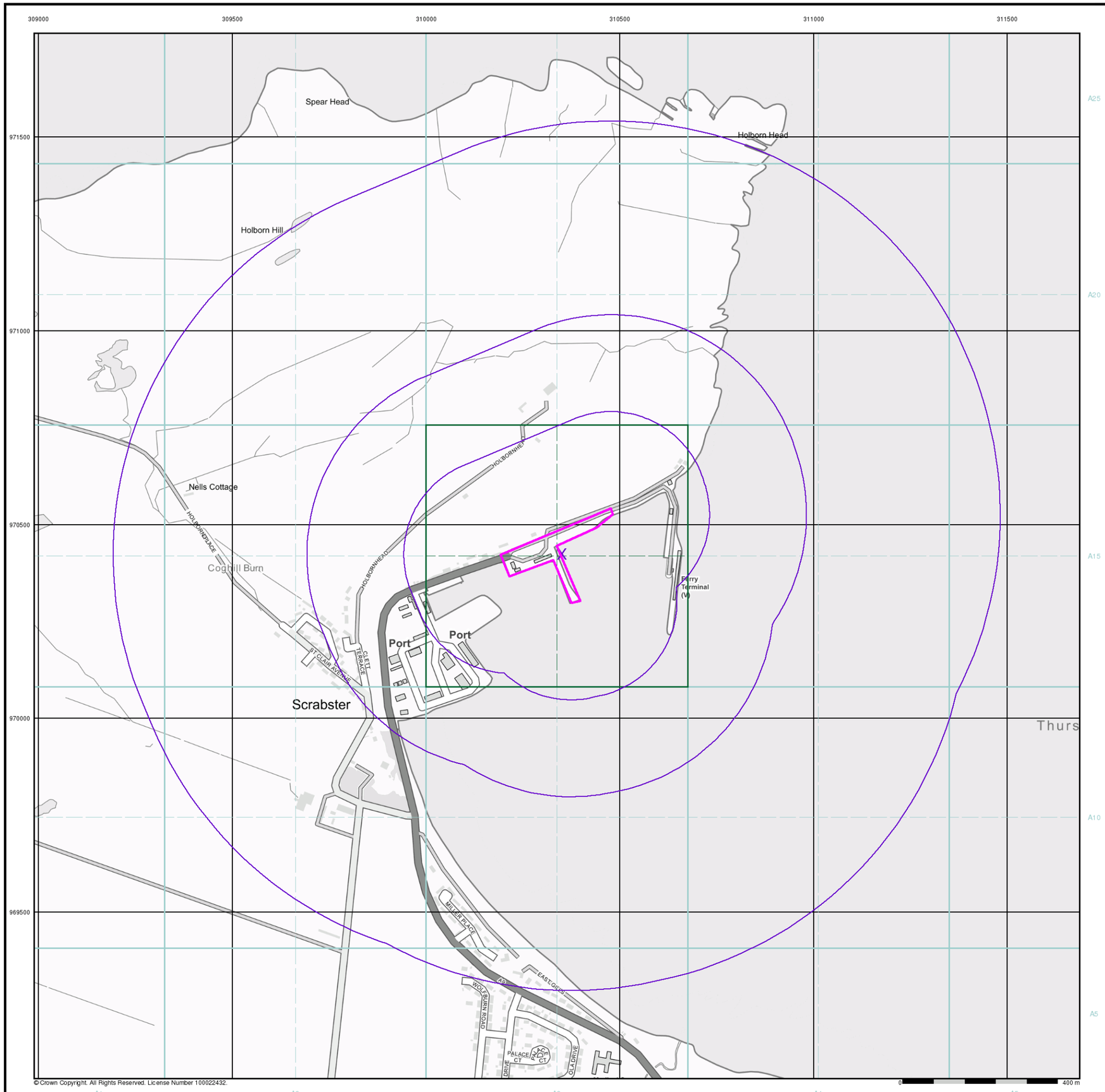


RPS

General

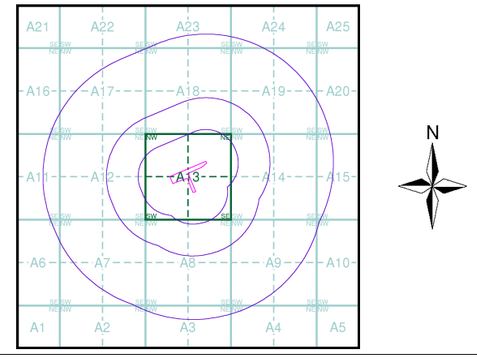
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Agency and Hydrological (Flood)

- 0 - 1m estimated 100yr flood depth
- 1 - 2m estimated 100yr flood depth
- Over 2m estimated 100yr flood depth

The flooded areas have been generated using a generalised technique and should not, by themselves, be used to infer that specific areas are or are not at risk of inundation. Flood risk at any specific location may be influenced by local factors - not least flood defence - that have not been taken into account.

Flood Map - Slice A



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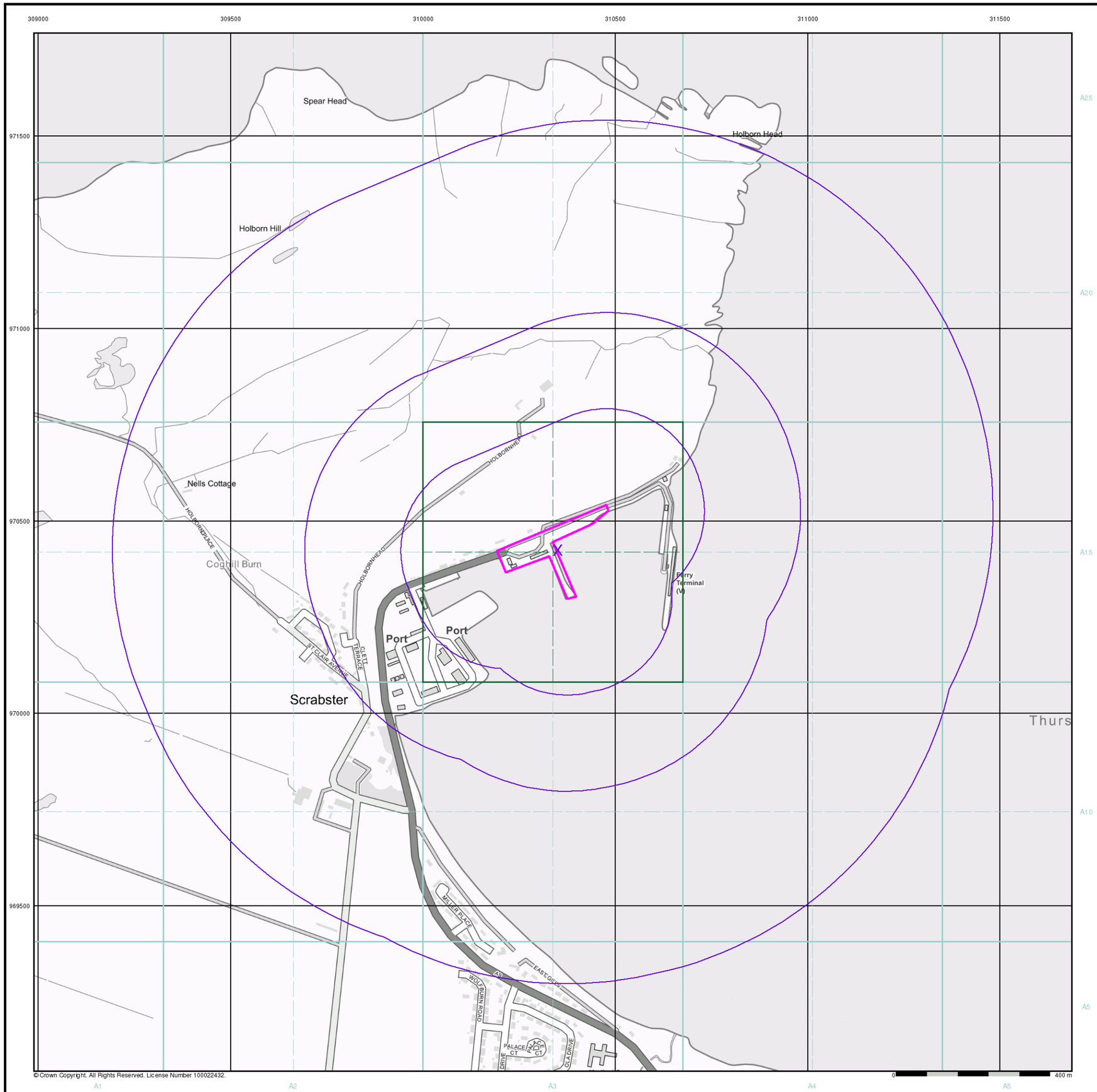


RPS

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

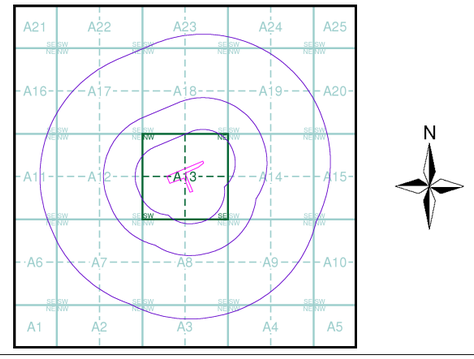
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



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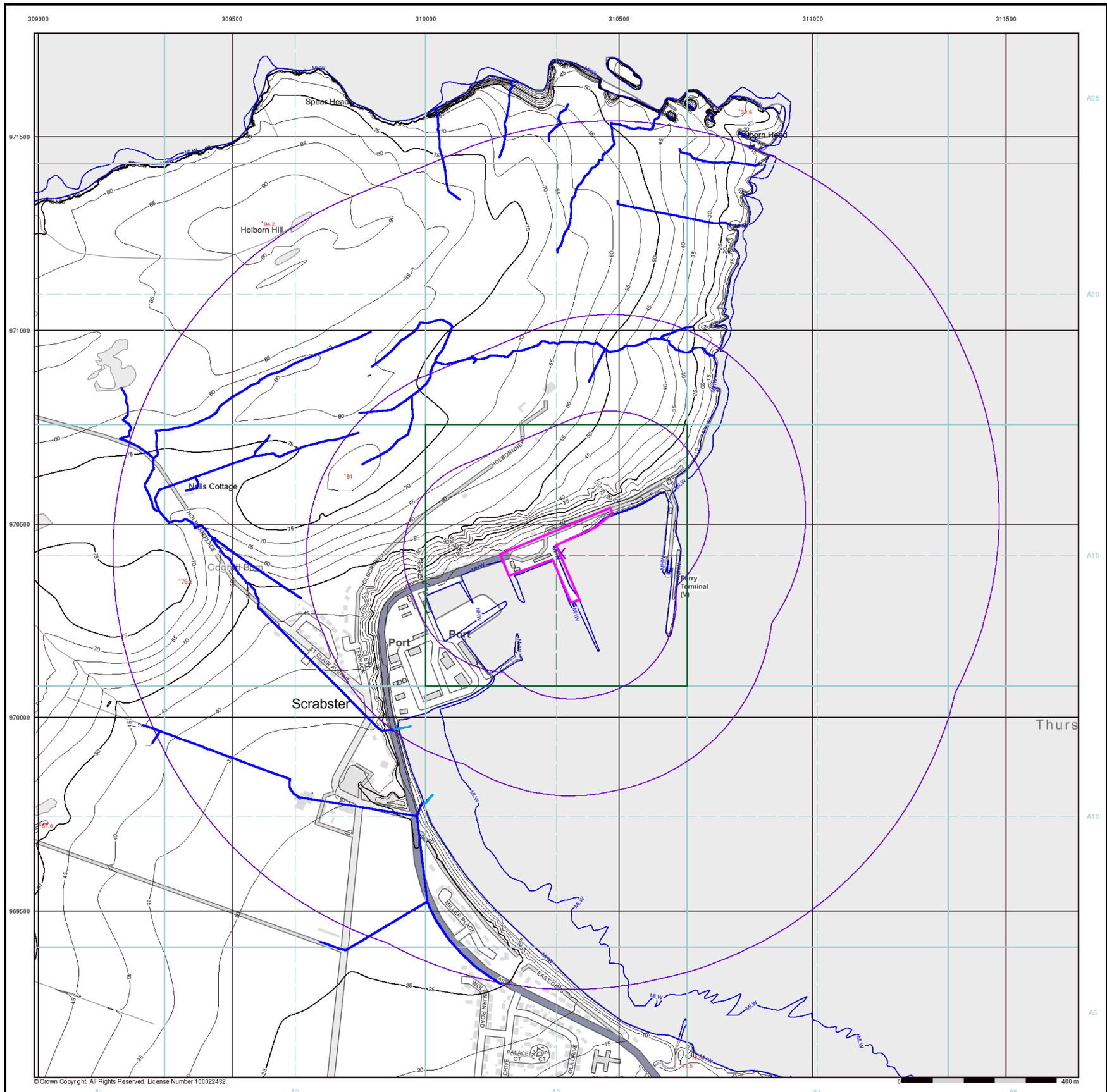

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RPS

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

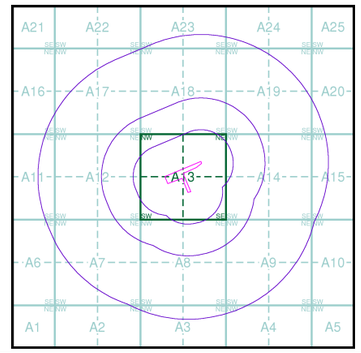
OS Water Network Data

- Canal
- Reservoir
- Foreshore
- Marsh
- Tidal River
- Inland River
- Drain
- Other
- Lake
- Transfer
- Lock Or Flight Of Locks
- Sea

Contours (height in meters)

- Standard Contour
- Master Contour
- Spot Height 167.3
- MLW Mean Low Water Springs
- MHW Mean High Water Springs

OS Water Network Map - Slice A



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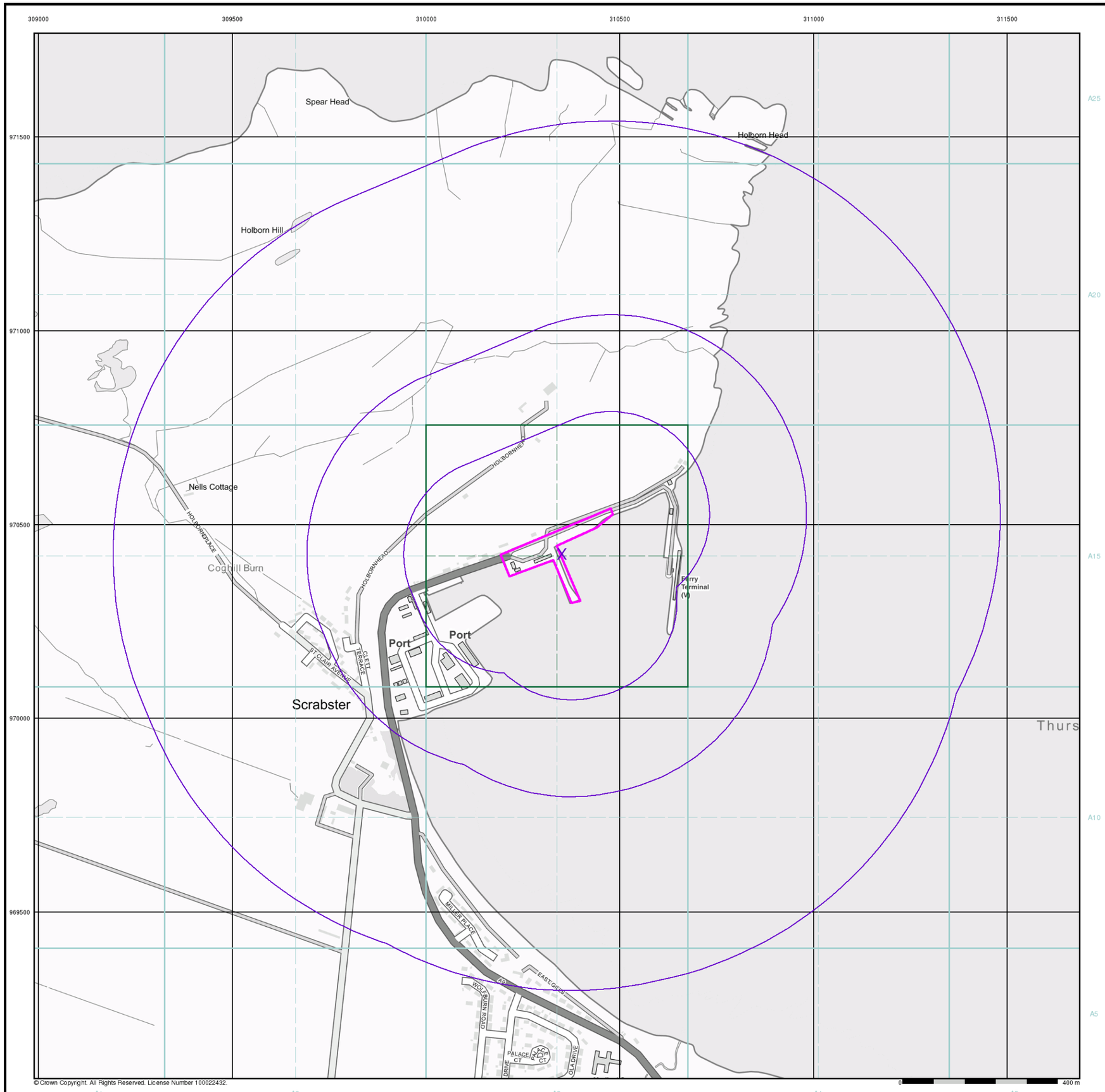


RPS

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Risk of Flooding from Surface Water

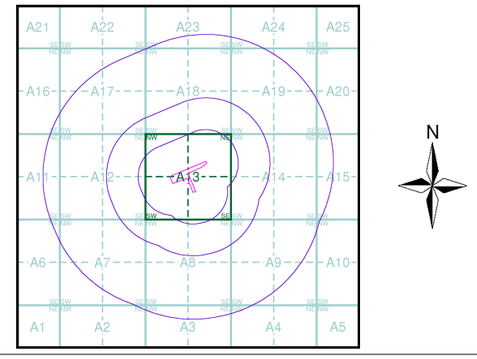
- High - 30 Year Return
- Medium - 100 Year Return
- Low - 1000 Year Return

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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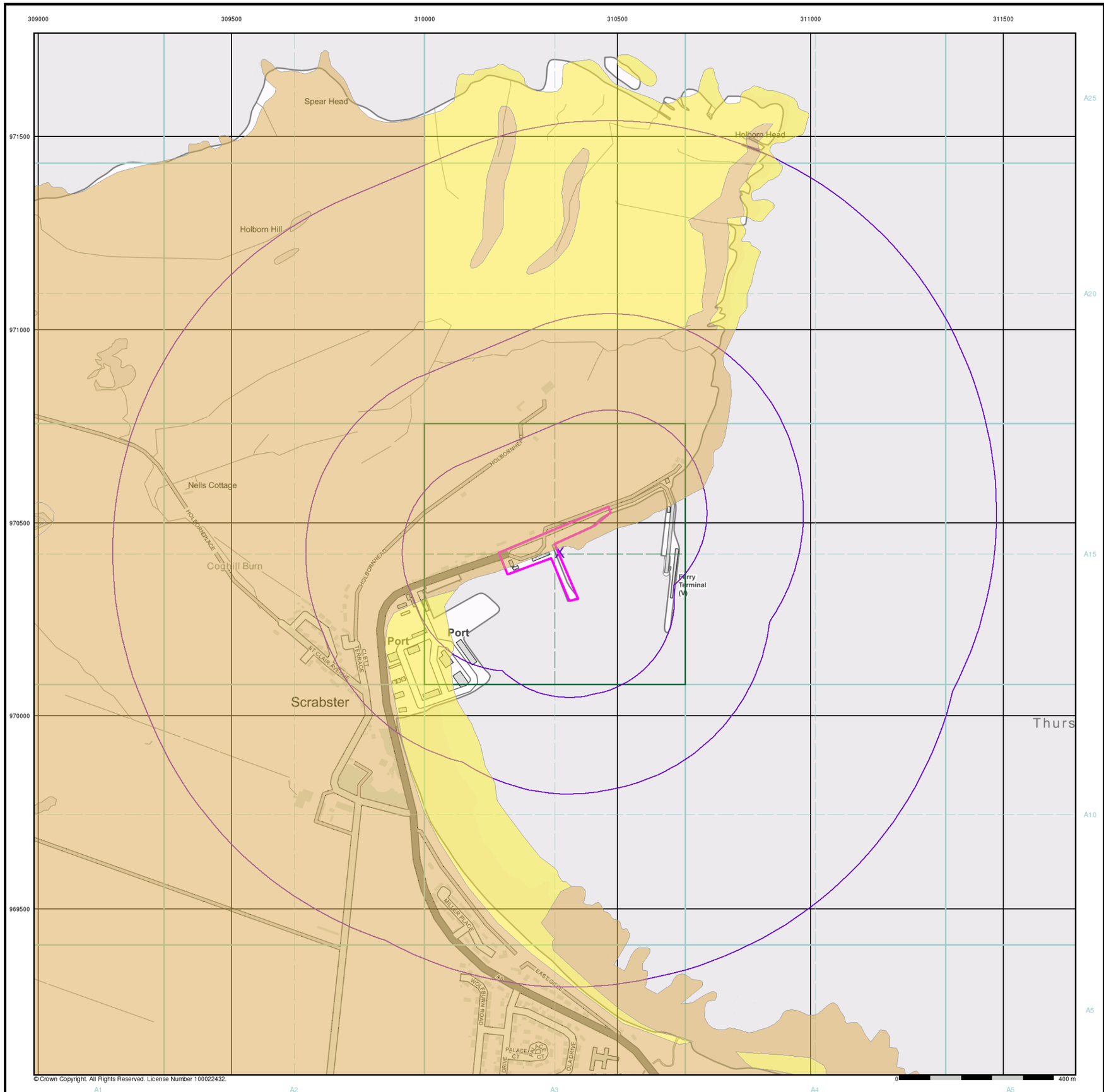

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RPS

General

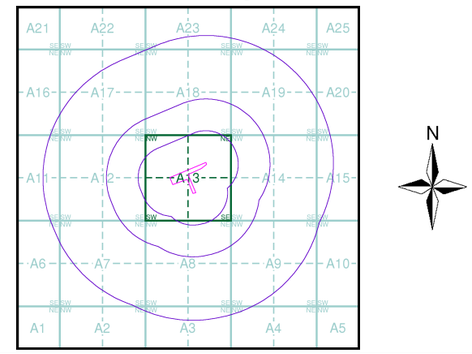
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Arsenic

Arsenic Concentrations mg/kg

- < 15
- 15 - 25
- 25 - 35
- 35 - 45
- 45 - 60
- 60 - 120
- > 120

Estimated Soil Chemistry Arsenic - Slice A



Order Details

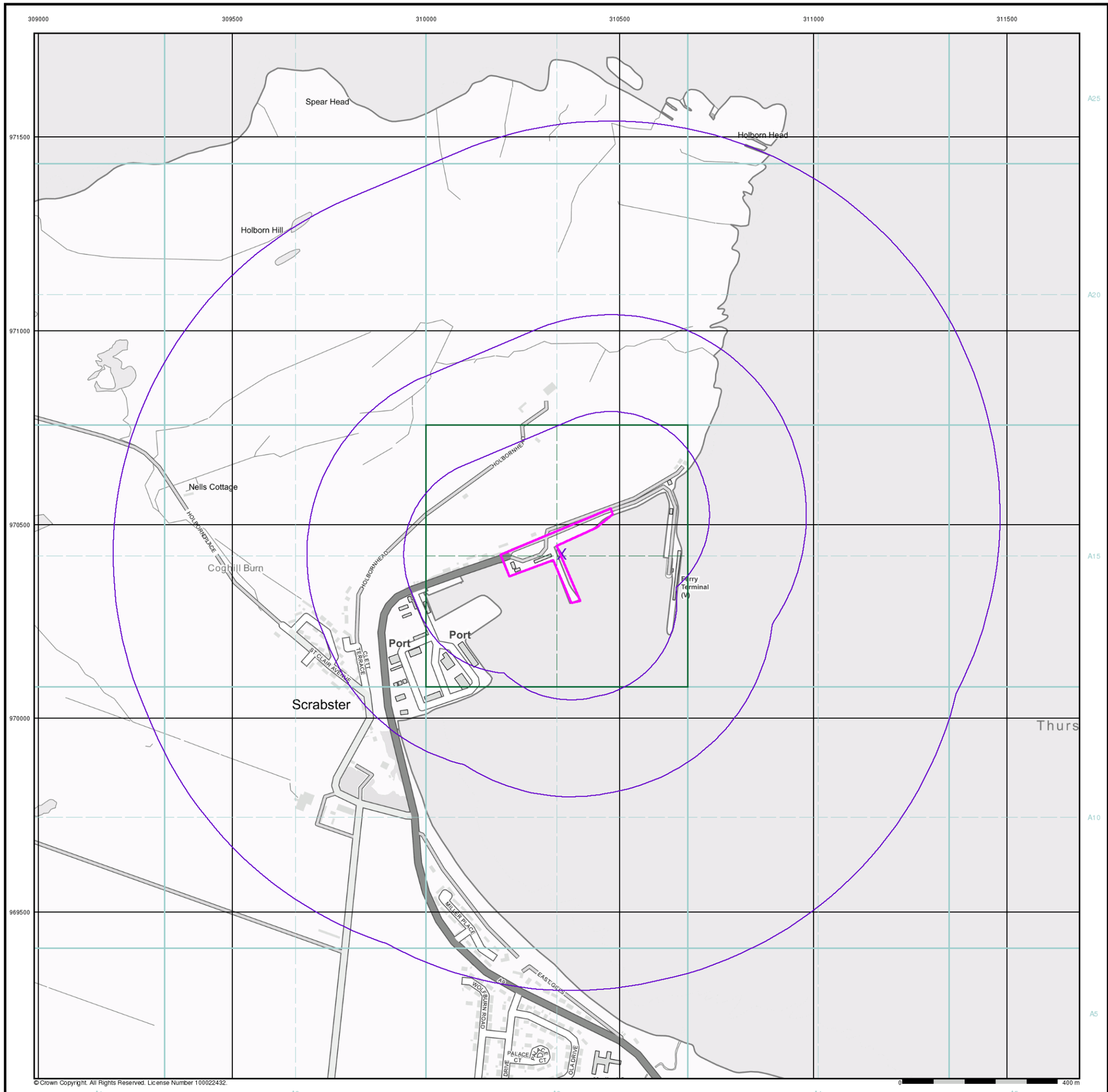
Order Details:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	1000

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



RPS

General

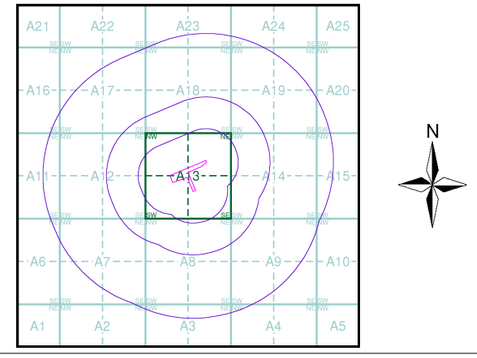
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Cadmium

Cadmium Concentrations mg/kg

- < 1.8
- 1.8 - 2.2
- 2.2 - 3.0
- > 3.0

Estimated Soil Chemistry Cadmium - Slice A



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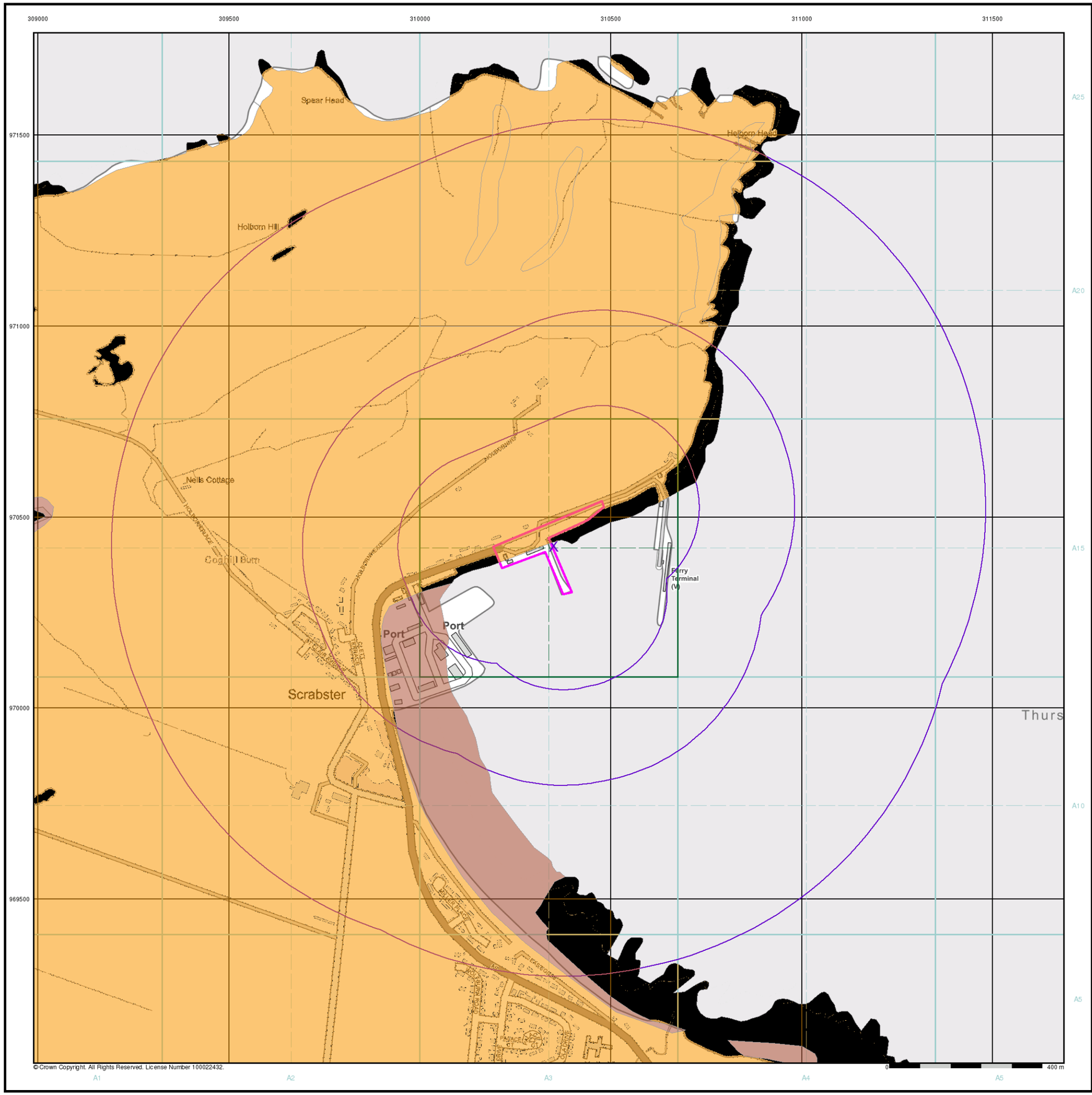

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RPS

General

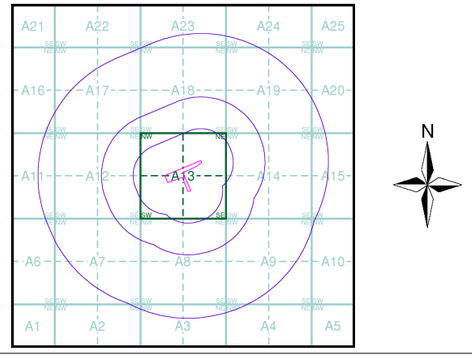
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Chromium

Chromium Concentrations mg/kg

- < 20
- 20 - 40
- 40 - 60
- 60 - 90
- 90 - 120
- 120 - 180
- > 180

Estimated Soil Chemistry Chromium - Slice A



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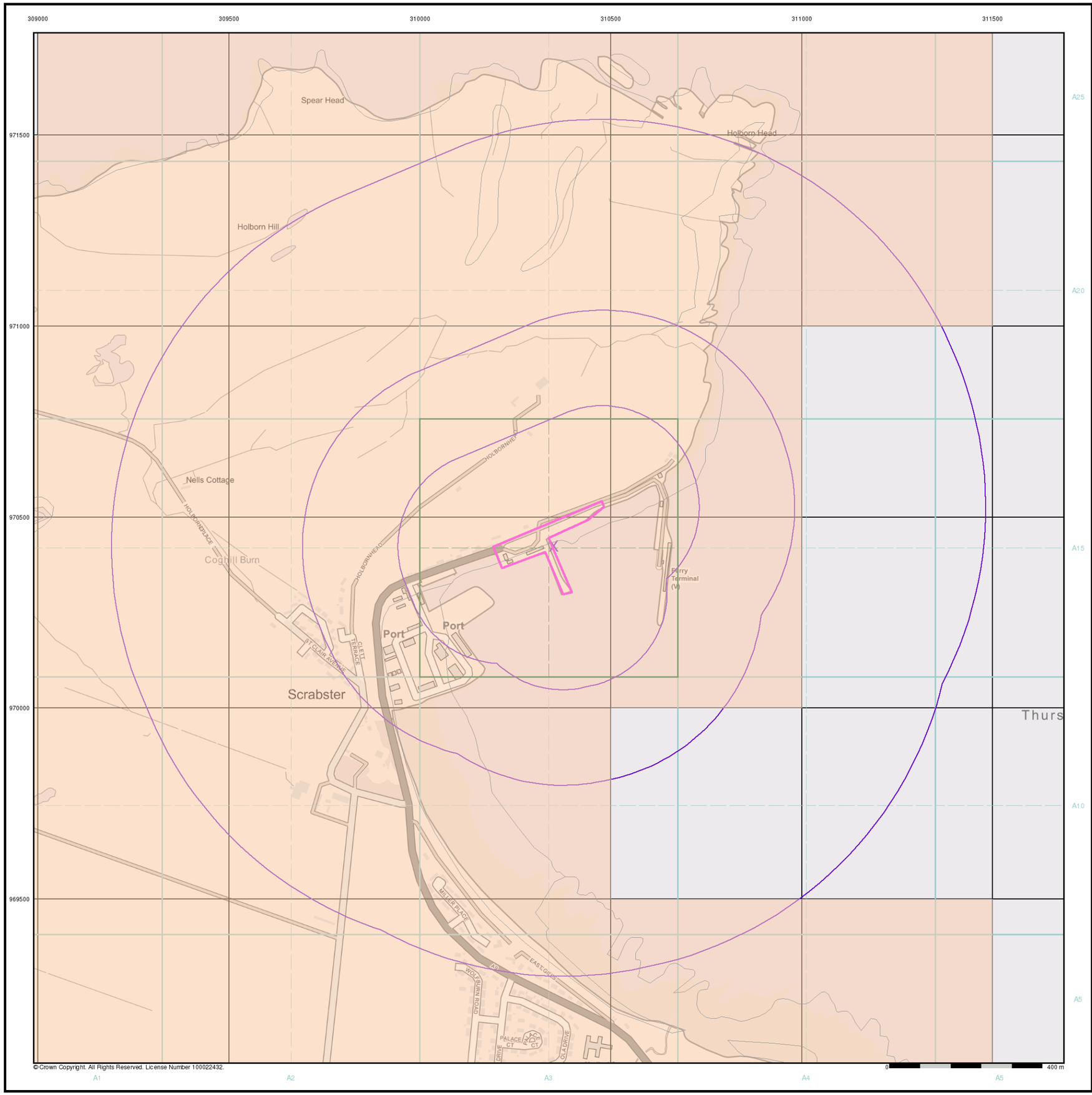


RPS

General

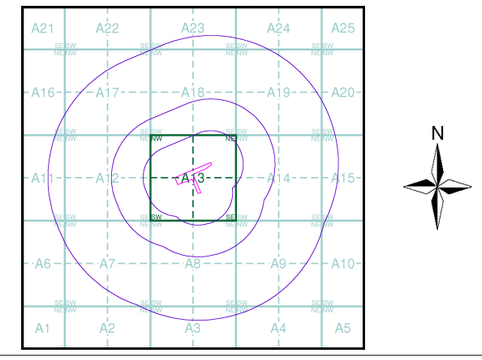
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Lead

Lead Concentrations mg/kg

- <100 mg/kg
- 100 - 200
- 200 - 300
- 300 - 600
- 600 - 1200
- >1200

Estimated Soil Chemistry Lead - Slice A



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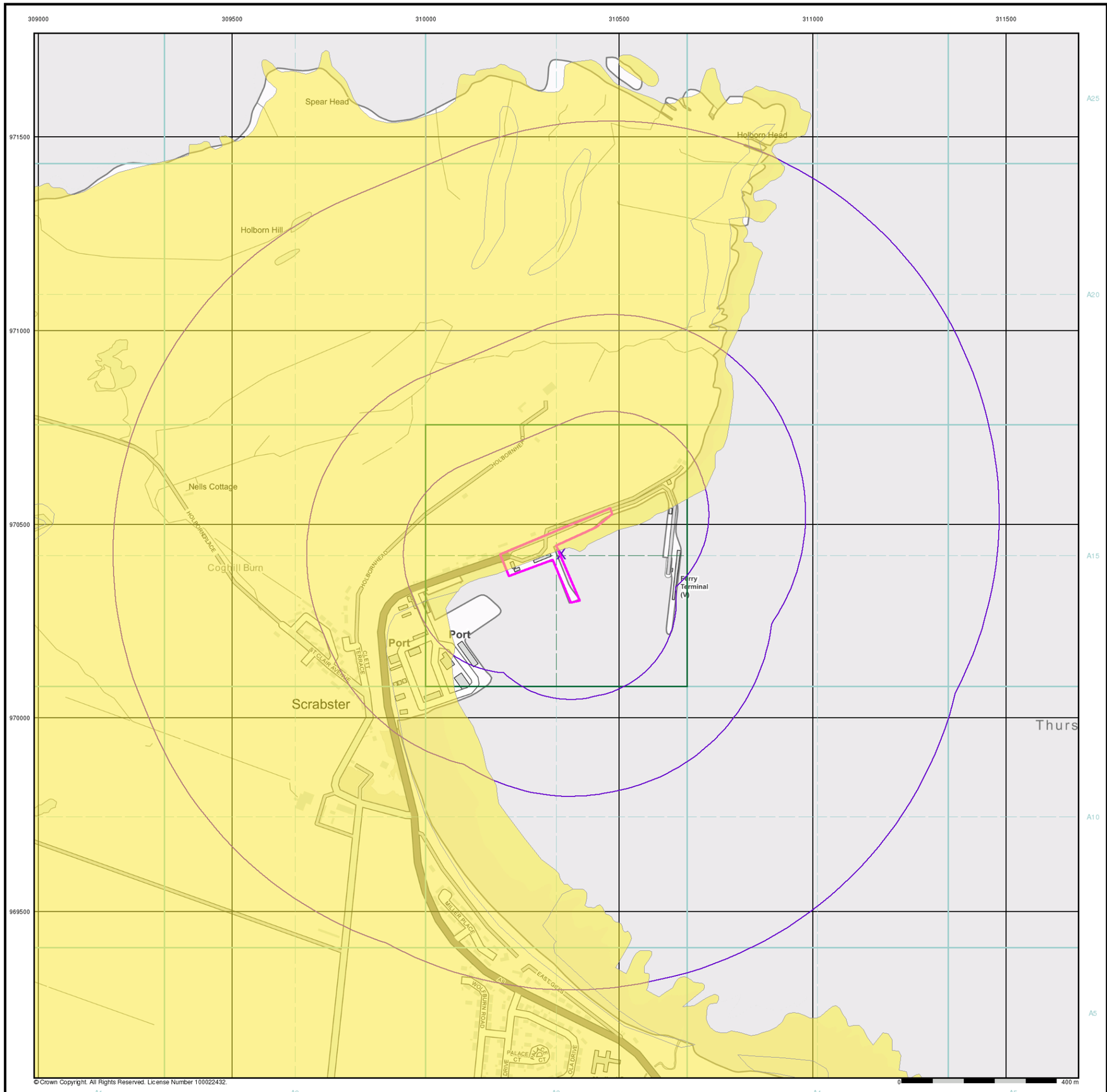

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RPS

General

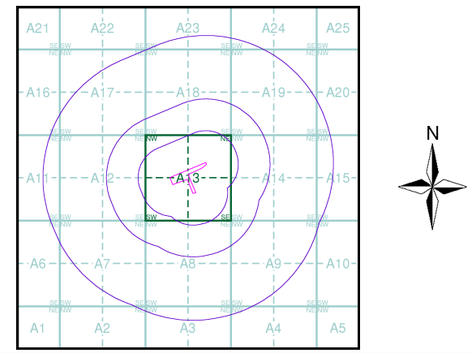
Specified Site | Specified Buffer(s) | X Bearing Reference Point

Estimated Soil Chemistry Nickel

Nickel Concentrations mg/kg

- < 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 80
- 80 - 100
- > 100

Estimated Soil Chemistry Nickel - Slice A



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Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Envirocheck® Report:

Historical Data Report Datasheet

Order Details:

Order Number:
191090468_1_1

Customer Reference:
IBR1139

National Grid Reference:
310350, 970430

Slice:
A

Site Area (Ha):
1.67

Search Buffer (m):
1000

Site Details:

The Peerie Cafe, Scrabster
THURSO
KW14 7UJ

Client Details:

Mr J McGrath
RPS Consultants
Elmwood House
74 Boucher Road
Belfast
Antrim
BT12 6RZ

Contents

Report Section	Page Number
Summary	-
Historical Building Plans Information	-
Historical Land Use Information	1
Historical Tanks and Energy Facilities	-
Historical Map List	3
Useful Contacts and Further Information	4

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Report Version v53.0

RPS

Summary

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Historical Building Plans Information					
Areas Cleared Due To Enemy Action					
Above Ground Fuel Tanks (100m)				n/a	n/a
Asbestos (100m)				n/a	n/a
Benzene/Benzole/Naphtha, Naphthalene/Kerosene (100m)				n/a	n/a
Electricity Generation (100m)				n/a	n/a
Electricity Sub-Stations (100m)				n/a	n/a
Gas Industry (100m)				n/a	n/a
Gas Storage (100m)				n/a	n/a
Gas Use (100m)				n/a	n/a
Oil Industry (100m)				n/a	n/a
Oil Storage (100m)				n/a	n/a
Oil Use (100m)				n/a	n/a
Paint based Oils (100m)				n/a	n/a
Paraffin (100m)				n/a	n/a
Petrol and Diesel Industry (100m)				n/a	n/a
Petrol and Diesel Storage (100m)				n/a	n/a
Petrol and Diesel Use (100m)				n/a	n/a
Potential Fuel Gas (100m)				n/a	n/a
Potential Fuel Oil (100m)				n/a	n/a
Potential Fuel Use (100m)				n/a	n/a
Potential Petrol and Diesel (100m)				n/a	n/a
Potential Tanks (100m)				n/a	n/a
Potentially Fuel-related Tanks (100m)				n/a	n/a
Underground Fuel Tanks (100m)				n/a	n/a
Historical Land Use Information					
Former Marshes					
Historical Flood Liabilities					
Potentially Contaminative Industrial Uses (Past Land Use)	pg 1	2	6	4	5
Potentially Infilled Land (Non-Water)	pg 1		1		4
Potentially Infilled Land (Water)	pg 2	2	7		

Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m
Historical Tanks and Energy Facilities					
Electrical Sub Station Facilities (100m)				n/a	n/a
Electricity Industry Facilities (100m)				n/a	n/a
Gas Industry Facilities (100m)				n/a	n/a
Gas Monitoring Facilities (100m)				n/a	n/a
Miscellaneous Power Facilities (100m)				n/a	n/a
Oil Industry Facilities (100m)				n/a	n/a
Petroleum Storage Facilities (100m)				n/a	n/a
Potential Tanks (100m)				n/a	n/a
Tanks (100m)				n/a	n/a

Historical Land Use Information

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Transport support & cargo handling Date of Mapping: 1877 - 1960	A13NW (NW)	0	1	310322 970442
2	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907	A13SW (W)	0	1	310199 970418
3	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907 - 1960	A13NE (N)	10	1	310339 970493
4	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Factory or works - use not specified Date of Mapping: 1960	A13NW (W)	22	1	310172 970427
5	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907	A13NE (N)	157	1	310362 970663
6	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907	A13NW (NW)	216	1	310143 970634
7	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Transport support & cargo handling Date of Mapping: 1907 - 1960	A13SW (SW)	239	1	310035 970210
8	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: Oil, petroleum & gas refining & storage Date of Mapping: 1976	A12SE (SW)	240	1	309994 970276
9	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907	A18SE (N)	291	1	310381 970815
10	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907	A18SW (N)	303	1	310215 970759
11	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907	A18SE (NE)	349	1	310629 970855
12	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907	A18SE (NE)	407	1	310627 970919
13	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907	A17SE (NW)	606	1	309840 970914
14	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907	A12SW (W)	682	1	309528 970270
15	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907	A17NE (NW)	766	1	309966 971157
16	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907	A12NW (W)	776	1	309420 970491
17	**Potentially Contaminative Industrial Uses (Past Land Use)** Use: General quarrying Date of Mapping: 1907	A12NW (W)	890	1	309359 970731
18	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A13NW (NW)	216	1	310143 970634
19	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A17SE (NW)	606	1	309840 970914
20	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A17NE (NW)	766	1	309966 971157
21	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A12NW (W)	776	1	309420 970491

Historical Land Use Information

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
22	**Potentially Infilled Land (Non-Water)** Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1976	A12NW (W)	890	1	309359 970731
23	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A13NE (W)	0	1	310341 970421
24	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A13SE (SW)	0	1	310345 970417
25	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1877	A13SW (SW)	31	1	310242 970344
26	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1907	A13SW (SW)	61	1	310202 970308
27	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A13SW (SW)	118	1	310110 970314
28	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A13SW (SW)	122	1	310145 970266
29	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1960	A13SW (W)	137	1	310067 970366
30	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1907	A13SW (W)	216	1	310010 970297
31	**Potentially Infilled Land (Water)** Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1877	A13SW (SW)	233	1	310004 970270

Historical Map List

No Historical Building Plans information available.

The following mapping has been analysed for Historical Land Use Information:

1:10,560	Mapsheet	Published Date
Caithness-Shire	005_00	1877
Caithness-Shire	005_00	1907
Ordnance Survey Plan	ND06NE	1959
Ordnance Survey Plan	ND07SE	1960
Ordnance Survey Plan	ND16NW	1960
Ordnance Survey Plan	ND17SW	1960
1:10,000	**Mapsheet**	**Published Date**
Ordnance Survey Plan	ND06NE	1969
Ordnance Survey Plan	ND07SE	1976
Ordnance Survey Plan	ND17SW	1976
Ordnance Survey Plan	ND16NW	1985

The following mapping has been analysed for Historical Tanks and Energy Facilities:

1:2,500	Mapsheet	Published Date
Ordnance Survey Plan	ND0970	1967
Ordnance Survey Plan	ND1070	1967

Useful Contacts and Further Information

Contact	Name and Address	Contact Details
1	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9966 Fax: 0844 844 9951 Email: helpdesk@landmark.co.uk Website: www.landmark.co.uk

Historical Building Plans Information

This data set contains potentially contaminative features such as asbestos, petrol, oil and tanks captured from Historical Building Plans. The Historical Building Plans were produced by the London-based firm Charles E. Goad Ltd. as fire insurance plans, dating back to 1885. The firm ceased production of fire insurance plans in 1970. Most of the important towns and cities of the British Isles are covered. Historical Building Plans are usually at the scales of 1:480 (1 inch to 40 feet) for the British Isles. They were updated every 5-6 years by means of revision sheets designed to be pasted on to the original plans.

It should be noted that Historical Building Plans are only available for certain major towns and cities and in some cases there may only be partial coverage of the search area. It cannot therefore be assumed that the absence of responses under the Historical Building Plans section of this report indicates that no hazards exist. Please check the Historical Building Plans Map List table in the Historical Map List section of this report to establish if Historical Building Plans are available for this search area.

Historical Land Use Information

Landmark's Historical Land Use Data is the result of combined analysis of historical map data captured at 1:10,560 and 1:10,000. A unique comprehensive database of Historic Land Use from the 1840's to 1996 it includes 67 different types of potentially contaminated past industrial land use. This entailed analysing over 60,000 maps and is drawn from at least four, and up to six historical map editions. In addition a seventh layer was also created, known as the land use layer, containing areas of infilled land which are plotted via comparison between two or more map editions.

Historical Tanks and Energy Facilities

In addition to HLUD, additional analysis uncovered some of the most dangerous sources of contamination (past and present tanks, petrol storage, oil, gas, electricity, miscellaneous facilities). This data set covers over 390,000 Historical Tanks and Energy facilities in Great Britain and was captured from post war 1:2500 and 1:1250 Ordnance Survey historical mapping covering a period from 1943 to 1996.

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

Gravel Pit
Sand Pit
Other Pits
Quarry
Shingle
Orchard
Osiers
Reeds
Marsh
Mixed Wood
Deciduous
Brushwood
Fir
Furze
Rough Pasture
Arrow denotes flow of water
Trigonometrical Station
Site of Antiquities
Bench Mark
Pump, Guide Post, Signal Post
Well, Spring, Boundary Post
285 Surface Level
Sketched Contour
Instrumental Contour
Main Roads
Fenced
Un-Fenced
Minor Roads
Fenced
Un-Fenced
Sunken Road
Raised Road
Road over Railway
Railway over River
Railway over Road
Level Crossing
Road over River or Canal
Road over Stream
Road over Stream
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
Co. Boro. Bdy.
County Borough Boundary (England)
Co. Burgh Bdy.
County Burgh Boundary (Scotland)
R.D. Bdy.
Rural District Boundary
Civil Parish Boundary

Ordnance Survey Plan 1:10,000

Chalk Pit, Clay Pit or Quarry
Gravel Pit
Sand Pit
Disused Pit or Quarry
Refuse or Slag Heap
Lake, Loch or Pond
Dunes
Boulders
Coniferous Trees
Non-Coniferous Trees
Orchard
Scrub
Coppice
Bracken
Heath
Rough Grassland
Marsh
Reeds
Saltings
Building
Direction of Flow of Water
Shingle
Sand
Glasshouse
Pylon
Pylon
Electricity Transmission Line
Sloping Masonry
Cutting
Embankment
Standard Gauge Multiple Track
Road Under
Road Over
Level Crossing
Foot Bridge
Standard Gauge Single Track
Siding, Tramway or Mineral Line
Narrow Gauge
Geographical County
Administrative County, County Borough or County of City
Municipal Borough, Urban or Rural District, Burgh or District Council
Borough, Burgh or County Constituency
Shown only when not coincident with other boundaries
Civil Parish
Shown alternately when coincidence of boundaries occurs

BP, BS	Boundary Post or Stone	Pol Sta	Police Station
Ch	Church	PO	Post Office
CH	Club House	PC	Public Convenience
F E Sta	Fire Engine Station	PH	Public House
FB	Foot Bridge	SB	Signal Box
Fn	Fountain	Spr	Spring
GP	Guide Post	TCB	Telephone Call Box
MP	Mile Post	TCP	Telephone Call Post
MS	Mile Stone	W	Well

1:10,000 Raster Mapping

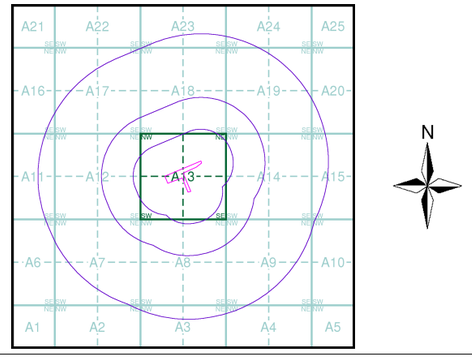
Gravel Pit
Refuse tip or slag heap
Rock
Rock (scattered)
Boulders
Boulders (scattered)
Shingle
Mud
Mud
Sand
Sand
Sand Pit
Slopes
Top of cliff
General detail
Underground detail
Overhead detail
Narrow gauge railway
Multi-track railway
Single track railway
County boundary (England only)
Civil, parish or community boundary
District, Unitary, Metropolitan, London Borough boundary
Constituency boundary
Area of wooded vegetation
Non-coniferous trees
Non-coniferous trees (scattered)
Coniferous trees
Coniferous trees (scattered)
Positioned tree
Orchard
Coppice or Osiers
Rough Grassland
Heath
Scrub
Marsh, Salt Marsh or Reeds
Water feature
Flow arrows
MHW(S) Mean high water (springs)
MLW(S) Mean low water (springs)
Telephone line (where shown)
Electricity transmission line (with poles)
BM 123.45 m Bench mark (where shown)
Triangulation station
Point feature (e.g. Guide Post or Mile Stone)
Pylon, flare stack or lighting tower
Site of (antiquity)
Glasshouse
General Building
Important Building

RPS

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Caithness-Shire	1:10,560	1877	2
Caithness-Shire	1:10,560	1907	3
Caithness-Shire	1:10,560	1938	4
Ordnance Survey Plan	1:10,000	1959	5
Ordnance Survey Plan	1:10,000	1960 - 1969	6
Ordnance Survey Plan	1:10,000	1971 - 1976	7
Ordnance Survey Plan	1:10,000	1985	8
10K Raster Mapping	1:10,000	2001	9
10K Raster Mapping	1:10,000	2006	10
VectorMap Local	1:10,000	2018	11

Historical Map - Slice A



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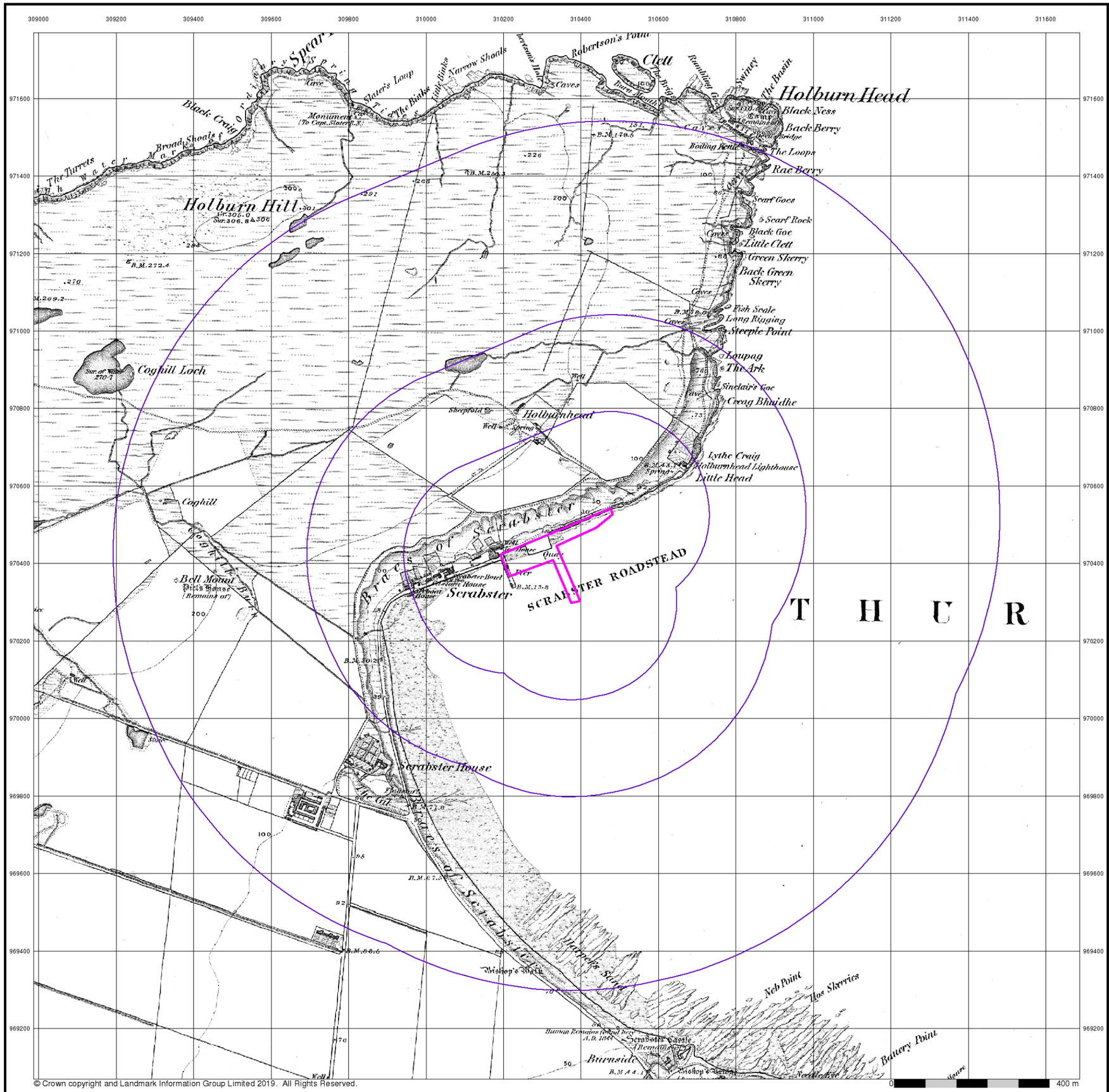


RPS

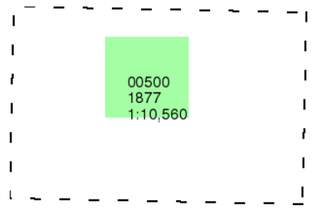
Caithness-Shire

Published 1877

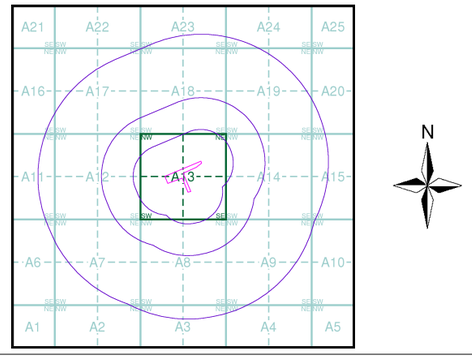
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940`s, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



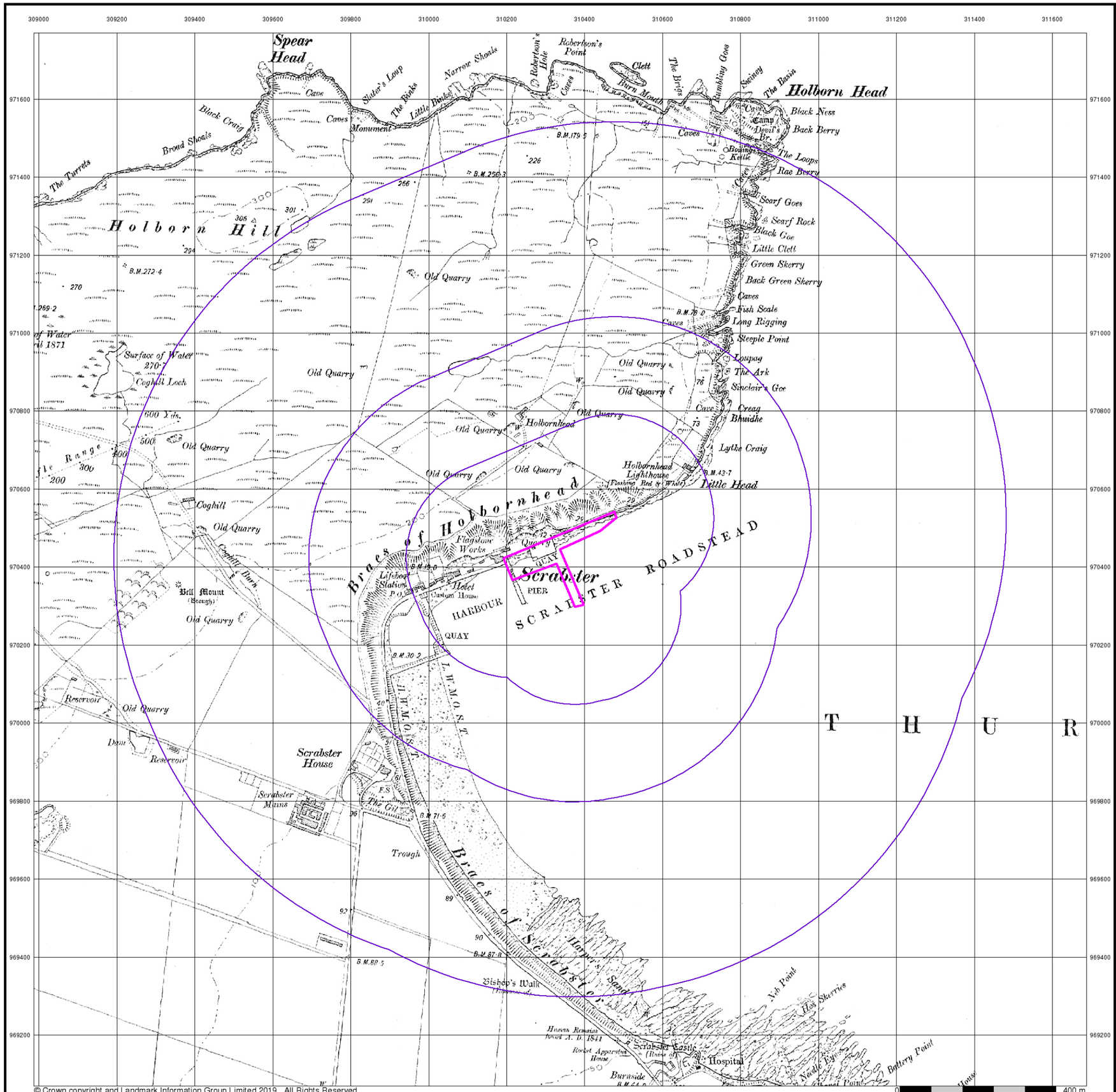
Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	1000

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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RPS

Caithness-Shire

Published 1907

Source map scale - 1:10,560

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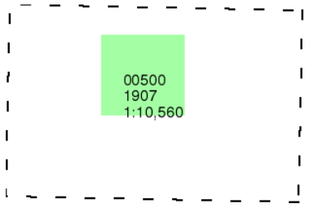
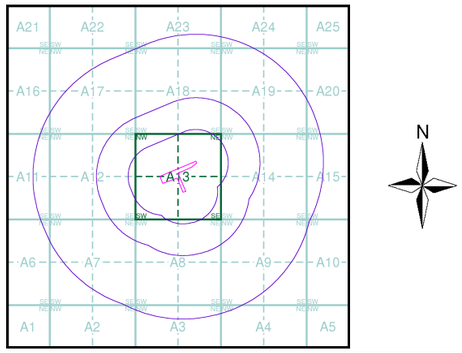
Map Name(s) and Date(s)



Historical Map - Slice A



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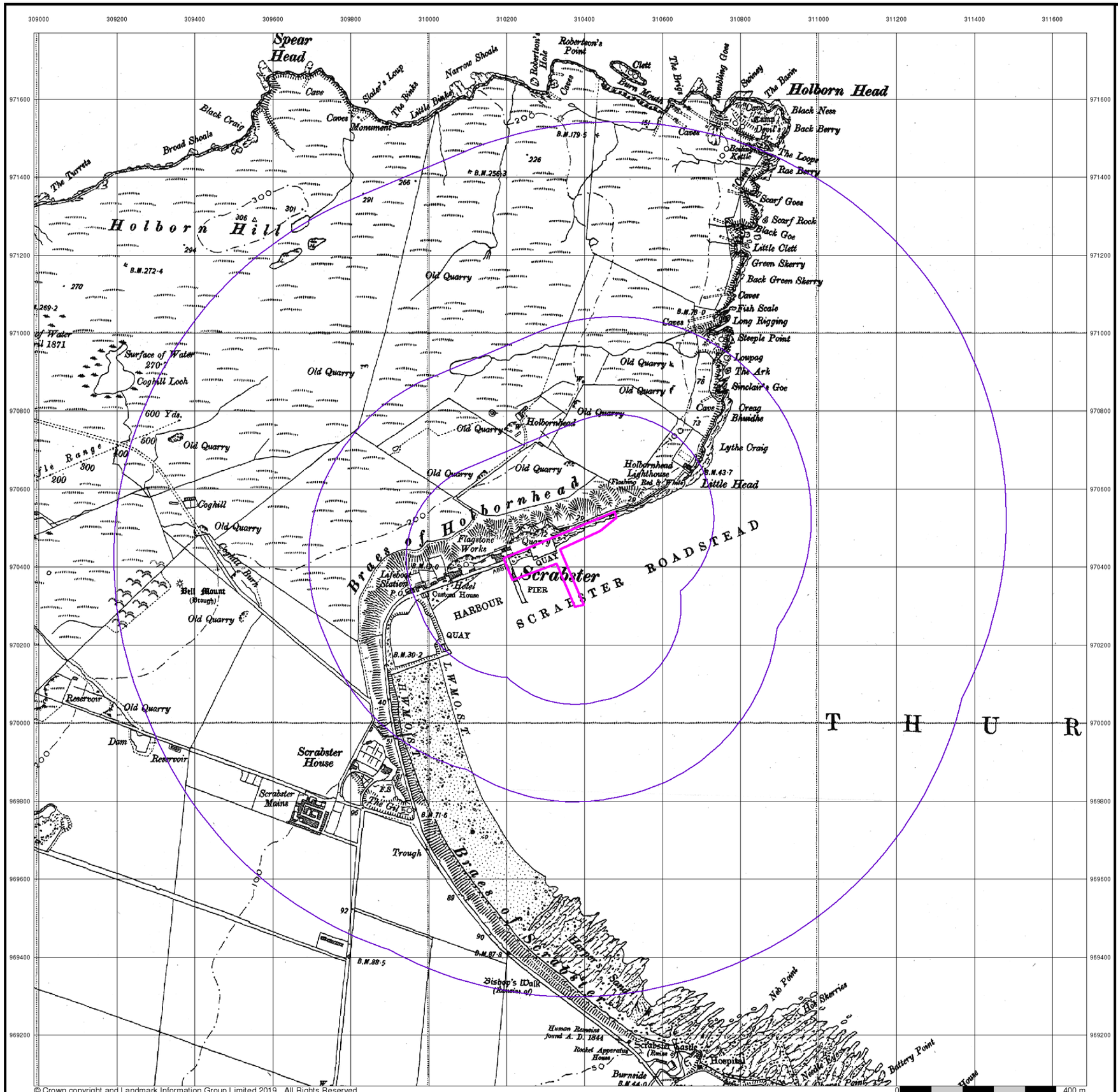

RPS

Caithness-Shire

Published 1938

Source map scale - 1:10,560

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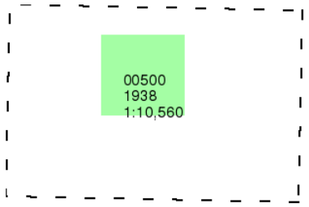
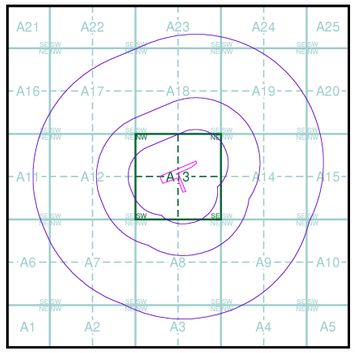
Map Name(s) and Date(s)



Historical Map - Slice A



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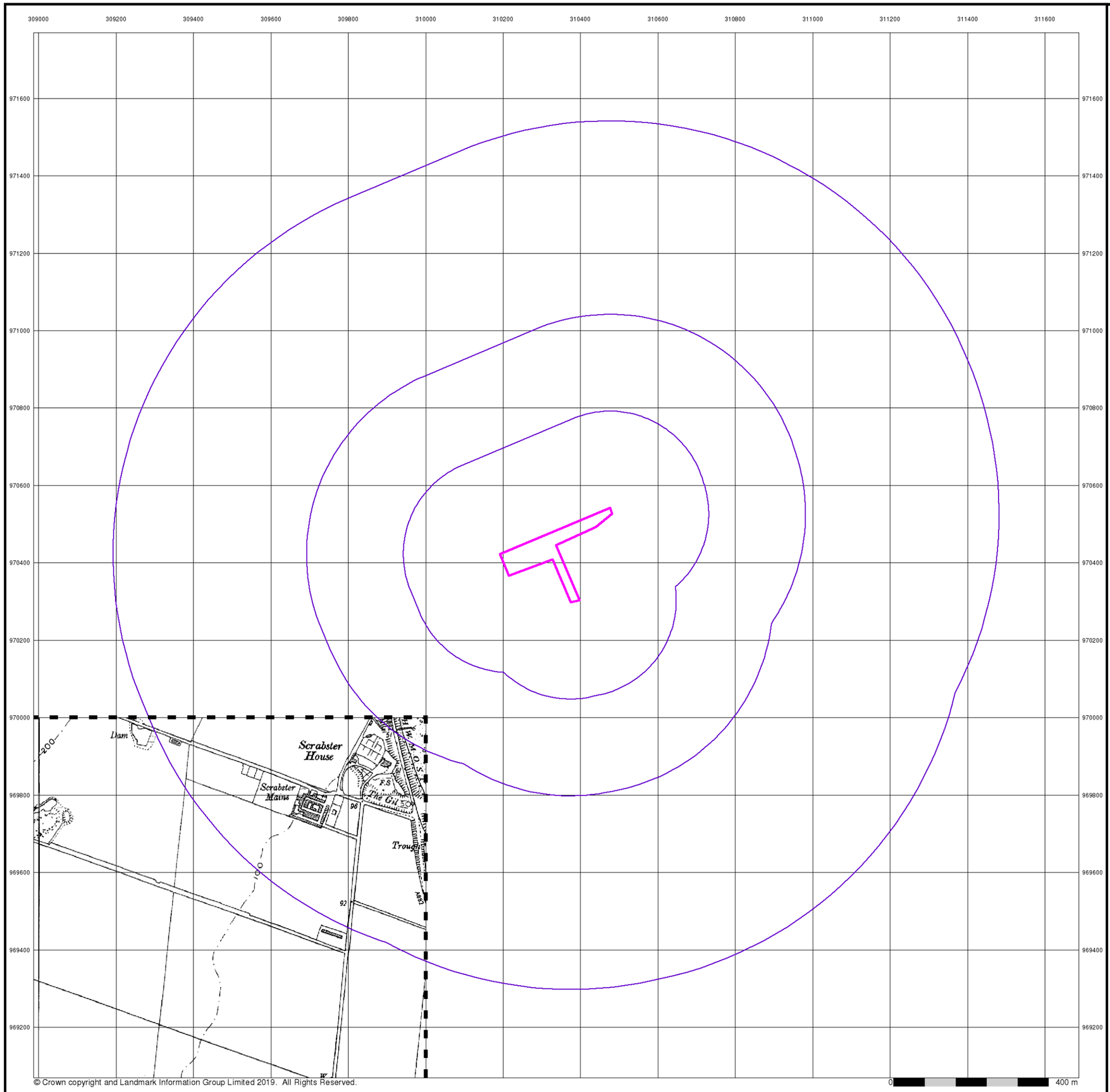

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RPS

Ordnance Survey Plan

Published 1959

Source map scale - 1:10,000

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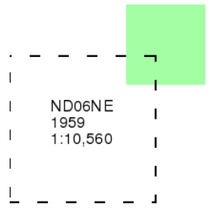
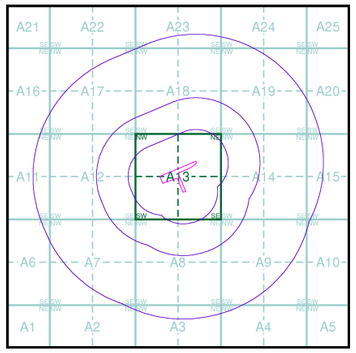
Map Name(s) and Date(s)



Historical Map - Slice A



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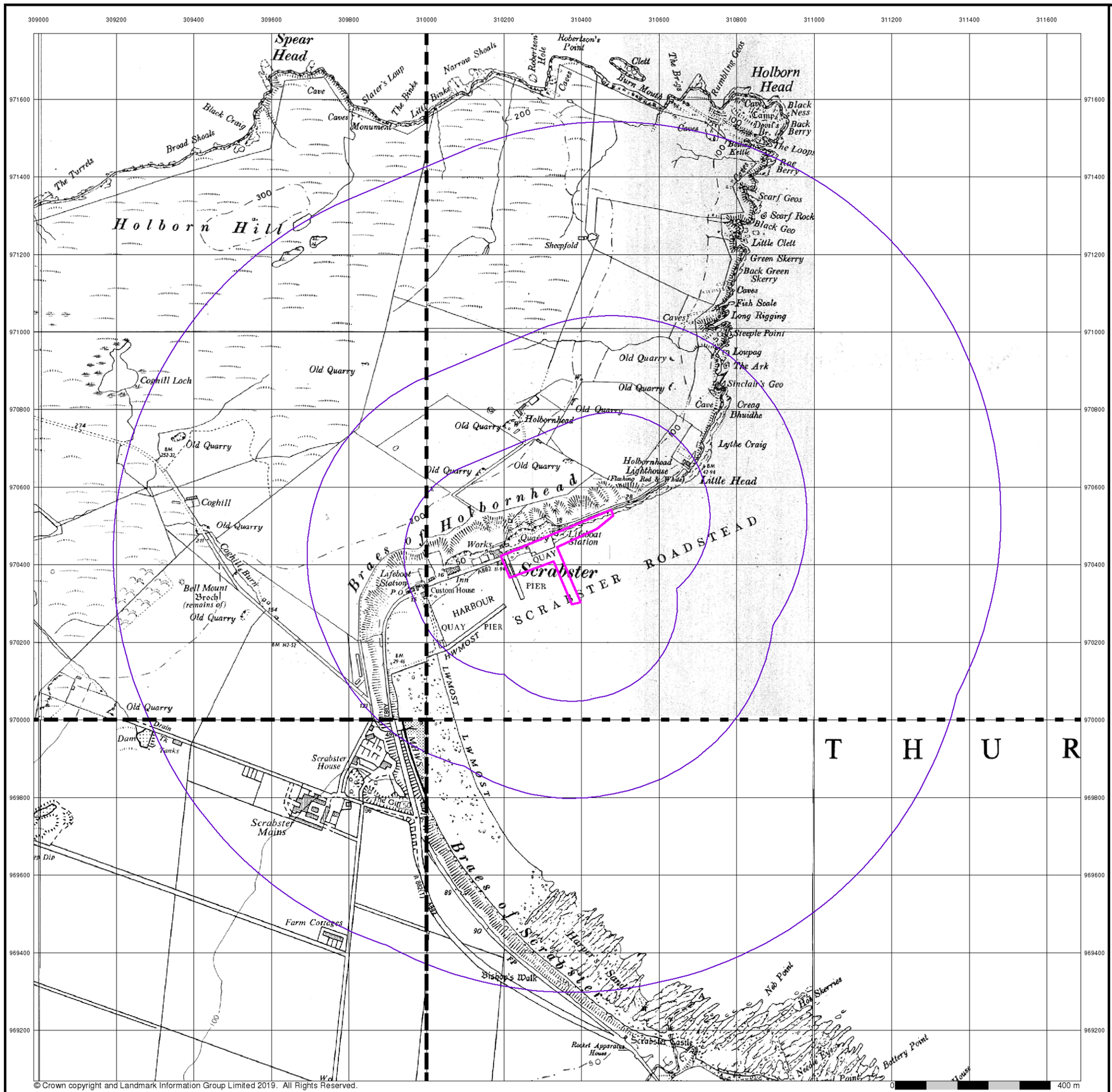

RPS

Ordnance Survey Plan

Published 1960 - 1969

Source map scale - 1:10,000

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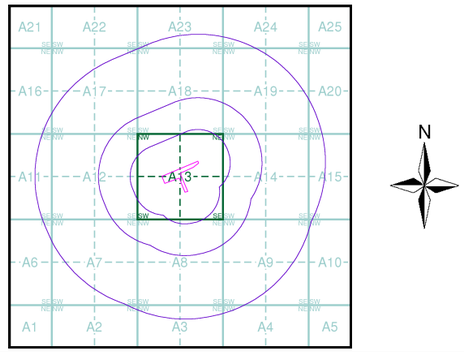
Map Name(s) and Date(s)

ND07SE 1960 1:10,560	ND17SW 1960 1:10,560
ND06NE 1969 1:10,560	ND16NW 1960 1:10,560

Historical Map - Slice A



Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	1000

Site Details

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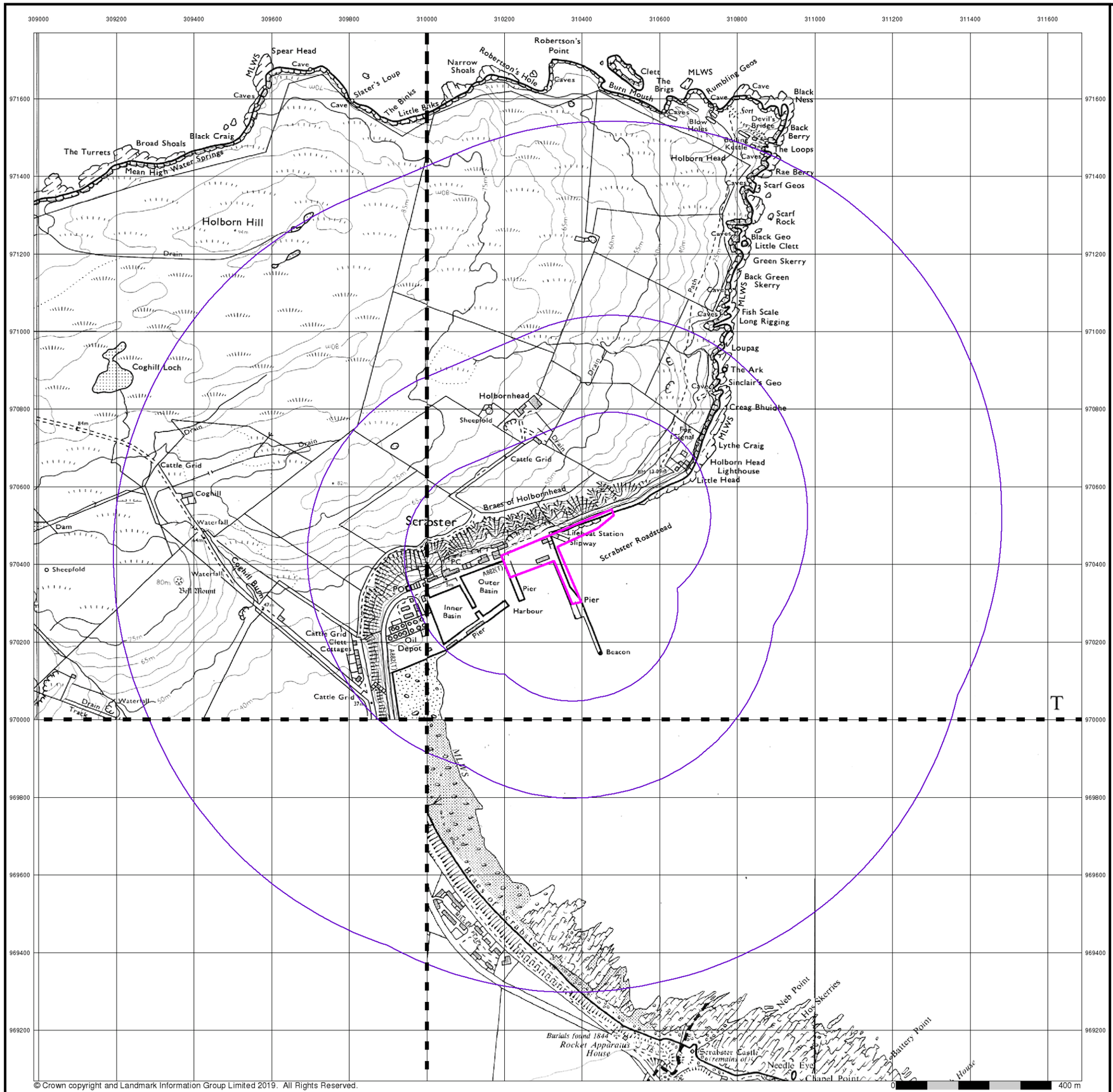
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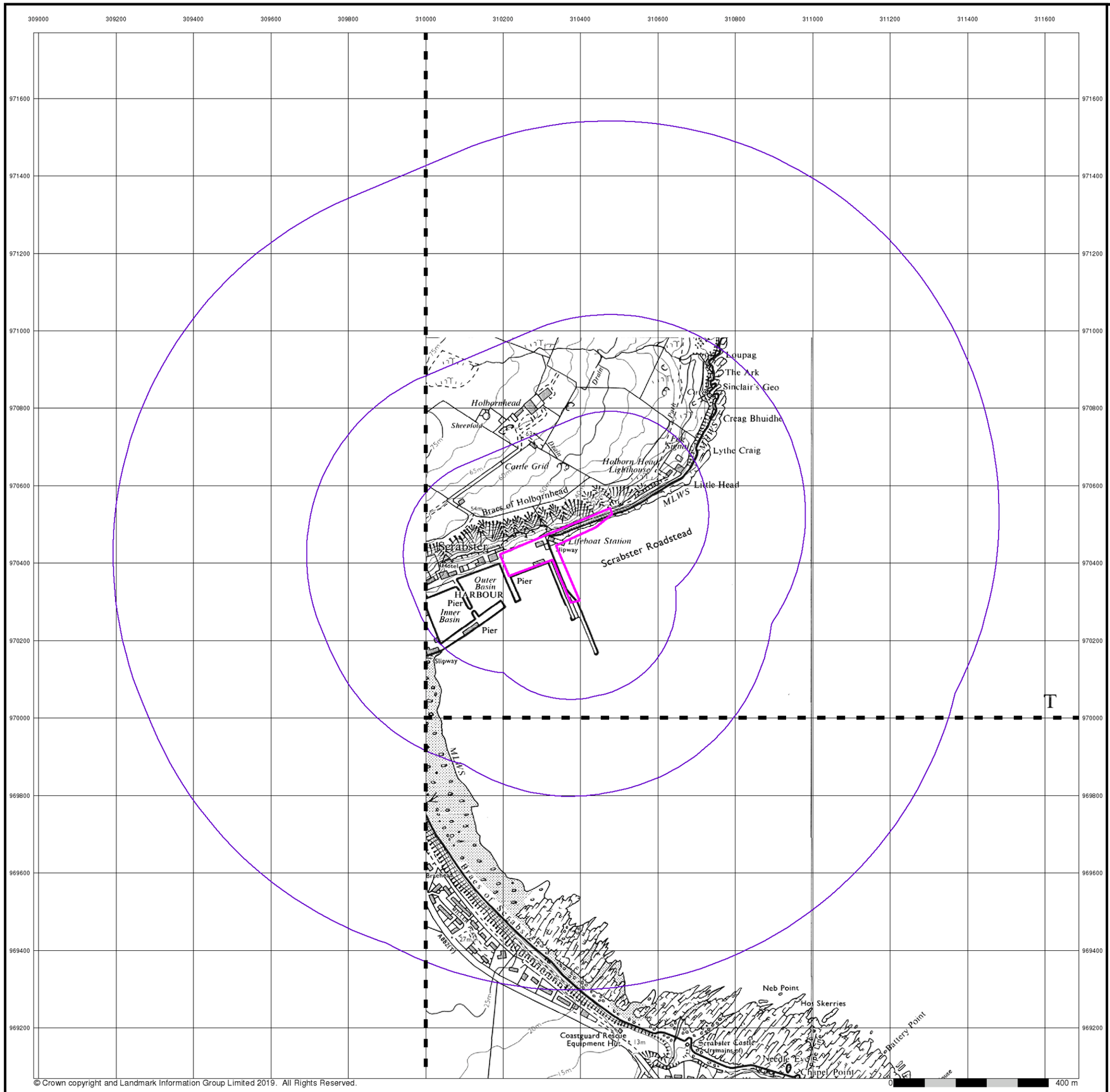
970400
970200
970000
969800
969600
969400
969200
Spear Head
Cave
MLWS
Caves
Slater's Loup
The Binks
Little Binks
Narrow Shoals
Robertson's Hole
Robertson's Point
Caves
Burn Mouth
Clett
The Brigs
MLWS
Rumbling Geos
Cave
Black Ness
Caves
Sorr
Devil's Bridges
Back Berry
Blow Holes
Boiling Kettle Geo
The Loops
Caves
Holborn Head
Rae Berry
Caves
Scarf Geos
Scarf Rock
Caves
Black Geo
Little Clett
Green Skerry
Back Green Skerry
Caves
MLWS
Caves
Fish Scale
Long Rigging
Loupag
The Ark
Sinclair's Geo
Caves
Creag Bhuidhe
MLWS
Lythe Craig
Holborn Head Lighthouse
Little Head
Braes of Holbornhead
Lifeboat Station
Slipway
Scrabster Roadstead
Pier
Pier
Harbour
Outer Basin
Inner Basin
Pier
Beacon
Oil Depot
Cattle Grid
Clett Cottages
Cattle Grid
Track
Drain
Waterfall
Cattle Grid
Braes of Scrabster
MLWS
Burials found 1844
Rocket Apparatus House
Scrabster Castle
Remains of
Needle Eye
Chapel Point
Battery Point
Neb Point
Hoy Skerries
Broad Shoals
Black Craig
The Turrets
Mean High Water Springs
Holborn Hill
Drain
Coghill Loch
Holbornhead
Sheepfold
Drain
Drain
Cattle Grid
Coghill
Waterfall
Dam
Sheepfold
Waterfall
Coghill Burn
Bell Mount
Scrabster
Drain
Drain
Drain



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RPS

Ordnance Survey Plan

Published 1985

Source map scale - 1:10,000

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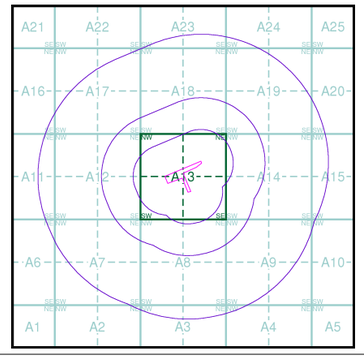
Map Name(s) and Date(s)

ND17SW
1985
1:10,000

ND16NW
1985
1:10,000

Historical Map - Slice A



Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	1000

Site Details

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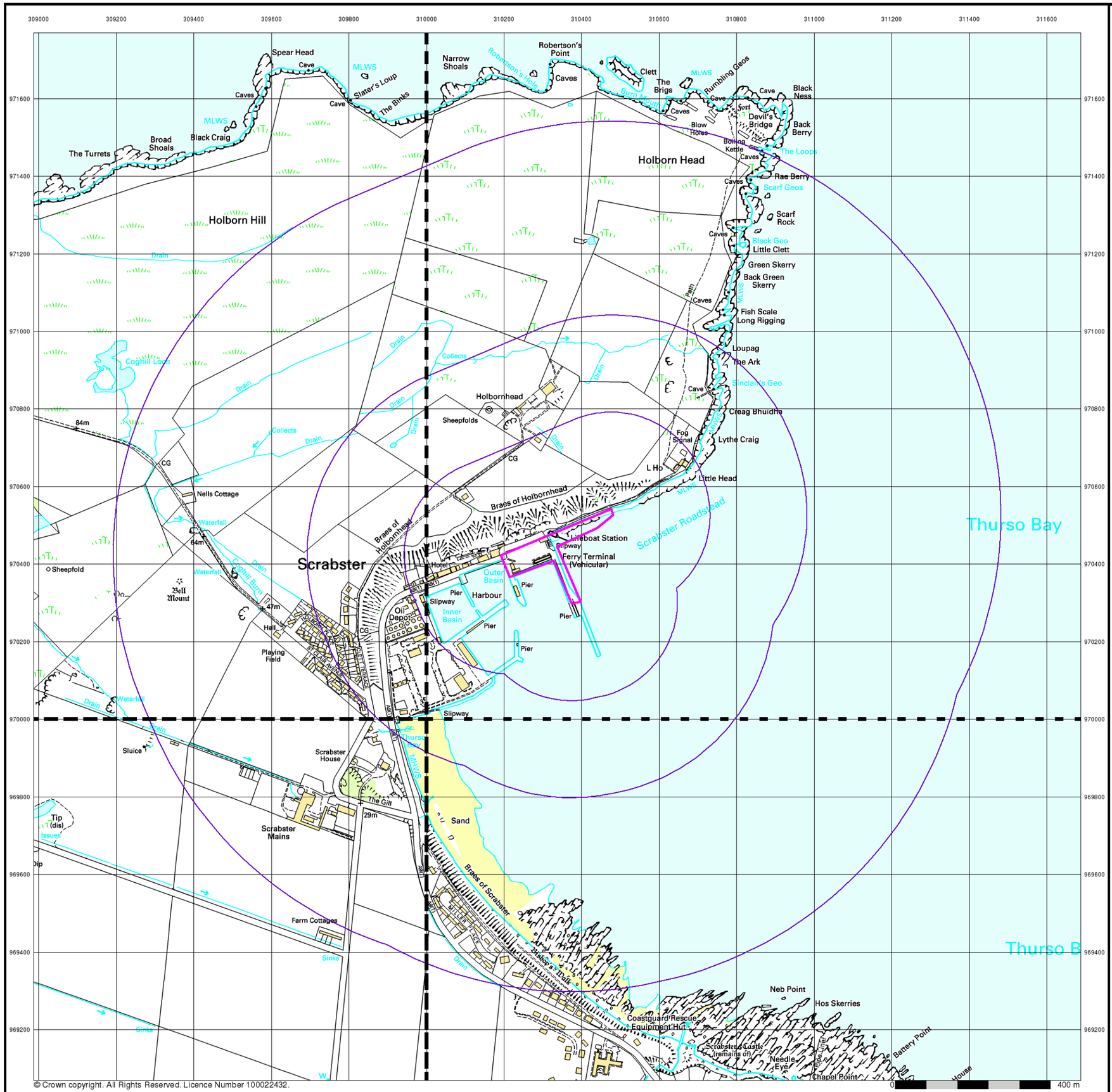

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RPS

10k Raster Mapping

Published 2001

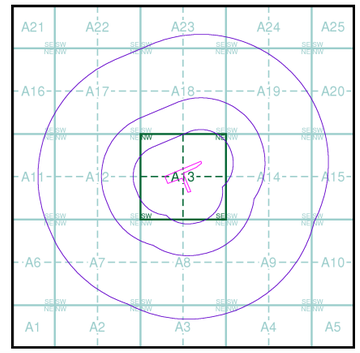
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

ND07SE 2001 1:10,000	ND17SW 2001 1:10,000
ND06NE 2001 1:10,000	ND16NW 2001 1:10,000

Historical Map - Slice A



Order Details

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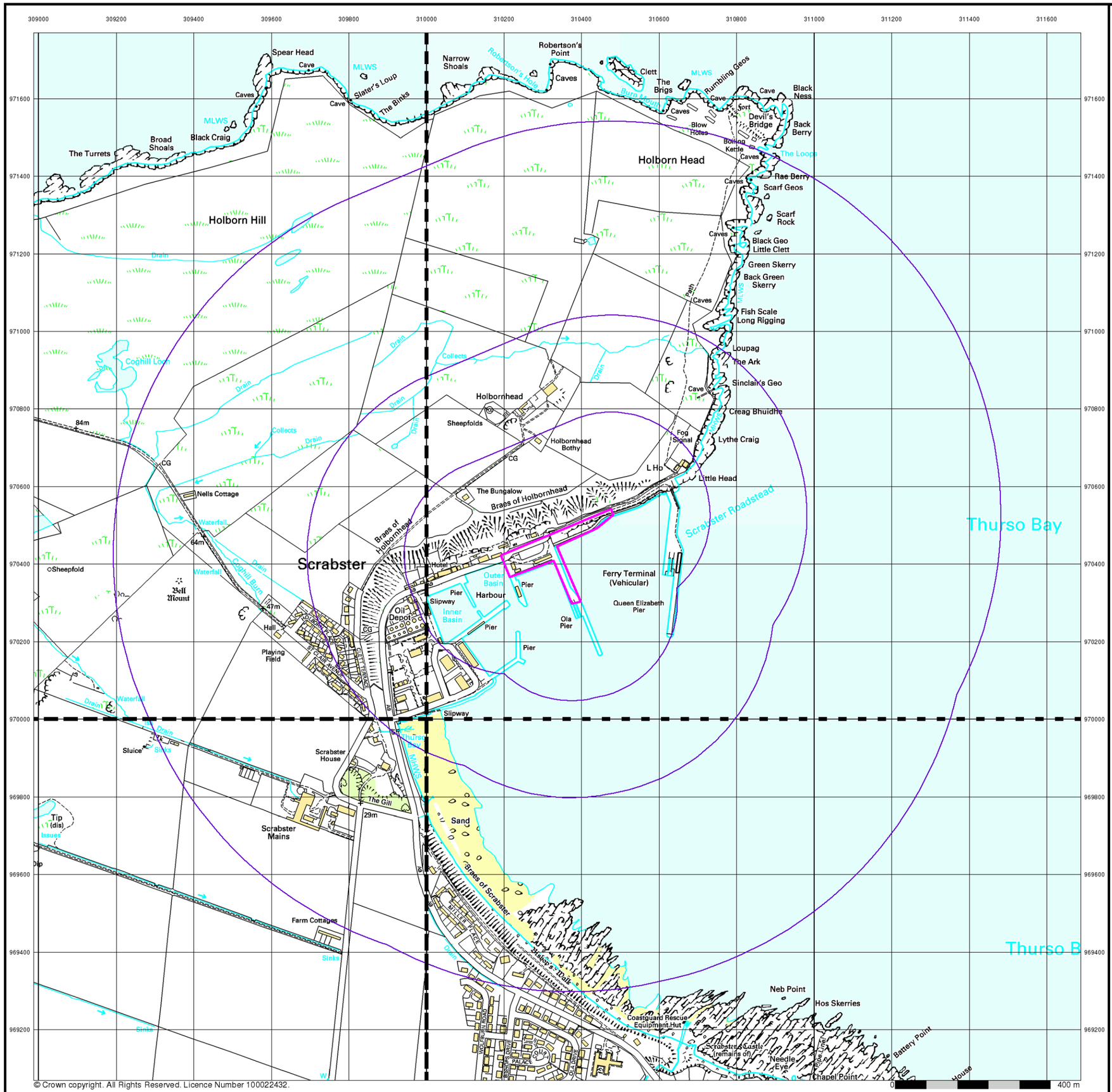

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RPS

10k Raster Mapping

Published 2006

Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey`s 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

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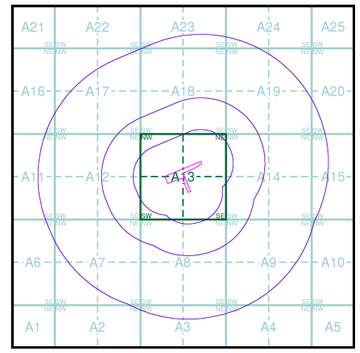
ND06NE 2006 1:10,000	ND16NW 2006 1:10,000

Historical Map - Slice A



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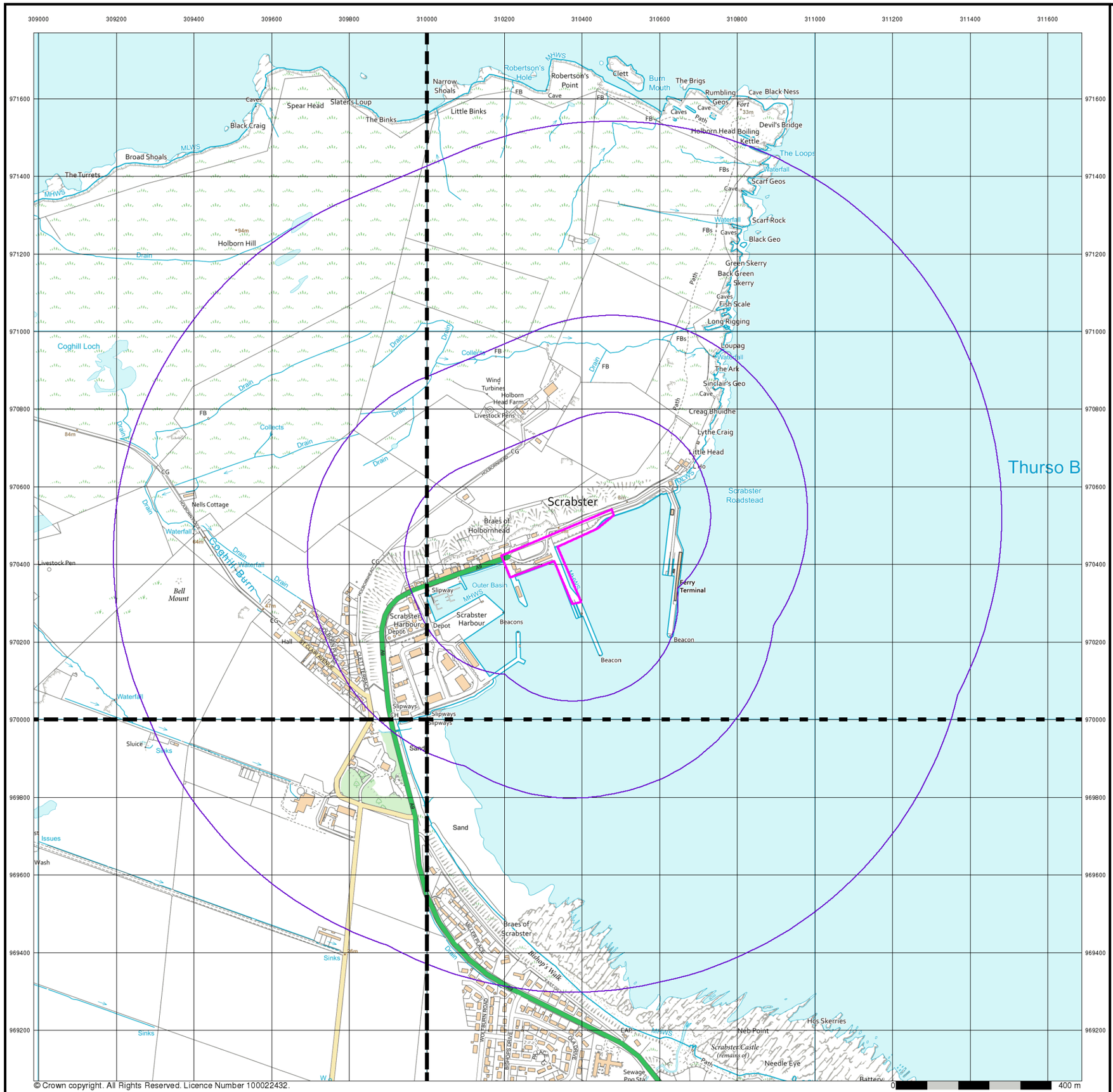

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RPS

VectorMap Local

Published 2018

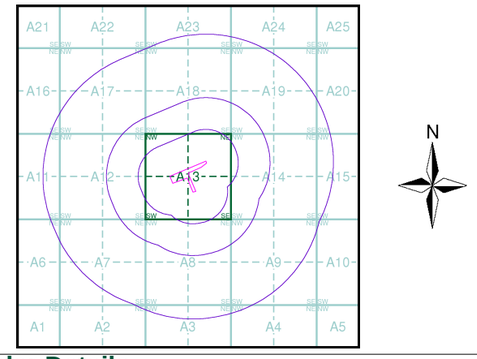
Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities),1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

ND07SE 2018 Variable	ND17SW 2018 Variable
ND06NE 2018 Variable	ND16NW 2018 Variable

Historical Map - Slice A



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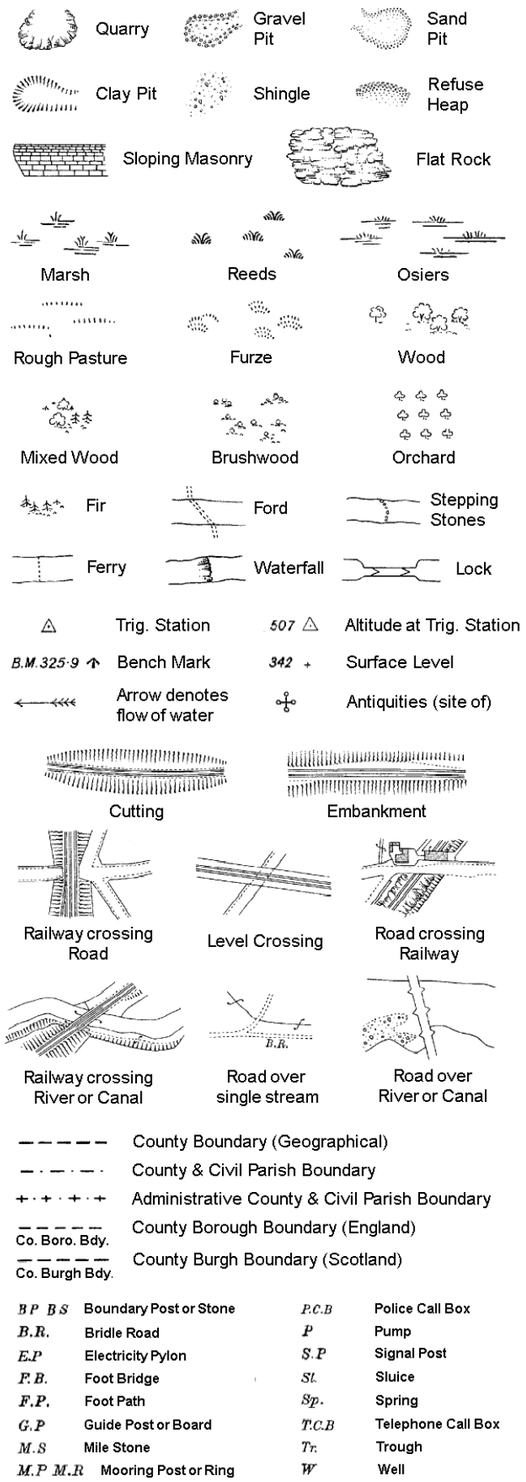
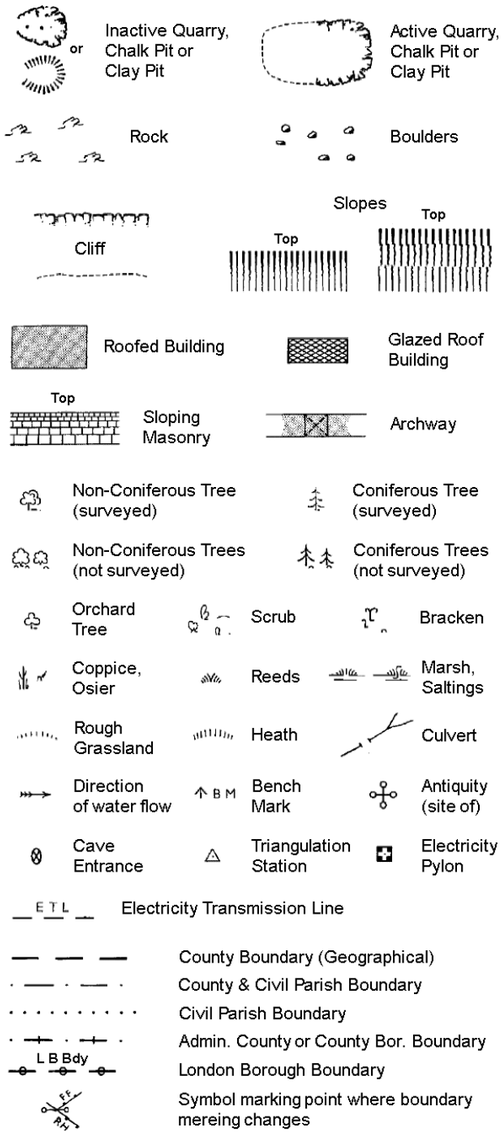
Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



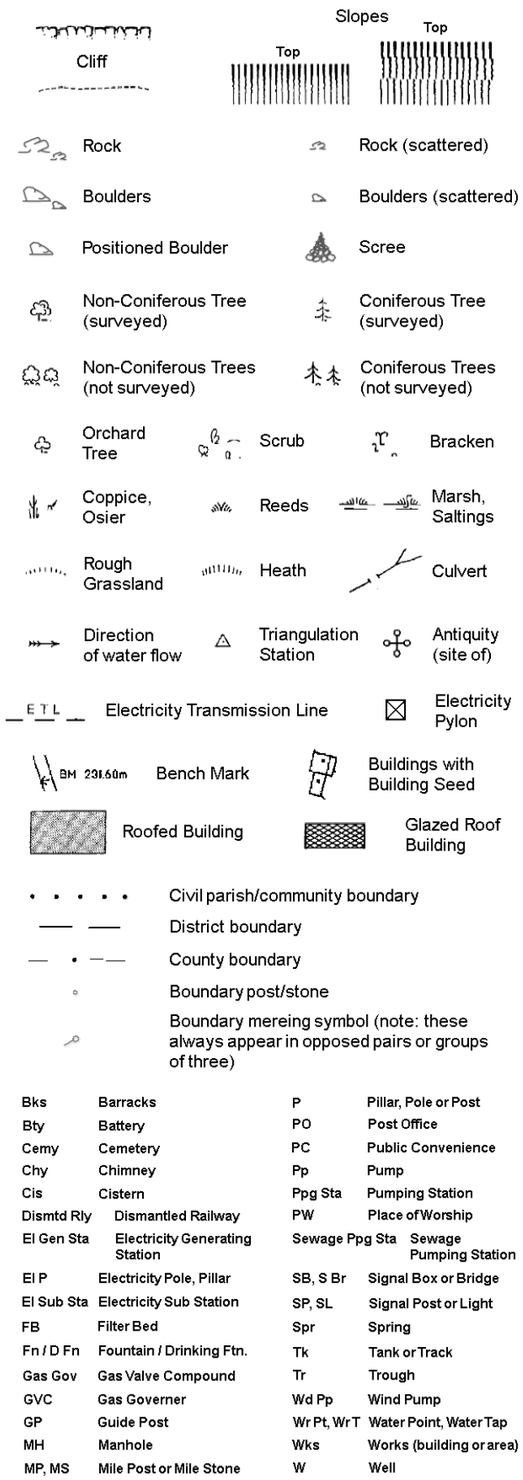
B P B S	Boundary Post or Stone	P.C.B	Police Call Box
B.R.	Bridle Road	P	Pump
E.P	Electricity Pylon	S.P	Signal Post
F.B.	Foot Bridge	St.	Sluice
F.P.	Foot Path	Sp.	Spring
G.P	Guide Post or Board	T.C.B	Telephone Call Box
M.S	Mile Stone	Tr.	Trough
M.P M.R	Mooring Post or Ring	W	Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250



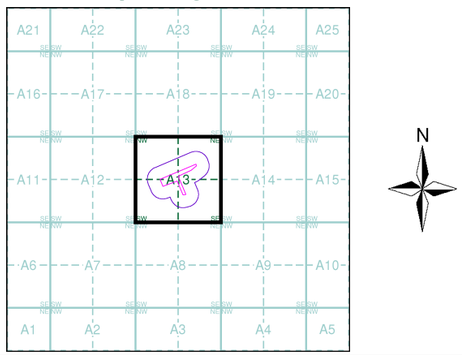
Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

RPS

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Caithness-Shire	1:2,500	1873	2
Caithness-Shire	1:2,500	1906	3
Ordnance Survey Plan	1:2,500	1967	4
Additional SIMs	1:2,500	1983 - 1994	5
Additional SIMs	1:2,500	1986	6
Large-Scale National Grid Data	1:2,500	1995	7
Large-Scale National Grid Data	1:2,500	1996	8
Historical Aerial Photography	1:2,500	2004	9

Historical Map - Segment A13



Order Details

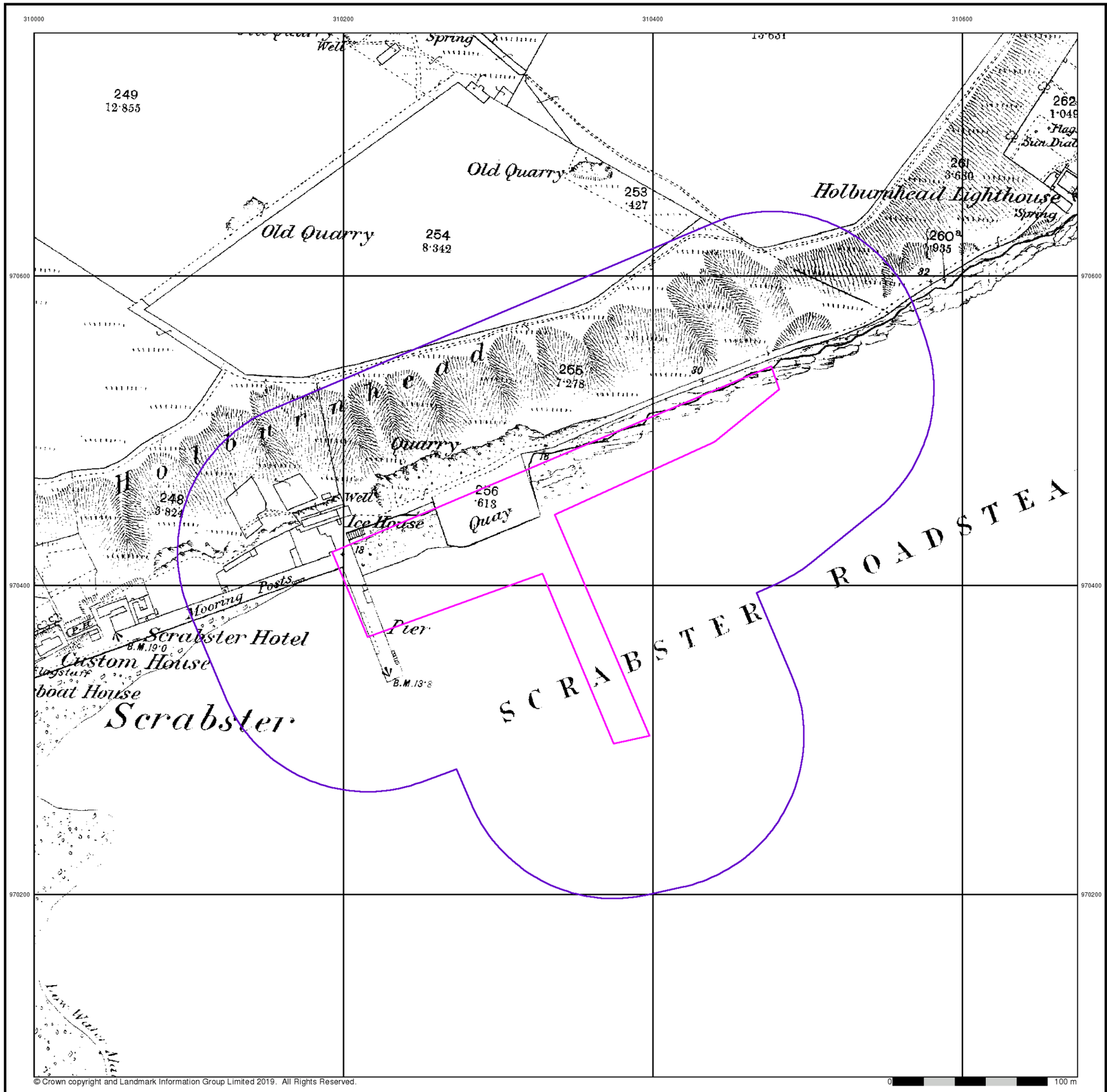
Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	100

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



RPS

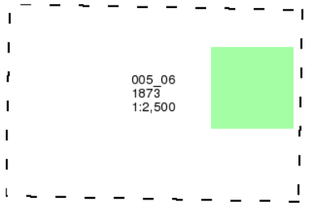
Caithness-Shire

Published 1873

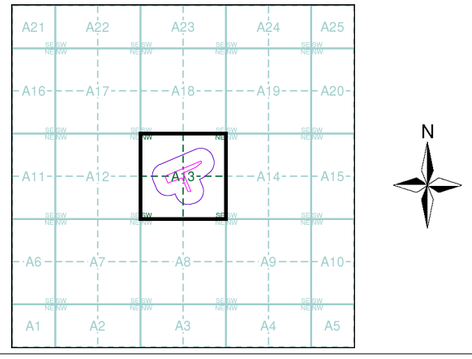
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	191090468_1_1
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Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

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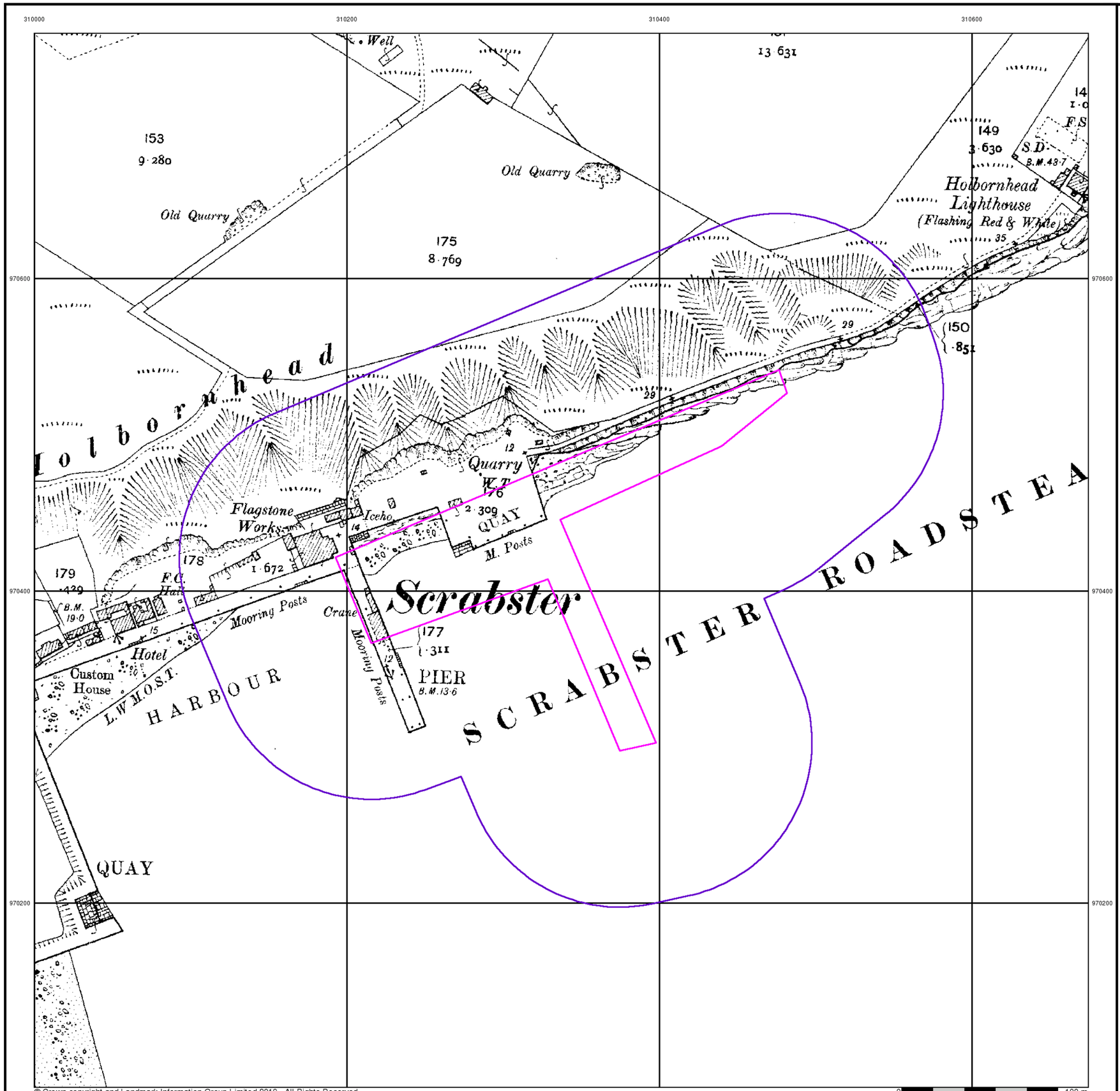

RPS

Caithness-Shire

Published 1906

Source map scale - 1:2,500

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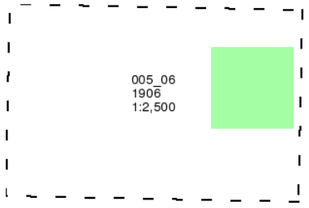
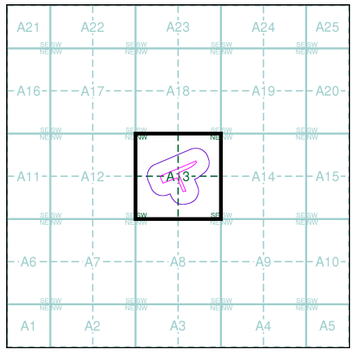
Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	100

Site Details

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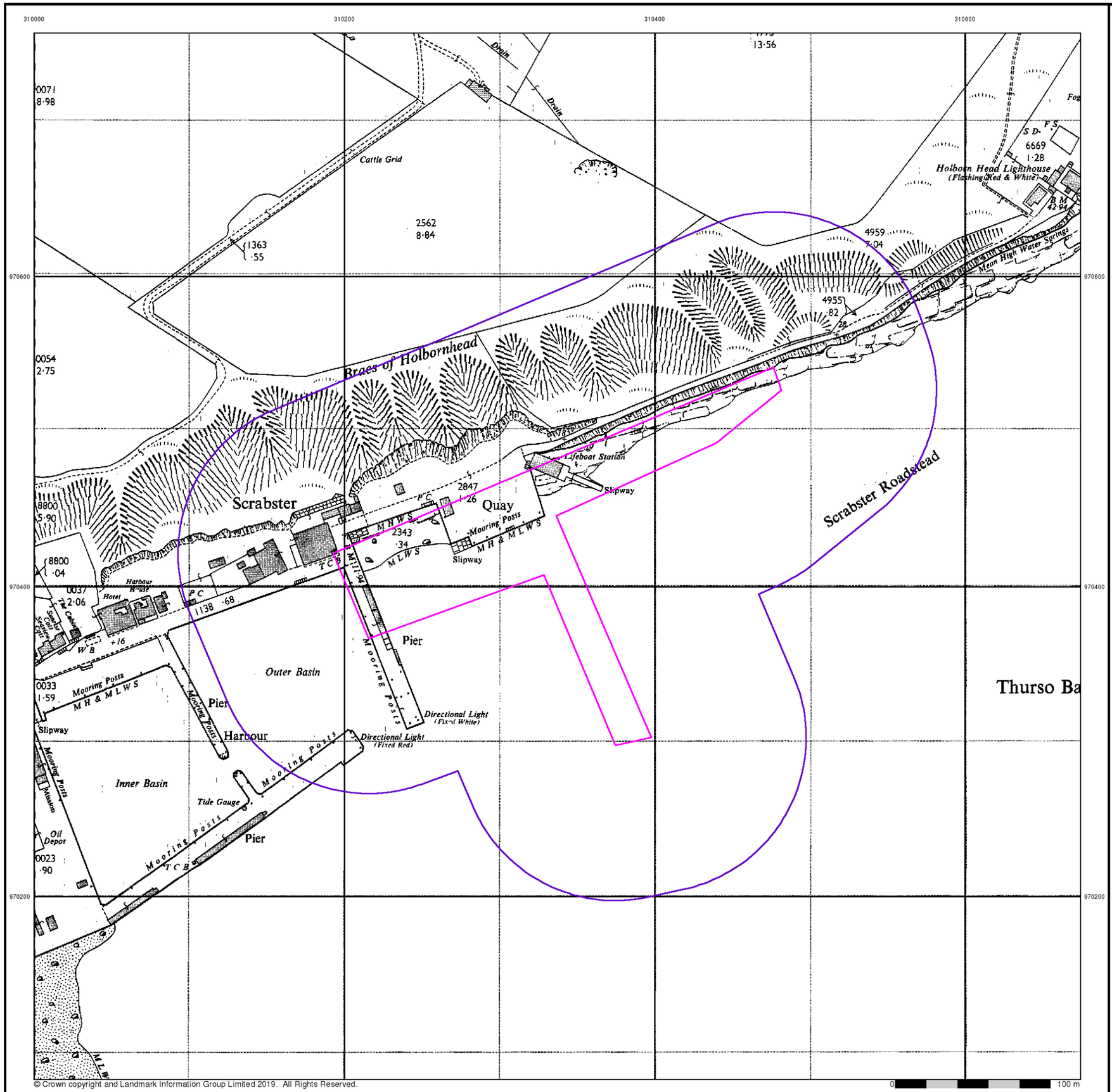

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RPS

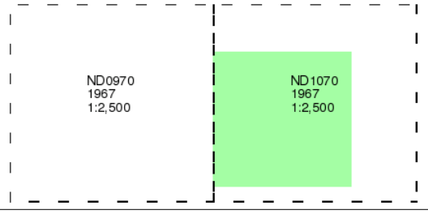
Ordnance Survey Plan

Published 1967

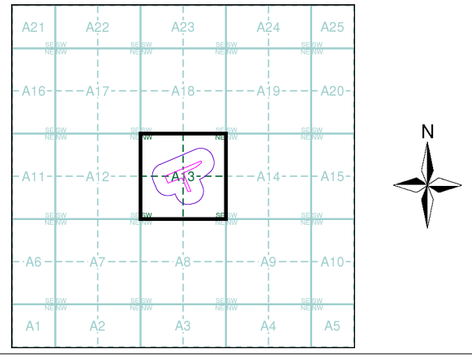
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	100

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

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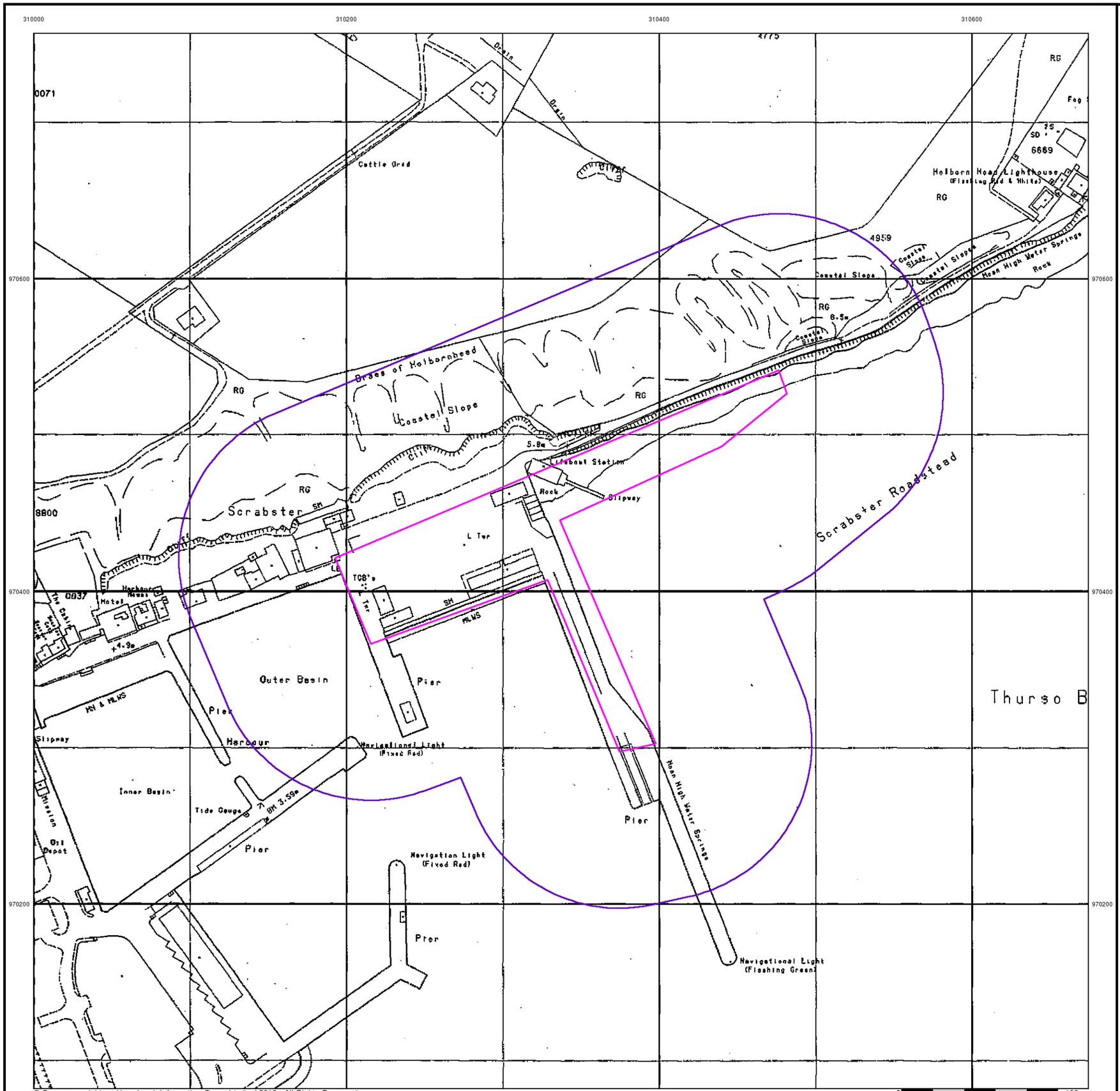

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RPS

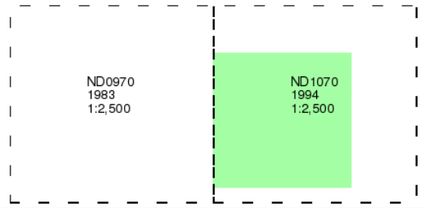
Additional SIMs

Published 1983 - 1994

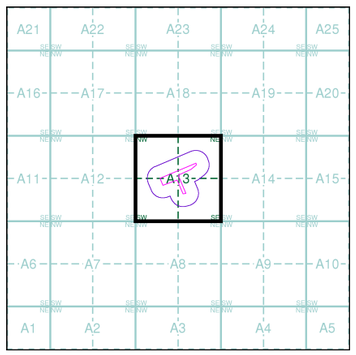
Source map scale - 1:2,500

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



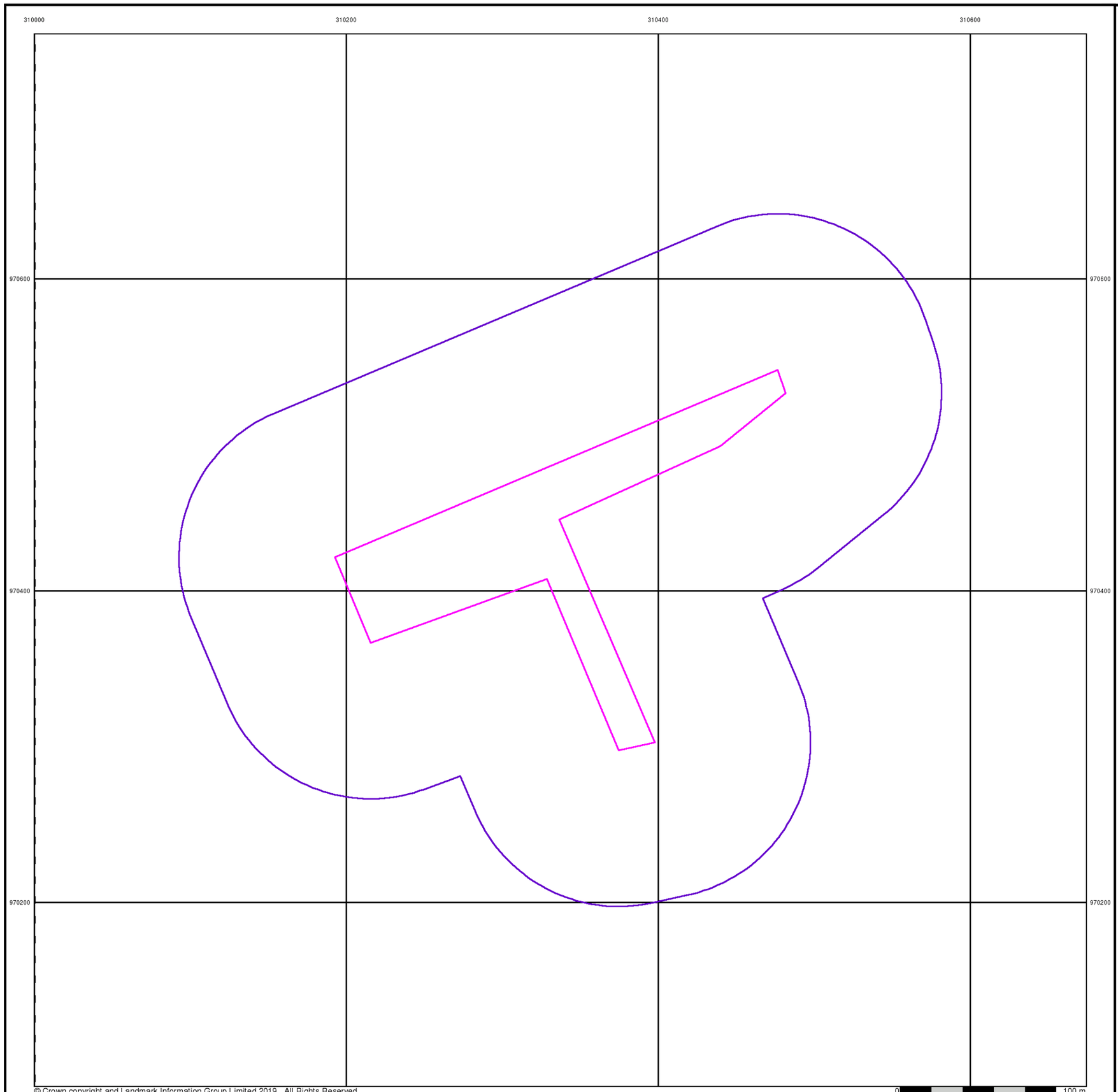
Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	100

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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RPS

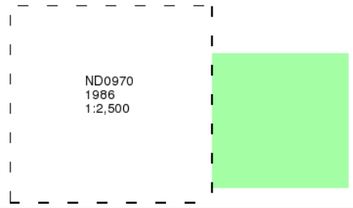
Additional SIMs

Published 1986

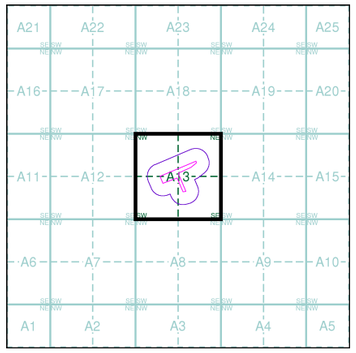
Source map scale - 1:2,500

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	100

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

Landmark INFORMATION GROUP

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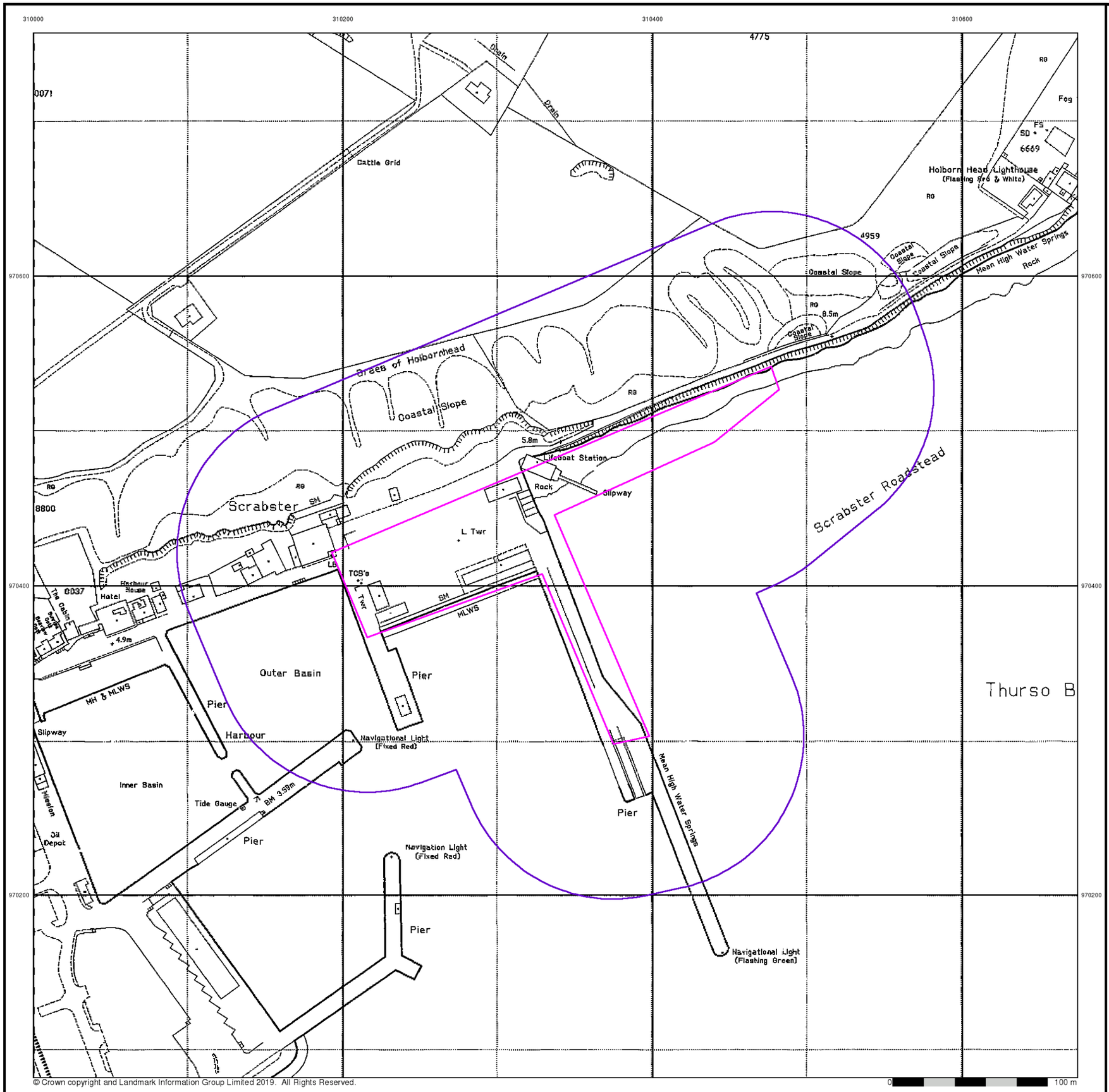

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RPS

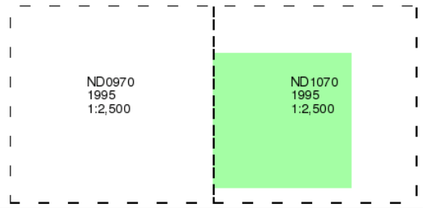
Large-Scale National Grid Data

Published 1995

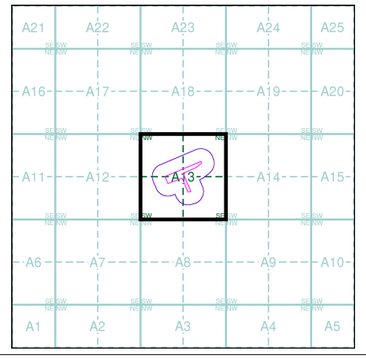
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

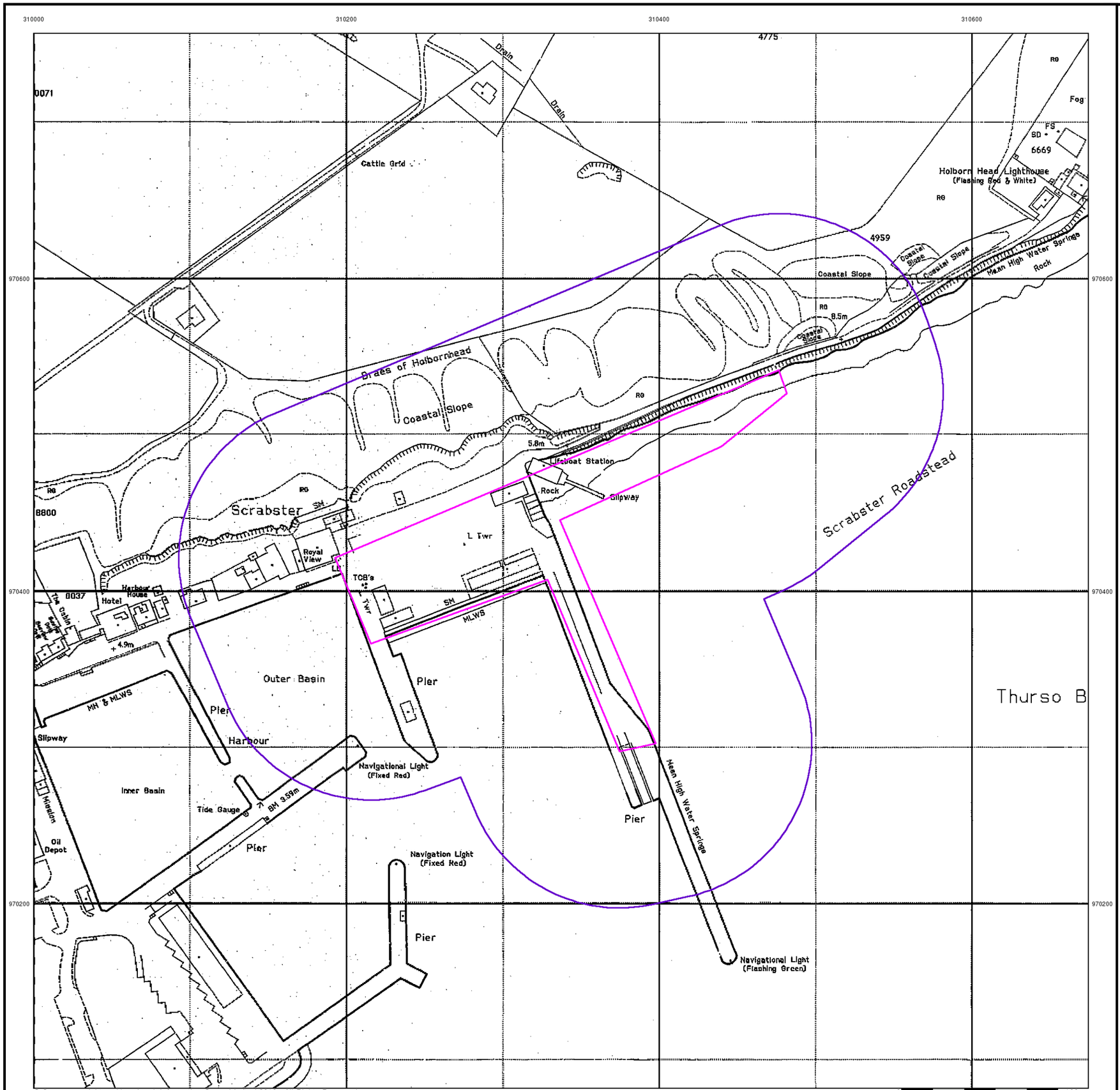
Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	100

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

Landmark INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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RPS

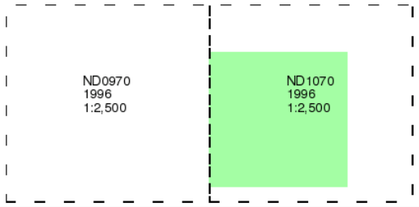
Large-Scale National Grid Data

Published 1996

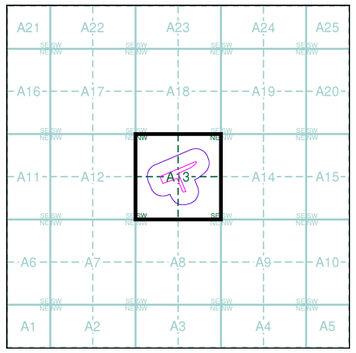
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
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Site Details

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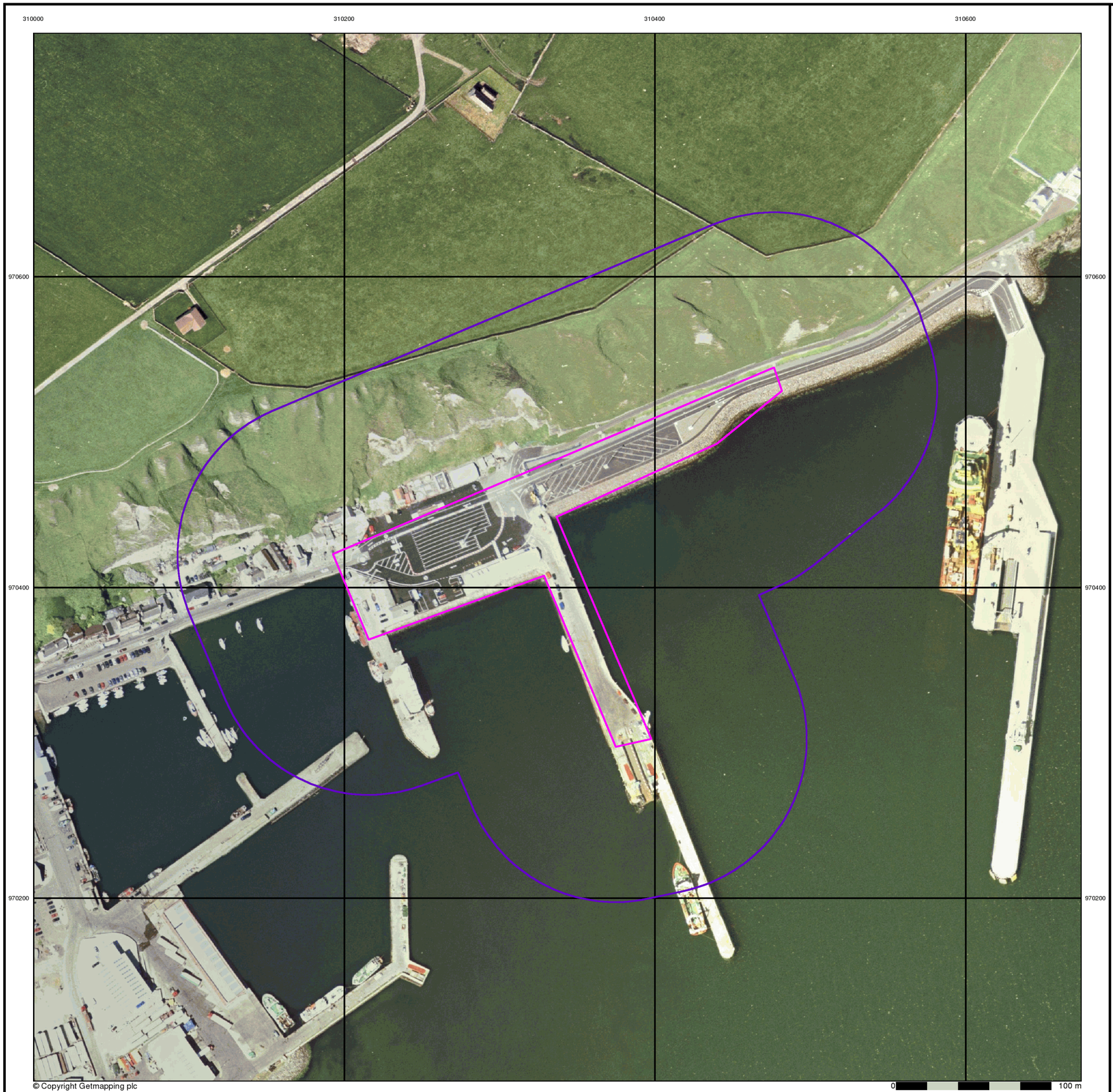
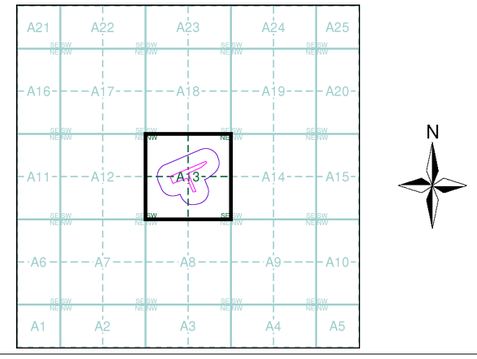


Historical Aerial Photography

Published 2004

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A13



Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	100

Site Details

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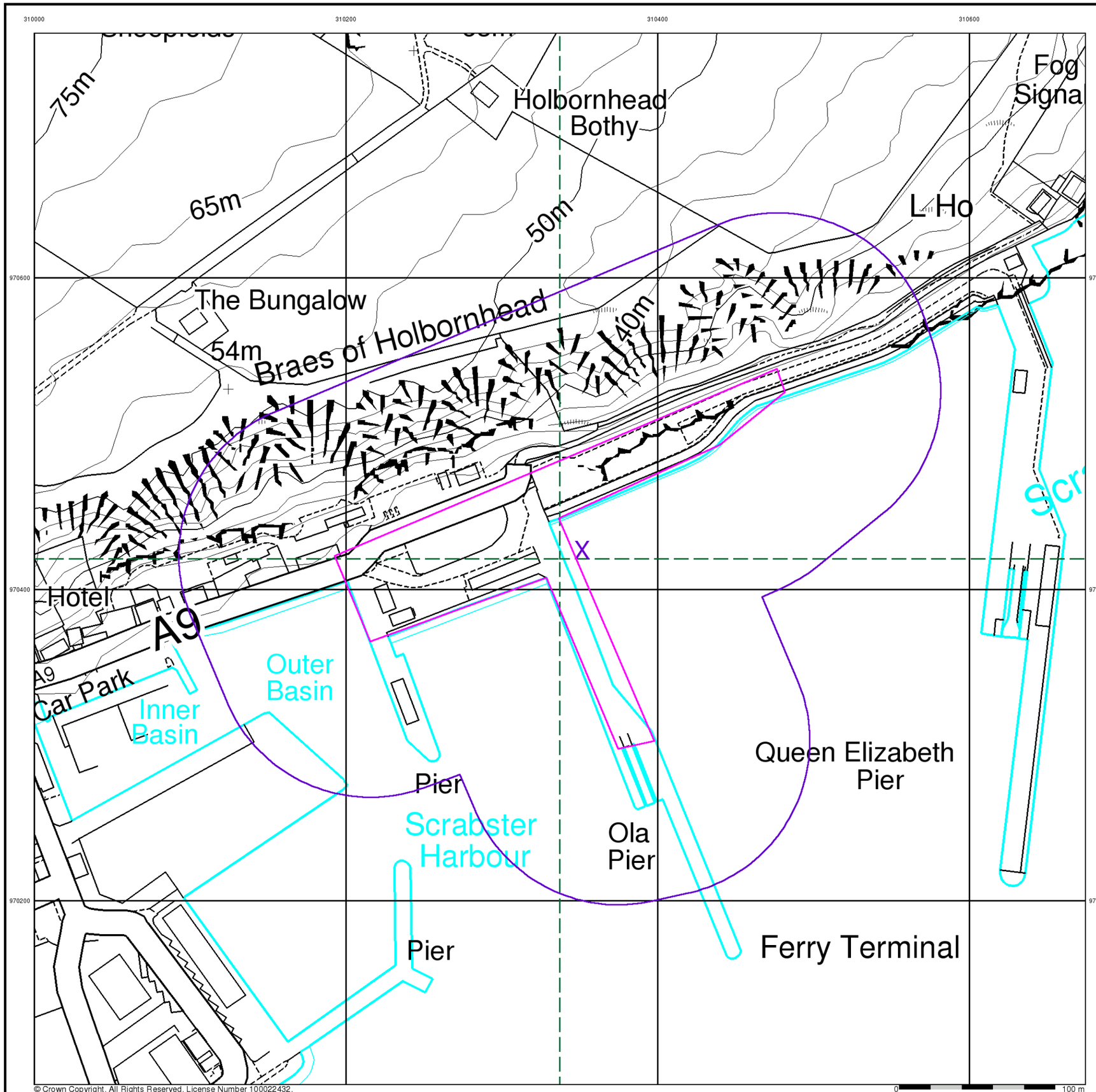

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RPS

General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Map ID

Several of Type at Location

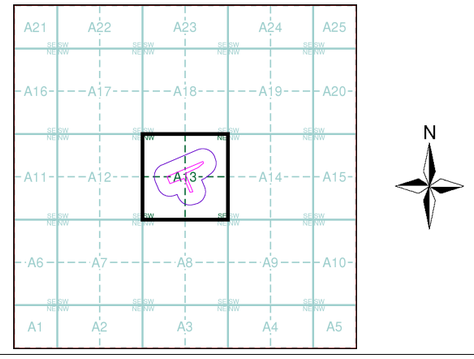
Historical Building Plans

- Area Cleared due to Enemy Action
- Asbestos
- Above Ground Fuel Tanks
- Benzene/Benzole/Naphtha, Naphthalene/Kerosene
- Electricity Generation
- Electricity Sub-Stations
- Gas Industry
- Gas Storage
- Gas Use
- Oil Industry
- Oil Storage
- Oil Use
- Paint based Oils
- Paraffin
- Petrol and Diesel Industry
- Petrol and Diesel Storage
- Petrol and Diesel Use
- Potential Fuel Gas
- Potential Fuel Oil
- Potential Fuel Use
- Potential Petrol and Diesel
- Potential Tanks
- Potentially Fuel-related Tanks
- Underground Fuel Tanks

Historical Tanks and Energy Facilities

- (B) Electrical Sub Station Facility
- (E) Electricity Industry Facility
- (G) Gas Industry Facility
- (V) Gas Monitoring Facility
- (M) Miscellaneous Power Facility
- (O) Oil Industry Facility
- (S) Petroleum Storage Facility
- (P) Potential Tank
- (T) Tank

Historical Data Report - Segment A13



Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Plot Buffer (m):	100

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

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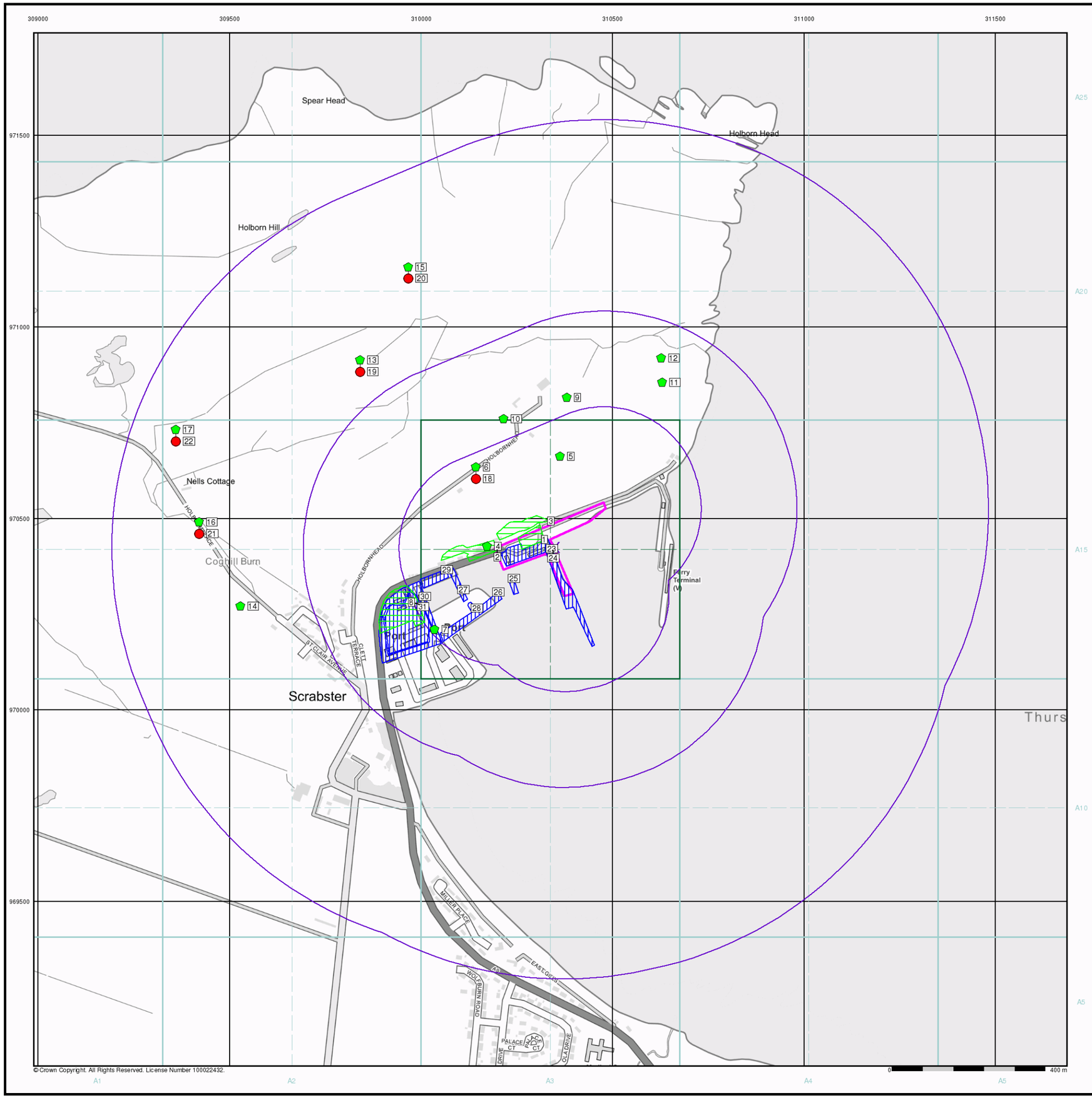

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RPS

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

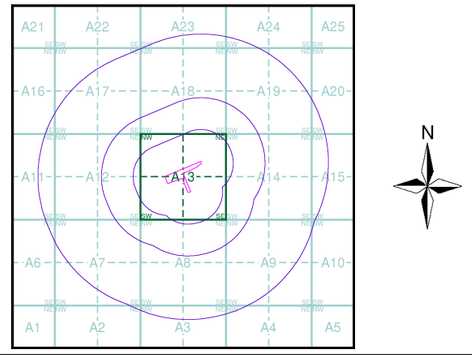
Historical Building Plans

- Area Cleared due to Enemy Action

Historical Land Use

- Former Marsh
- Historical Flood Liability
- Historical Flood Liability (Location)
- Potentially Contaminative Industrial Use (Past Land Use)
- Potentially Contaminative Industrial Use (Past Land Use) (Linear)
- Potentially Contaminative Industrial Use (Past Land Use) (Location)
- Potentially Infilled Land (Non-Water)
- Potentially Infilled Land (Non-Water) (Linear)
- Potentially Infilled Land (Non-Water) (Location)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water) (Linear)
- Potentially Infilled Land (Water) (Location)

Historical Data Report - Slice Map A



Order Details

Order Number:	191090468_1_1
Customer Ref:	IBR1139
National Grid Reference:	310350, 970430
Slice:	A
Site Area (Ha):	1.67
Search Buffer (m):	1000

Site Details

The Peerie Cafe, Scrabster, THURSO, KW14 7UJ

Landmark INFORMATION GROUP
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Appendix 8.2 Fugro Ground Investigation Report

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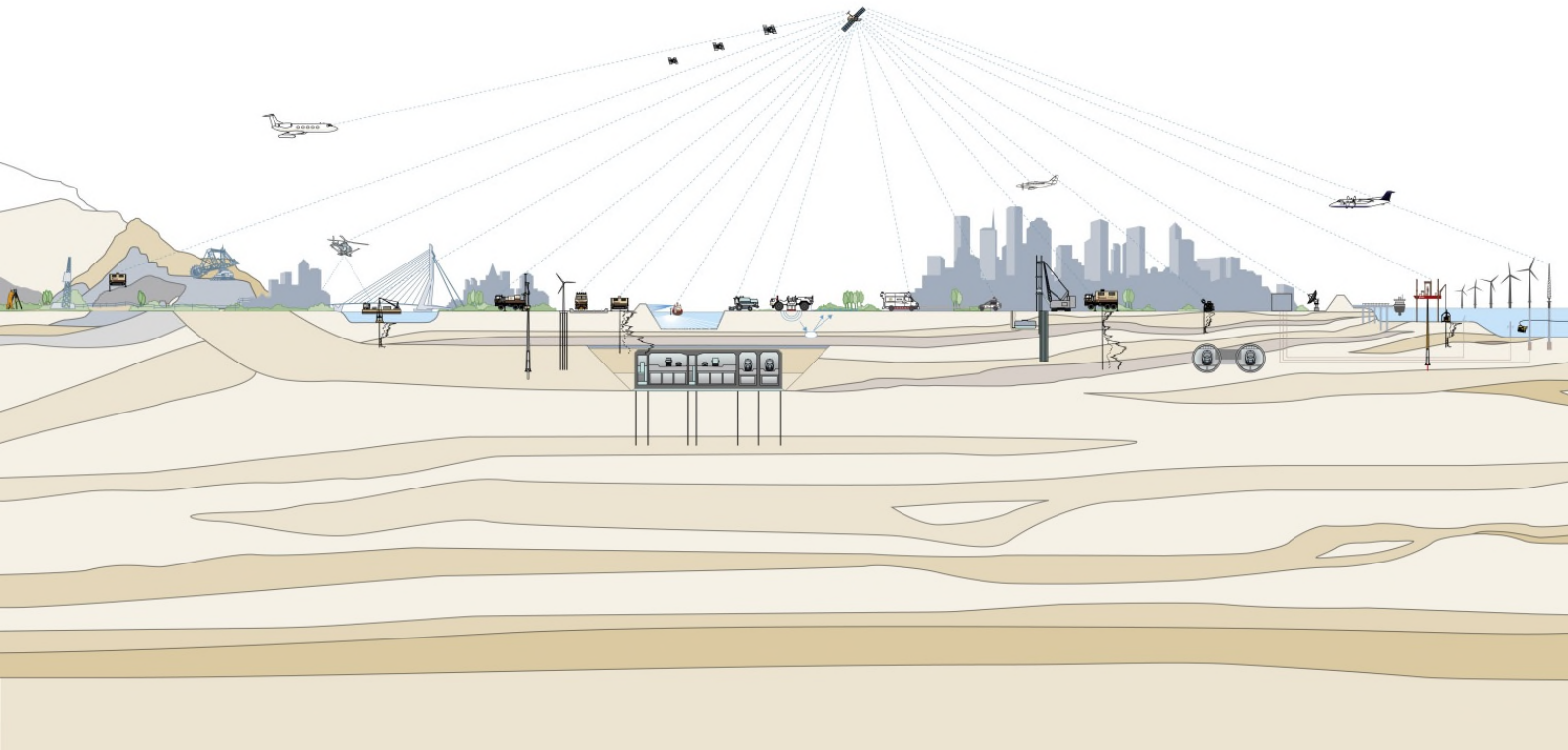
FUGRO

Report on Ground Investigation without Geotechnical Evaluation St. Ola Pier Refurbishment - Site Investigation (Marine)

Fugro Reference: G180030U(01)
Issue Date: 15 March 2019

Scrabster Harbour Trust

Interim Draft for Comment



Report on Ground Investigation without Geotechnical Evaluation

St. Ola Pier Refurbishment - Site Investigation (Marine)

Fugro Reference: G180030U(01)
Issue Date: 15 March 2019

Ultimate Client:	Scrabster Harbour Trust
Contract No.:	G180030U
Client Address:	Elmwood House, 74 Boucher Road, Belfast, BT12 6RZ Northern Ireland
Client Consultant:	RPS Consulting Engineers

Issue	Description	Prepared	Checked	Approved	Date
01	Interim Draft Factual Report	CAY	NHA		15/03/2019

Our ref: G180030U(01)/NHA/CAY
Date: 15 March 2019

Scrabster Harbour Trust
Elmwood House,
74 Boucher Road,
Belfast,
BT12 6RZ
Northern Ireland

Attention: **Mr Sandy Mackie**

Dear Sir

St. Ola Pier Refurbishment - Site Investigation (Marine)
Interim Draft Report on Ground Investigation without Geotechnical Evaluation

This report presents interim draft factual data on the ground investigation for the above project.

This report was prepared by Chelsea Au-Yeung under the supervision of Nick Armstrong.

We thank you for the opportunity to be of service to you during this project. If you require any additional information or clarification, please contact those listed below.

Yours faithfully,
Fugro

Chelsea Au-Yeung
Project Engineer

Nick Armstrong
Engineering and Reporting Manager

Distribution: One electronic copy to Mr Sandy Mackie (Scrabster Harbour Trust) and Mr Diarmuid O'Loan (RPS) and various persons via Fugro SFT

CONTENTS

1.	**INTRODUCTION**	**1**
2.	**THE SITE SETTING**	**2**
2.1	Site Location and Description	2
2.2	Geology	2
3.	**PROPOSED DEVELOPMENT**	**3**
4.	**GENERAL METHOD OF INVESTIGATION**	**4**
4.1	Introduction	4
4.2	Scope of Works	4
4.3	Soil and Rock Description and Identification	4
	4.3.1 General	4
	4.3.2 Core Related	5
4.4	Exploratory Hole Sampling and Core Subsampling	5
4.5	Photographic Records	6
4.6	Positioning	6
5.	**EXPLORATORY HOLE INVESTIGATION**	**7**
5.1	Cable Percussion Boring	7
5.2	Rotary Drilling	7
6.	**IN SITU AND FIELD TESTING**	**8**
6.1	Standard Penetration Tests	8
7.	**GEOTECHNICAL LABORATORY TESTING**	**9**
7.1	Introduction	9
7.2	Summary	9
7.3	Particle Size Distribution Analyses	10
8.	**GEOENVIRONMENTAL LABORATORY TESTING**	**11**
9.	**DIGITAL DATA DELIVERABLES**	**12**
10.	**REFERENCES**	**13**

APPENDICES

A. GUIDELINES ON USE OF REPORT
A.1 Health and Safety File
A.2 Sample Storage
A.3 Eurocodes, Standards and Specifications
A.4 Limitations and Use of Data

B. DRAWINGS

C. EXPLORATORY HOLE RECORDS
C.1 Notes and Keysheets
C.2 Exploratory Hole Records

D. PHOTOGRAPHS
D.1 Rotary Core Photographs

E. IN SITU FIELD TEST RESULTS
E.1 Standard Penetration Tests

F. GEOTECHNICAL LABORATORY TEST RESULTS
F.1 Guidance Notes
F.2 UKAS Schedules
F.3 Results

G. GEOENVIRONMENTAL LABORATORY TEST RESULTS
G.1 Guidance Notes
G.2 Schedules and Analytical Suites
G.3 Test Certificates

TABLES IN THE MAIN TEXT

Table 7.1: Summary of geotechnical laboratory tests undertaken 9
Table 9.1: Digital data deliverables 12

1. INTRODUCTION

On the instructions and under the supervision of RPS Consulting Engineers (RPS) (the Engineer), acting on behalf of Scrabster Harbour Trust (the Employer), a site investigation has been carried out by Fugro GeoServices Limited (FGSL) in the Scrabster Harbour by St. Ola Pier, on the north coast of Scotland.

The objective of the investigation was to determine the ground and ground contamination conditions at the site and to provide information that would assist RPS in the geotechnical and geoenvironmental appraisal of the site. The scope of the investigation was determined by RPS.

An Interim Draft Factual Report on Ground Investigation, without geotechnical evaluation, was requested including site plan, exploratory hole records, photographs and field testing records. The report has been provided as electronic copy in PDF format. Digital data have also been provided as appropriate: to AGS 4.0 format (the exploratory hole records including field test data and laboratory data) and JPEG files (photographs).

The site work was carried out between 30 October and 16 November 2018.

2. THE SITE SETTING

2.1 Site Location and Description

The site is located within the inner and outer basins of Scrabster Harbour by St. Ola Pier. The harbour lies to the east of Scrabster Village, Caithness, Scotland.

The approximate National Grid reference of the site is E310410 N970305.

At the time of the investigation, the Harbour was a busy multi-purpose port serving the oil and gas, renewables, fishing and commercial sectors.

2.2 Geology

The records of the British Geological Survey (BGS) (Sheet 116 – Wick – of the One-Inch Series Geological Map, Drift (1957) Edition; Sheet 116(W) – Thurso – of the 1:50,000 Series Geological Map, Solid (1985) Edition) indicate that the area is underlain by Present Beach Deposits, Dunnet Head Sandstone and Upper Caithness Flagstone Group (Mey Subgroup, Ham-Scarfskerry Subgroup and Latheron Subgroup).

Data provided by BGS online (http://mapapps.bgs.ac.uk/geologyofbritain/home.html) indicate that the area is underlain by Marine Beach Deposits, Upper Caithness Flagstone Subgroup, Mey Flagstone Formation, Holborn Sandstone Member, Spital Flagstone Formation and Scrabster Flagstone Member.

3. PROPOSED DEVELOPMENT

It is proposed to refurbish the St Ola Pier to create modern deep-water harbour infrastructure. The works will include harbour basin dredging, revetment construction and reclamation.

4. GENERAL METHOD OF INVESTIGATION

4.1 Introduction

The investigation was carried out in accordance with BS 5930:2015, BS EN ISO 14688-1:2018, BS EN ISO 14689:2018 and BS 10175:2011+A2:2017 as appropriate.

An exploratory hole location plan (Figure LP1) showing the approximate as-built positions of the boreholes is presented in Appendix B.

A Schedule of Boreholes summarising the hole construction method, survey details, hole depths and field tests undertaken is given in Figure C.2 preceding the borehole records in Appendix C. The borehole records provide details of the in situ sampling and testing and present the descriptions of the strata encountered.

An explanation of the symbols and abbreviations used on the borehole records, together with the method of strata description utilised, is given on the Notes on Exploratory Hole Records (Figure C.1) in Appendix C.

Photographic and field-testing records are given in subsequent appendices.

4.2 Scope of Works

The scope of works for the ground investigation include 16 overwater boreholes with sampling and field testing, geotechnical and contamination laboratory testing. The site work was undertaken between 30 October and 16 November 2018.

The site work comprised the following:

- 5 cable percussion boreholes (BH05 to BH08 and BH11), to depths of 5.00 m below seabed level (BSL) and 7.50 m BSL;
- 11 combined cable percussion and rotary cored boreholes (BH01 to BH04, BH09, BH20 to BH23, BH24a and BH30), to depths between 7.65 m BSL and 26.00 m BSL;
- Standard penetration tests;
- Geotechnical logging, subsampling and core photography;
- Position surveying.

Geotechnical laboratory testing was still ongoing at the time this report was issued.

4.3 Soil and Rock Description and Identification

4.3.1 General

The strata descriptions given in the borehole records, unless otherwise noted, are compiled from an examination of the disturbed samples and rotary cores, together with the results of any field and laboratory testing. Density index descriptions are based on the results of the standard penetration tests and have not been amended to take into account any overburden effects. The consistency of cohesive strata is based on manual assessment only. Undrained shear strength descriptions are based on laboratory triaxial test results.

Where there is a degree of uncertainty regarding the density index or consistency of the soil, the terms 'probably' or 'possibly' have been used and the descriptions given should be treated with caution.

4.3.2 Core Related

The Solid Core Recovery (SCR) and Rock Quality Designation (RQD) have been determined using the modified proposal, as given in Norbury *et al* (1986), that a 'solid cylinder' should be defined as having a full diameter (but not necessarily a full circumference) without discontinuities and should be measured axially along the core. In a number of instances, the logging geologist assessed that some core from one run was recovered with the core from the next run. In these cases, the Total Core Recovery (TCR), SCR and RQD have been determined assuming that the core had been recovered from the core run in which it had first been drilled, and details are given in the borehole records.

Assumed zones of core loss have been identified only where the TCR is less than or equal to 90 %. Generally, assumed zones of core loss, identified as 0.50 m thick or greater, have been assigned strata boundaries and the driller's strata descriptions (where recorded) were used on the borehole records; assumed zones of core loss, identified as less than 0.50 m thick, are presented as depth-related remarks within the strata descriptions on the borehole records.

The assumed zones of core loss are reflected in the fracture index column on the borehole records.

Drilling induced fractures are not included on the borehole records and are not taken into consideration for the core measurements and fracture index records.

Where possible, fractures have been classified into bedding fractures and joints. Where the fractures can be grouped into fracture sets, a summary description per each of the fracture set per stratum is given on the borehole records, as part of the strata descriptions. Fractures that have not been described in these summaries are described in the depth-related remarks.

4.4 Exploratory Hole Sampling and Core Subsampling

The sample categories and achievable quality classes are defined in EN ISO 22475-1:2006 for each sample/sampler system.

In boreholes advanced by cable percussion boring, disturbed samples were taken at each change in soil type and at regular vertical intervals during boring in order to identify and give a record of the strata encountered. Disturbed samples of soil were placed in a plastic tub (D samples) or sealed in plastic bags (B samples).

Disturbed samples were taken from cores recovered from the boreholes advanced by rotary drilling, and were placed in a plastic tub (D samples) or sealed in plastic bags (B samples). Intact samples from the recovered core were cut and preserved (C samples). Subsampling from recovered cores was undertaken at the on-site logging facility, and as requested by RPS after the completion of fieldwork at the Fugro's in-house laboratory.

Geotechnical samples were transported to Fugro's in-house laboratory in Consett, County Durham, before being distributed to the various other subcontracted laboratories, for examination and testing as scheduled by RPS.

Geoenvironmental samples were transported directly to the subcontracted environmental laboratory for examination and testing as scheduled by RPS.

Details of the subcontracted laboratories are given in later sections of the report: Geotechnical Laboratory Testing (Section 7) and Geoenvironmental Laboratory Testing (Section 8).

4.5 Photographic Records

Photographs of the cores recovered from rotary drilling were taken by geotechnical engineers from Fugro; the photographs are presented in Appendix D and have also been provided as digital data in JPEG format.

4.6 Positioning

The borehole positions were set out using grid coordinates provided by RPS.

The grid coordinates and deck elevations at the as-built borehole positions were determined using the Fugro's Starfix positioning system, Starfix.G2+. The system is based on advanced Integer Ambiguity Resolution (IAR) technology and uses corrections generated by Fugro's global Starfix network of reference stations received from geostationary communication satellites. The system affords centimetre level accuracy to horizontal and vertical positioning.

The grid coordinates and seabed elevations have been given to the nearest 0.01 m on the records. The grid coordinates refer to the British National Grid. The seabed elevations refer to the Chart Datum (CD).

5. EXPLORATORY HOLE INVESTIGATION

5.1 Cable Percussion Boring

Five, 200 mm minimum diameter, boreholes (BH05 to BH08 and BH11) were sunk to depths of 5.00 m BSL and 7.50 m BSL using cable tool percussion boring techniques.

Eleven, 150 mm and 200 mm minimum diameter boreholes (BH01 to BH04, BH09, BH20 to BH23, BH24a and BH30) were sunk to depths between 0.50 m BSL and 7.50 m BSL using cable tool percussion boring techniques and then were extended by rotary coring techniques.

The boreholes were constructed from a jack-up platform Skate 3A using Dando drill rig.

The borehole records are presented in Appendix C.

5.2 Rotary Drilling

Eleven boreholes (BH01 to BH04, BH09, BH20 to BH23, BH24a and BH30) were extended using rotary core drilling techniques to depths of between 7.65 m BSL and 26.00 m BSL.

The rotary drilling was carried out using Geobor S size (146 mm) triple tube core barrels with rigid coreliner and “combination” bits. Seawater was used as the flush medium.

The cores are photographed on site and logged by geotechnical engineers from Fugro. The borehole records are presented in Appendix C. The rotary core photographs are given in Appendix D.

6. IN SITU AND FIELD TESTING

6.1 Standard Penetration Tests

Standard penetration tests (SPTs) using a split spoon (S) or a solid 60° cone (C) were carried out in accordance with BS EN ISO 22476-3:2005+A1:2011.

The results are shown as S(N) and C(N) values on the borehole records at the relevant depths in Appendix C and, tabulated in Figures E.1.1 to E.1.16 in Appendix E. The relevant SPT trip hammer calibration report is also presented in Appendix E.

7. GEOTECHNICAL LABORATORY TESTING

7.1 Introduction

The following laboratory tests were scheduled by RPS and carried out by or for Fugro in accordance with BS1377 where applicable. The results are given in tabular and/or graphical form as appropriate in Appendix F. Attention is drawn to the comments on interpretation of the results of the investigation on the Notes on Exploratory Hole Records (Figure C.1.1). General Notes on Laboratory Test Results (Figure F.1.1) also given preceding the laboratory test results in Appendix F.

All tests with the exception of the ones listed below were carried out in the Fugro in-house laboratory at Wallingford, and the tests for which the laboratory has UKAS accreditation are detailed in Appendix F:

- Selective shear box tests by MATtest Limited (MATtest);

The laboratory testing was still ongoing on 15 March 2019, at the time this interim draft report was produced. The test numbers stated below relate only to the results that were included in this interim draft report.

7.2 Summary

Table 7.1 summarises the types of geotechnical laboratory tests for the investigation; the numbers of test reported; the laboratories of which the tests were undertaken; where the results are located in Appendix F.

Table 7.1: Summary of geotechnical laboratory tests undertaken

Test Type		Number of Tests Reported	Laboratory	Laboratory Reference
Soil Classification	Water Content	56	Fugro	Fig. F.3.1
	Atterberg Limits †	23		
	Natural Density	8		
PSD *	Sieve	31	Fugro	Fig. F.3.2
	Pipette	9		
Oedometer Test *		11	Fugro	Fig. F.3.3

Test Type		Number of Tests Reported	Laboratory	Laboratory Reference
Undrained Shear Strength (Total Stress) (UUT) *	UUT – Single Stage	12	Fugro	Fig. F.3.4.1
	UUT – Multistage	7	Fugro	Fig. F.3.4.2
Shear Strength * (Effective Stress)	Isotropic CDT	3	Fugro	Fig. F.3.5.1
	Isotropic CUT	10		Fig. F.3.5.2
Direct Shear – Shear Box		3	Fugro	Fig. F.3.6
		-	MATtest	-
Point Load Strength Index (PLT) *		25	Fugro	Fig. F.3.7
Unconfined Compressive Strength (UCS) *		7	Fugro	Fig. F.3.8
Direct Shear – Rock Discontinuities		4	Fugro	Fig. F.3.9

Notes:

* Further information described in the subsections below.

† Atterberg Limits (liquid and plastic limits) were performed on 23 samples; 2 of the samples were found to be non plastic and the liquid limit was not determined.

7.3 Particle Size Distribution Analyses

Particle size distribution analyses (PSD) were undertaken on a total of 40 samples in order to classify the materials in respect to their grain size: 9 PSDs were carried out by sieving and continued by sedimentation; 31 were carried out by sieving only.

8. GEOENVIRONMENTAL LABORATORY TESTING

Geoenvironmental laboratory tests were scheduled by RPS. Test results on a total of 40 soil samples are provided.

Information on sample collection, preservation, and deviating samples is given in the Notes on Chemical Analysis for Contaminated Land Assessment (Figure G.1) at the beginning of Appendix F. Schedule of Contamination Tests – Soil Samples (Figure G.2) summarises the scheduled analytical suites per sample.

The results are given in Concept Life Sciences (CLS) certificate of analysis reference numbers 783470-2, 785487-2, 785568-2, 785646-2 and 785882-1 in Appendix F. These results include details of any deviating samples and the reasons for any deviations.

9. DIGITAL DATA DELIVERABLES

Table 9.1 summarises the types and formats of the digital data provided.

Table 9.1: Digital data deliverables

Content	Data Format	File Reference	Remarks
Exploratory Hole Records, Field Test and Laboratory Test Data	Association of Geotechnical Specialists (AGS) Version 4.0	G180030U_DraftAGS.ags	Will be accompanying the draft report.
Core Photographs	JPEG	(various)	Provided previously via Fugro SFT.
Notes: Fugro SFT – Fugro Secure File Transfer System (https://sft.fugro.com/)			

10. REFERENCES

BRITISH DRILLING ASSOCIATION (BDA), 2008. *Guidance for Safe Intrusive Activities on Contaminated or Potentially Contaminated Land*. Appendix A Site categorisation system. BDA.

BRITISH STANDARDS INSTITUTION (BSI), 1999. *BS 5930:1999+A2:2010. Code of Practice for Site Investigations*. London: BSI.

BRITISH STANDARDS INSTITUTION (BSI), 2006. *BS EN ISO 22475-1:2006. Geotechnical Investigation and Testing – Sampling Methods and Groundwater Measurements.* Technical principles for execution. London: BSI.

BRITISH STANDARDS INSTITUTION (BSI), 2006. *BS EN ISO 22476-3:2005+A1:2011. Geotechnical Investigation and Testing – Field testing.* Standard penetration test. London: BSI.

BRITISH STANDARDS INSTITUTION (BSI), 2007. *BS EN 1367-1:2007. Tests for Thermal and Weathering Properties of Aggregates.* Determination of resistance to freezing and thawing. London: BSI.

BRITISH STANDARDS INSTITUTION (BSI), 2007. *BS EN 1997-2:2007. Eurocode 7 – Geotechnical Design.* Ground investigation and testing. London: BSI.

BRITISH STANDARDS INSTITUTION (BSI), 2018. *BS EN ISO 14688-1:2018. Geotechnical Investigation and Testing – Identification and Classification of Soil.* Part 1 Identification and description. London: BSI.

BRITISH STANDARDS INSTITUTION (BSI), 2018. *BS EN ISO 14689:2018. Geotechnical Investigation and Testing – Identification, Description and Classification of Rock.* Part 1 Identification and description. London: BSI.

NORBURY, D.R., CHILD, G.H., and SPINK, T.W., 1986. A Critical Review of Sections 8 (BS 5930:1981) – Soil and Rock Descriptions. Geological Society Engineering Geology Special Publication No. 2. *Proceedings of 20th Regional Meeting of the Engineering Group.* Guildford.

APPENDICES

A. GUIDELINES ON USE OF REPORT
A.1 Health and Safety File
A.2 Sample Storage
A.3 Eurocodes, Standards and Specifications
A.4 Limitations and Use of Data

B. DRAWINGS

C. EXPLORATORY HOLE RECORDS
C.1 Notes and Keysheets
C.2 Exploratory Hole Records

D. PHOTOGRAPHS
D.1 Rotary Core Photographs

E. IN SITU FIELD TEST RESULTS
E.1 Standard Penetration Tests

F. GEOTECHNICAL LABORATORY TEST RESULTS
F.1 Guidance Notes
F.2 UKAS Schedules
F.3 Results

G. GEOENVIRONMENTAL LABORATORY TEST RESULTS
G.1 Guidance Notes
G.2 Schedules and Analytical Suites
G.3 Test Certificates

A. GUIDELINES ON USE OF REPORT

A.1 HEALTH AND SAFETY FILE

A.2 EUROCODES, STANDARDS AND SPECIFICATIONS

A.3 LIMITATIONS AND USE OF DATA

A.1 HEALTH AND SAFETY FILE

A.1.1 INTRODUCTION

This report forms part of Section 14 of the Health and Safety File for the project. The Introduction section of this report provides a brief description of the ground investigation works carried out for this project. The General Method Of Investigation section of this report describes the method of investigation.

Made Ground was not encountered in the exploratory holes.

Contamination analyses were undertaken as part of the scope of works and the results are presented in Appendix F.

A.1.2 COMPLETION OF EXPLORATORY HOLES

Backfilling of the exploratory holes was not requested. The boreholes were generally allowed to backfill naturally as casing was pulled.

A.1.3 WASTE MANAGEMENT

Fugro operates under a Waste Management Policy which includes segregation of waste on all sites and appropriate processing or disposal of waste and abides by relevant current legislation and duty of care.

During the investigation waste products and arisings were disposed of appropriately according to Fugro's waste management policy.

On completion of the project (generally four weeks after issue of the final report), unless otherwise requested, the remaining soil and rock samples were disposed of to appropriate landfill.

A.2 EUROCODES, STANDARDS AND SPECIFICATIONS

A.2.1 INTRODUCTION

The investigation has been carried out in accordance with the Contract documentation and current Eurocode Standards from the following:

- EUROCODE STANDARDS (including applicable National Forewords and Annexes).
- BS EN 1997-1:2004+A1:2013 and National Annex NA to BS EN 1997-1:2004.
- BS EN 1997-2:2007 and National Annex NA to BS EN 1997-2:2007.
- The normative documents given in BS EN 1997-2:2007 Section 1.2 including:
  - BS EN ISO 14688-1:2018 Geotechnical investigation and testing – Identification and classification of soil. Part 1 Identification and description;
  - BS EN ISO 14689:2018 Geotechnical investigation and testing – Identification, description and classification of rock. Part 1 Identification and description; as appropriate, and
- BS EN ISO 22476 – Various In situ Testing.
- BS 10175:2011+A2:2017 – Investigation of potentially contaminated sites. Code of practice.

A.2.2 CODES OF PRACTICE

- BS 5930:2015. Code of practice for ground investigations. British Standards Institution.
- Guidance for safe intrusive activities on contaminated or potentially contaminated land. British Drilling Association (BDA), 2008.

A.2.3 METHODS OF IN SITU TEST

- BS 1377, Methods of test for soils for civil engineering purposes. British Standards Institution.
- BS 5930:2015, Code of practice for ground investigations. British Standards Institution.
- BS EN ISO 22476, Geotechnical investigation and testing – Part 3 (BS EN ISO 22476-3:2005+A1:2011): Standard Penetration Test.
- BS EN 1997-2:2007 Eurocode 7 – Geotechnical design – Part 2 Ground Investigation and testing. Section 4 Field tests in soil and rock.

A.2.4 REPORT STATUS

The current report comprises part of the Ground Investigation Report for the project, in particular a presentation the factual data from the ground investigation, including items outlined in BS EN 1997-2: 2007 Section 6 sub section 6.1 (2) part and sub section 6.2 (2) part. Specifically the report covers BS EN 1997-1: 2004 Section 3 sub section 3.4.2 excluding:

- field reconnaissance
- history of site
- information from aerial photographs
- local experience of the area
- information about seismicity of the area
- possibility of the occurrence of Radon
- data on frost susceptibility of the soils

The report does not provide an evaluation of geotechnical information (BS EN 1997-1: 2004 Section 3 sub section 3.4.3 and BS EN 1997-2: 2007 Section 6 sub section 6.3 and 6.4) for the Ground Investigation Report, nor is it a Geotechnical Design Report.

Note that the investigation is carried out generally in accordance with the current BS 5930:2015, Code of practice for ground investigations which has recently been amended to remove any conflicts with current Eurocode standards, particularly BS EN ISO 14688-1:2018, BS EN ISO 14689:2018 include for rock and BS EN ISO 22475-1:2006 include for groundwater.

It is understood that the proposed works (refurbishment of the existing pier infrastructure) involve harbour basin dredging, revetment construction and reclamation. The geotechnical category may be 2 – conventional structures and foundations.

A.3 LIMITATIONS AND USE OF DATA

The scope of the investigation was determined by the RPS Consulting Engineers for the particular project requirements set out in the Specification for the Contract. A factual report only was required, without interpretation of the data from the present investigation or consideration of data from other sources, except where noted. The data presented in this report reflects the site conditions encountered at the time the investigation was performed. The investigation has disclosed evidence of conditions at point locations across the site which provides information about discrete volumes of soil

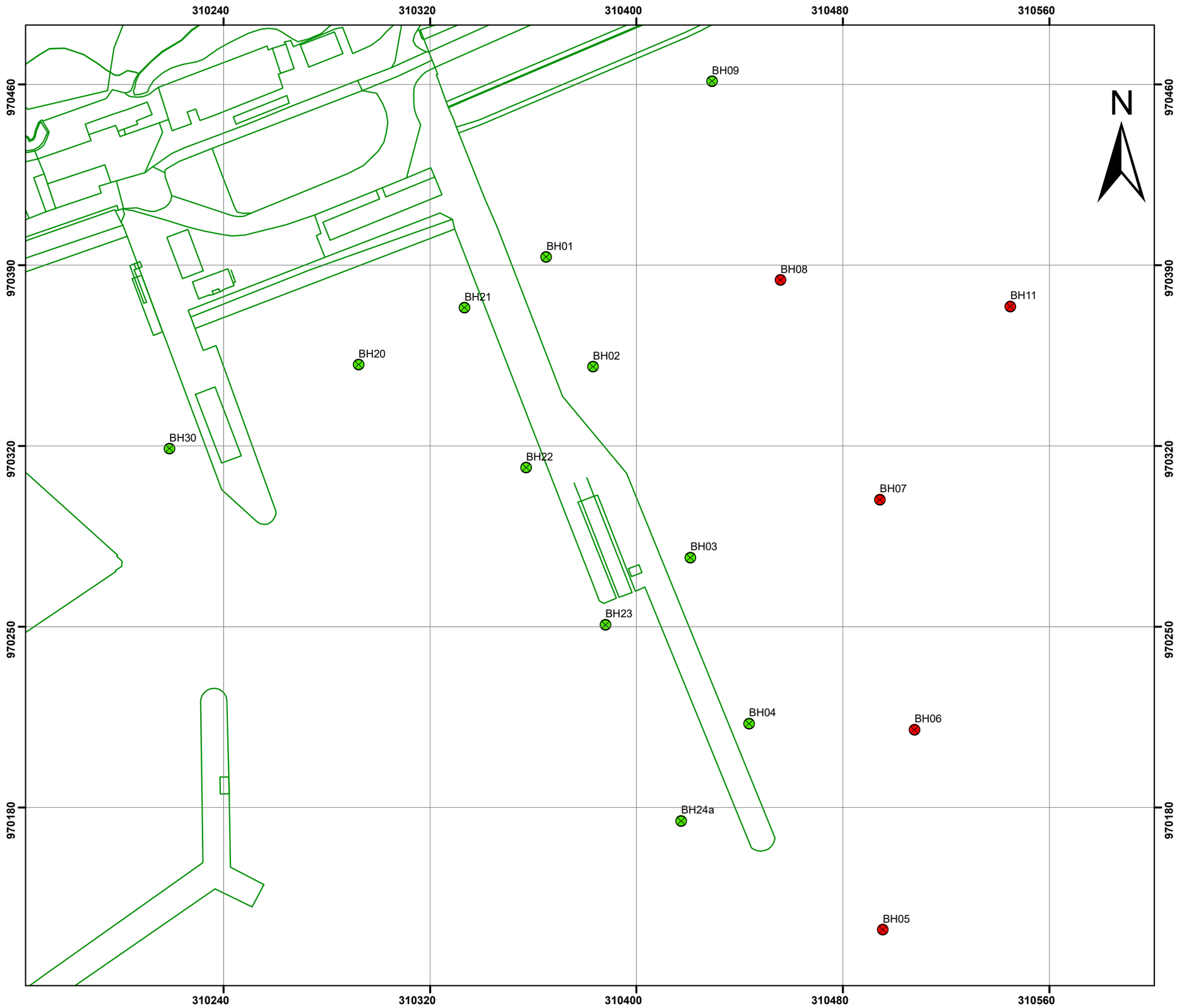
or rock. Accordingly, there may be ground conditions at the site which may not have been revealed by the investigation, and the passage of time may give rise to changes in the conditions encountered. Any interpolation or extrapolation of strata from the exploratory holes is subject to the interpretation of the reader. The records should be read in conjunction with the Notes on Exploratory Hole Records in Appendix C. Particular attention is drawn to the comments made on groundwater and interpretation which are given in these Notes.

The investigation has been carried out by Fugro GeoServices Limited and the report has been prepared for the sole internal use of Scrabster Harbour Trust. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Fugro GeoServices Limited. If an unauthorised third party comes into possession of this report they rely upon it at their peril and the authors owe them no duty of care and skill.

It is Fugro GeoServices Limited's understanding that this report is to be used for the purposes as described in the Specification for the investigation and as summarised in the text of the report. Should the purpose for which the report is used or the proposed use of the site change, this report may no longer be valid. Any further use or reliance upon the report in these circumstances by Scrabster Harbour Trust without further review by and advice from Fugro GeoServices Limited shall be at their sole and own risk.

B. DRAWINGS

Exploratory Hole Location Plan Figure LP1



GENERAL LOCATION PLAN:

GENERAL LOCATION PLAN SCALE:

0 0.2 0.4 0.8 1.2 1.6 km

PLAN SCALE:

0 10 20 40 60 80 m

Legend

- Cable Percussion Boreholes
- Cable Percussion/Rotary Follow-on Boreholes

Notes:
1. Inset map provided by ESRI UK
2. Sheet size: A3
3. Coordinate system: British National Grid

CLIENT: SCRABSTER HARBOUR TRUST

PROJECT: ST. OLA PIER REFURBISHMENT-
SITE INVESTIGATION (MARINE)

TITLE: EXPLORATORY HOLE LOCATION PLAN

GIS BY: EMM	DATE: 23/01/2019
CHECKED BY:	DATE:
APPROVED BY:	DATE:
CONTRACT NO.: G180030U	FIGURE NO.: LP1

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C. EXPLORATORY HOLE RECORDS

C.1 NOTES AND KEYSHEETS

Notes on Exploratory Hole Records	Figure C.1 (7 pages)

C.2 EXPLORATORY HOLE RECORDS

Schedule of Boreholes	Figure C.2 (1 pages)
Borehole Records	BH01 to BH09, BH11, BH20 to BH23, BH24a and BH30

NOTES ON EXPLORATORY HOLE RECORDS

GENERAL NOTES

1 OPERATING PROCEDURES

The procedure used for cable percussion boring, rotary drilling, trial pitting, sampling, in situ and laboratory testing and sample descriptions are generally in accordance with BS5930:1999 'Code of practice for site investigations', BS EN ISO 14688-1:2002 'Geotechnical investigation and testing – Identification and classification of soil – Part 1 Identification and description', BS EN ISO 14689-1:2003 'Geotechnical investigation and testing – Identification and classification of rock – Part 1 Identification and description' as appropriate, and BS1377:1990 'Methods of test for soils for civil engineering purposes', unless stated otherwise. Sampling is carried out in general accordance with EN ISO 22475-1 and Standard Penetration Testing (SPT) is carried out to EN ISO 22476-3:2005.

2 GROUNDWATER

Exploratory hole water levels are recorded together with the depths at which seepages or inflows of water are detected. These observations are noted on the Records, but may be misleading for the following reasons:

a) The exploratory hole is rarely left open at the relevant depth for a sufficient time for the water level to reach equilibrium.

b) A permeable stratum may have been sealed off by the borehole casing.

c) Water may have been added to the borehole to facilitate progress.

d) The permeability may have been altered by the excavation/boring/drilling process.

Standpipes or piezometers should be installed when an accurate record of groundwater level is required, however, it should be noted that groundwater levels may vary significantly due to seasonal, climatic or man made effects. Water levels recorded during the investigation and any advice or comment made accordingly may, therefore, not be appropriate to particular foundation, geotechnical design, or temporary works solutions. Long term monitoring of standpipes or piezometers is always recommended when water levels are likely to have a significant effect on design.

3 CHISELLING

The remarks in the Borehole Records contain information on the time spent advancing the borehole by 'Chiselling Techniques', and the depth of borehole over which it was required. Such information may be affected by a wide range of variable factors, unrelated to the geotechnical properties of the strata. Such factors include, but are not restricted to: plant, equipment and operator. The data should, therefore, only be used subjectively and with extreme caution.

4 IDENTIFICATION AND DESCRIPTION OF SOILS - SEE SEPARATE SHEET

The identification system follows the Company's Engineering: Geotechnical Procedures Manual which is based on BS EN ISO 14688-1:2002 and appropriate clarifications in the National Foreword, BS 5930:1999 and BS EN ISO 14689-1:2003

Relative density terms are given where supported by SPT N values, with the exception of Made Ground. The field assessment of compactness or relative density for coarse grained soils is only given on trial pit records where appropriate assessment of the soils has been undertaken.

Where the terms 'soft to firm', 'firm to stiff' etc. are used they indicate a strength which is close to the borderline between the two terms and cannot be precisely defined by inspection only, and/or which is indicated as borderline or ranging between the two terms after consideration also of in situ and laboratory test results. Consistencies may have been amended in the light of test results

Where 'to' links two terms, as in 'slightly sandy to sandy' this again represents a borderline case or a range, where the precise proportions cannot be determined as outlined previously.

The name of the geological formation is only given where this has been requested and can be determined with confidence (see Clause 41.5 of BS 5930:1999).

5 INTERPRETATION OF THE RESULTS OF THE INVESTIGATION

The description of ground conditions encountered and any engineering interpretation included in the report are based on the results of the boreholes and trial pits and the field and laboratory testing carried out. There may be ground conditions at the site which have not been revealed by the investigation and consequently have not been taken into account.

Any interpolation or extrapolation of strata between exploratory holes shown on any cross sections or site plans is an estimate only of the likely stratification based on general experience of the ground conditions and is subject to the interpretation of the reader.

The term "TOPSOIL" is used in this report to describe the surface, usually organic rich, layer including turf, subsoil and weathered material with roots. The use of this term may not imply that the soil satisfies the requirements of Clause 3 of BS 3882:1994, 'Specification for topsoil', or is suitable for general horticultural and agricultural purposes.

Laboratory test results in this report give the soil properties of individual specimens tested under specified conditions. Individual results or groups of results may not be appropriate for use as design parameters for some geotechnical analyses. The samples may be non-representative, disturbed internally, or prepared and tested under conditions suited for different geotechnical applications. Unless the selection of design parameters is discussed in this report, it is recommended that the advice of a Geotechnical Specialist is sought.

NOTES ON EXPLORATORY HOLE RECORDS

IN SITU TESTING AND SAMPLING

STANDARD PENETRATION TESTS

S( )&C( ) Standard Penetration Test (SPT). S( ) denotes a 50mm diameter split barrel sampler, normally undertaken in cohesive and mixed soils and C( ) indicates the test was carried out using a 50mm diameter, 60 degree apex, solid cone normally used in coarse granular soils and weak rock. The tests are carried out in accordance with EN ISO 22476-3:2005

The distance that the SPT assembly sinks into the ground prior to the start of the test is measured and reported as Static Weight Penetration (SWP). The sampler or cone is driven up to 450mm into the soil using a 63.6kg hammer with a 760mm drop. An initial seating drive of 150mm (or 25 blows whichever is less) is undertaken to penetrate through any ground which may be disturbed at the base of the borehole. For the test drive, the number of blows required to obtain an additional 300mm penetration (or penetration for 50 / 100 blows) is recorded as the penetration resistance (also known as the 'N' value). The test is usually completed when the test drive attains the 300mm penetration or the number of blows recorded during the 'test drive' only reaches 50 in soils or 100 in weak rock.

If the sampler advances below the bottom of the borehole under the static weight of the drive rods with the hammer assembly on top, the corresponding penetration is not included as seating drive but the information is reported separately as SWP. The test is terminated in all cases before the non return valve reaches the level of the material at the base of the borehole, in effect about 600mm total penetration. If SWP (Static Weight Penetration) is greater than 150mm then test increments of 75mm are undertaken with the final increment being completed at less than 600mm total penetration including SWP.

If a sample is not recovered in the sampler, or the cone is used, a disturbed sample of appropriate size for the material is taken on completion of the test over the depth of the test zone. The sample is given the same depth as the top of the Standard Penetration Test drive.

The depth on the Borehole Record at the left hand side of the 'Depth' column is that at the start of the test Where full penetration of the test drive is obtained, the penetration resistance ('N' value) is reported in the 'SPT Blows/N' column. If full penetration in the test drive is not obtained, then the length of drive (test length in mm) and the penetration resistance (number of blows) are both reported. Full results, including the cone or barrel type, static weight penetration, blows and penetration of each of the Seating Drive and Test Drive increments, the calibration reference number for the SPT hammer assembly, the energy ratio and the 'N' value, as well as start and end depths and water and casing levels are given on the separate Standard Penetration Test Summary

* in the 'Test Length' column denotes that the blows and penetration include the initial Seating Drive blows.

OTHER IN SITU TESTS

The following in situ tests are reported on the **Exploratory Hole Records**, in the 'Test' or 'Type' and 'Results' columns where appropriate.

k In situ Permeability Test - refer to detailed test results for permeability values

PMT Pressuremeter Test - refer to detailed test results for modulus values, etc.

FV/FVR Borehole Shear Vane Test (undrained shear strength - c_u - in kPa) - refer also to detailed test results, N - 'Natural' or peak shear strength, R - Remoulded shear strength

HV/HVR Hand Shear Vane Test (Direct reading of undrained shear strength in kPa). 'N' and 'R' as above. The values are indicative and should not be taken as being equivalent to laboratory test results. The Pilcon vane results have a factor varying from about a sixth for the 33mm vane to a third for the 19mm vane which reduces the BS1377 shear vane value. The values presented are therefore approximate and should be treated with great caution if used for design purposes

PP Pocket Penetrometer. Unconfined Strength (UCS) reported in kg/cm^2 to the nearest 0.25 kg/cm^2 or kPa with the same accuracy. Equivalent c_u in kPa is very approximately UCS x 50. Pocket Penetrometers are an aid to logging of cohesive soils, the results are indicative and should not be relied upon. The equipment used is not calibrated

CBR California Bearing Ratio Test (CBR%) - refer also to detailed test results

PID Photo-Ionisation Detector Readings in headspace of small disturbed chemical samples. Result given in ppm by volume

NOTES ON EXPLORATORY HOLE RECORDS

IN SITU TESTING AND SAMPLING

UNDISTURBED SAMPLES

All samples recovered are recorded and handled in accordance with EN ISO 22475-1.

U/UT General purpose open tube sample. Sample normally taken with open tube sampler approximately 0.1m diameter and 0.45m long and driven with an 80kg sinker bar and 56kg sliding hammer, unless noted otherwise. "XX" in U100 blows column denotes the number of hammer blows. The height of hammer drop can be variable depending on operator technique. Depths are given of the top of the sample if full penetration and recovery are achieved, otherwise actual lengths of penetration and recovery are given in the appropriate columns.

'U' denotes steel or plastic liner sample in general use up to year 2010 designated OS/TKW in accordance with BS EN ISO 22475-1 with an area ratio greater than 25%. 'UT' denotes thin wall open tube sampler designated OS/TW with an area ratio less than 15%, available from 2010.

U/UT(X) General purpose open tube sample (X) mm diameter

TW(X) Thin wall (push) sample (X) mm diameter

P(X) Piston sample (X) mm diameter

DISTURBED AND CORE SAMPLES

CBR	Sample taken in CBR Mould
D	Small disturbed sample (plastic tub or jar with air tight lid)
B	Bulk disturbed sample (polythene bag, tied at neck - size dependent on purpose)
LB	Large Bulk disturbed sample (normally several bulk samples of the same material - size dependent on purpose)
W	Water sample
C	Core sample
CS	Short core, generally about 100mm
CL	Long core, generally 250mm to 300mm
#	Sample not recovered

ENVIRONMENTAL SAMPLES

CD	Sample for chemical analysis in a plastic tub
K	Sample for chemical analysis in an amber glass jar
V	Sample for chemical analysis in a glass vial
CDKV	Set of samples for chemical analysis as above
WAC	Sample for Waste Acceptance Criteria
ES	Environmental Soil Sample
EW	Environmental Water Sample

NOTES ON EXPLORATORY HOLE RECORDS

KEY TO BOREHOLE AND TRIAL PIT RECORDS

Soil Types

Coarse grained, Non cohesive

- Boulders
- Cobbles
- Gravel
- Sand

Fine grained, Cohesive

- Silt
- Clay

Other Soil Types

- Topsoil
- Peat
- Made Ground

Note: Composite soil types may be signified by combined symbols.

Rock Types

Sedimentary

- Sandstone
- Siltstone
- Conglomerate
- Chalk
- Limestone
- Breccia
- Coal
- Mudstone/Claystone/Shale

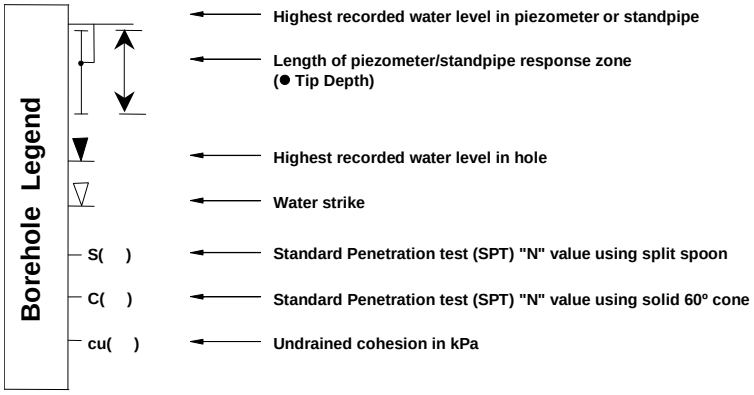
Metamorphic

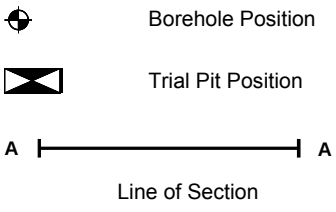
- Coarse/Medium grained
- Fine grained

Igneous

- Coarse grained
- Medium grained
- Fine grained

KEY TO SITE PLANS AND CROSS SECTIONS





NOTES ON EXPLORATORY HOLE RECORDS

DESCRIPTION OF ROCK CORES

DESCRIPTIVE ORDER

Strength, Structure, Colour, Texture, Grain Size, ROCK NAME. Minor constituents and additional information. (Geological formation - see comments under identification and description of soils). Mass characteristics - factual description of weathering state (if appropriate) and description of discontinuities and fracture state (if appropriate).

Term	Field identification	Strength (MPa)
Extremely weak	Can be indented by thumbnail. Gravel sized lumps crush between finger and thumb.	<1.0
Very weak	Crumbles under firm blows with point of geological hammer. Can be peeled by a pocket knife.	1 – 5
Weak	Peeled by a pocket knife with difficulty. Shallow indentations made by firm blow with point of geological hammer.	5 – 25
Medium strong	Cannot be scraped with pocket knife. Can be fractured with a single firm blow of geological hammer.	25 – 50
Strong	Requires more than one blow of geological hammer to fracture.	50 – 100
Very strong	Requires many blows of geological hammer to fracture.	100 – 250
Extremely strong	Can only be chipped with geological hammer.	> 250

DISCONTINUITIES

Bedding Spacing & Planar Structures *	Spacing (mm)	Discontinuity Spacing
	>6000	Extremely widely spaced
Very thickly bedded	>2000 2000-6000	Very widely spaced
Thickly bedded	600 - 2000	Widely spaced
Medium bedded	200 - 600	Medium spaced
Thinly bedded	60 - 200	Closely spaced
Very thinly bedded	20 - 60	Very closely spaced
Thickly laminated (Sedimentary) narrow (Metamorphic & Igneous)	6 – 20 <20	Extremely closely spaced
Thinly laminated (Sedimentary) Very narrow (Metamorphic & Igneous)	<6	

* For igneous and metamorphic rocks the appropriate descriptive term for planar structure should be used e.g. medium foliated gneiss, very narrowly cleaved slate, very thickly flow banded diorite.

WEATHERING

Standard descriptions of weathered rocks for engineering purposes should always include comments on the degree, extent and nature of any weathering effects at material or mass scales. This may allow subsequent classification and provide information for separating rock into zones of like character. Indications of weathering include

- changes in colour
- changes in fracture state
- reduction in strength
- presence, character and extent of weathering products

If a systematic classification following the guidelines given in the Standard can be applied unambiguously, this is described in the text of the report. Otherwise, the rocks are not classified in terms of weathering beyond the approach described above.

Weathering terms that may be used for description of rock material and these terms may be qualified or combined.
Discoloured - The degree and type of colour change from original is described, and if for mass or particular mineral constituents
Disintegrated - Fragmentation by physical weathering, bonding lost but material fabric intact. Material friable, not decomposed
Decomposed - Chemical alteration of mineral grains so material fabric is intact but some or all grains are decomposed

For rock mass weathering the following terms may be used
Slightly - Discolouration on surfaces and / or of material
Moderately - Less than half of mass decomposed/disintegrated. Fresh/discoloured rock as continuous material or corestones
Highly - More than half decomposed/disintegrated. Fresh/discoloured rock as discontinuous framework or corestones
Completely - All rock material decomposed and/or disintegrated. Original mass structure largely intact
Residual Soil - All material converted to soil, structure and fabric destroyed, may be volume change but material not moved
The term 'Fresh' is used to indicate that there is no visible weathering or alteration, except possibly slight discolouration on major surfaces.

NOTES ON EXPLORATORY HOLE RECORDS

ROCK CORES

ROCK CORE SIZES

The core barrels commonly used by the Company in site investigations are as follows:

Core Barrel Type	Borehole Diameter (mm)	Standard Core Size (mm)	Core Size using Rigid Plastic Liner (mm)	Casing Size or Type	Casing O.D (mm)	Casing I.D (mm)
STANDARD BRITISH SIZES						
NWM	75.7	54.7	51	NX	88.9	76.2
HWF	98.8	76.2	72	HX	114.3	100.0
HWAF	99.5	70.9	-	HX	114.3	100.0
PWF	120.0	92.1	87	PX	139.7	122.3
SWF	145.4	112.8	107	SX	168.3	147.7
UWF	173.7	139.8	132	UX	193.7	176.2
WIRELINE SIZES						
BQ	59.9	36.4	35			
NQ	75.7	47.6	45			
HQ	96.1	63.5	61			
PQ	122.7	85.0	82			
GEOBOR S	146.0	102.0	102	SX	168.3	147.7
THINWALL SIZES						
TNX	75.7	60.8	-	NX	88.9	76.2
T2 66	66.1	51.9	-	74	74.3	67.3
T2 76	76.1	61.9	-	84	84.3	77.3
T2 86	86.1	71.9	68	98	98.0	89.0
T2 101	101.1	83.9	80	113	113.0	104.0
T6 116	116.1	92.9	89	128	128.0	118.0
T6 131	131.1	107.9	104	143	143.0	133.3
NON STANDARD BARRELS						
4.12F TRIEFUS	105.2	74.7	72	PX	139.7	122.3
5.5x4C SINGLE TUBE	139.7	101.6	-	SX	168.3	147.7
B116	116	102	-	PX	139.7	122.3
B146	146	132	-	SX	168.3	147.7

Note: Core diameters may vary when different lining systems are in use.

ROCK CORE CHARACTERISTICS

TCR **Total Core Recovery.** The length of the total amount of core sample recovered, expressed as a percentage of the length of the core run.

SCR **Solid Core Recovery.** The length of solid core recovered, expressed as a percentage of the length of the core run. Solid core is defined as that length of core which has a full diameter, but not necessarily a full circumference. Only natural fractures are considered. Drilling or handling induced fractures are ignored.

RQD **Rock Quality Designation.** The length of solid core recovered in pieces each more than 100mm long as a percentage of the core run length.

I_f **Fracture Index.** The number of discontinuities expressed as 'fractures per metre', measured over any convenient length of consistent fracture characteristics. Fracture index is normally measured axial along the core.

F_s Fracture Spacing. The minimum, average and maximum spacing of discontinuities in mm, measured over any convenient length of consistent fracture characteristics. Fracture spacing is normally measured perpendicular to the discontinuity plane unless indicated otherwise.

AZCL Assumed Zone of Core Loss

Zones of atypical fracturing of restricted extent which occur within a rock unit of uniform fracture characteristics are identified within the Description of Strata, but not given a separate I_f / F_s.

NI - Not Intact NR - No Recovery NA - Not Applicable DI – Drilling Induced

I_s Corrected **Point Load Strength Index** $I_{s(50)}$ which is given in MPa

NOTES ON EXPLORATORY HOLE RECORDS

IDENTIFICATION AND DESCRIPTION OF SOILS

	Basic Soil Type	Particle Size (mm)		Visual Identification
VERY COARSE SOILS	BOULDERS		200	Large Boulders >630mm. These soils only seen complete in pits or exposures. Often difficult to recover from boreholes.
	COBBLES			
COARSE SOILS (Typically over 65% Sand and Gravel Sizes)	GRAVEL	coarse	63	Easily visible to naked eye; particle shape can be described, grading can be described. Well graded: wide range of grain sizes, well distributed. Poorly graded: not well graded. (May be uniform: size of most particles lies between narrow limits; or gap graded; an intermediate size of particle is markedly under represented).
		medium	20	
		fine	6.3	
	SAND	coarse	2	Visible to naked eye; no cohesion when dry; grading can be described. Well graded and poorly graded: as above
		medium	0.63	
		fine	0.2	
FINE SOILS (Typically over 35% Silt and Clay Sizes)	SILT	coarse	0.063	Only coarse silt visible with hand lens; exhibits little plasticity and marked dilatancy; slightly granular or silky to touch. Disintegrates in water; lumps dry quickly; possesses cohesion but powders easily between fingers. Term "SILT" or "CLAY" must be used, "SILT/CLAY" not allowed.
		medium	0.02	
		fine	0.0063	
	CLAY		0.002	Dry lumps can be broken but not powdered between the fingers; they also disintegrate under water but more slowly than silt; smooth to the touch; exhibits plasticity but no dilatancy; sticks to the fingers and dries slowly; shrinks appreciably on drying usually showing cracks. Intermediate and high plasticity clays show these properties to a moderate and high degree, respectively.
ORGANIC SOILS	ORGANIC CLAY, SILT or SAND	Varies		Contains varying amounts of organic vegetable matter - defined by colour: grey - slightly organic; dark grey – organic; black – very organic.

Composite Soil Types
(Mixtures of basic soil types)

Scale of secondary constituents with coarse and very coarse soils. Term before, description after principal

Term before (term in ' [ ] ' may be used for 2nd ry parts, matrix etc)	Principal Soil Type	Description after	Approx % 2nd ry soil type
Slightly (sandy*) [occasional / little]	(COBBLES or BOULDERS See Notes); SAND, GRAVEL;	Used to describe components of secondary constituents. e.g. Gravel is fine and medium subangular fine sandstone and mudstone.	<5
--(sandy*) [some]			5 – 20
Very (sandy*) [much / many]			20 to 40†
--		and (sand*) or and (cobbles+)	50†

* Fine or coarse soil type as appropriate
\+ Very coarse soil type – see Notes
† described as fine soil depending on behaviour

Scale of secondary constituents with fine soils. Terms before, description after principal constituent.

Term before	Principal Soil Type	Description after	Approx % 2nd ry soil type
Slightly (sandy*)	CLAY or SILT	Used to describe components of secondary constituents e.g. sandy gravelly CLAY. Gravel is coarse rounded quartzite	<35
-- (sandy*)			35 to 65†
Very (sandy*)			>65†

* Coarse soil type as appropriate
† or described as coarse soil depending on mass behaviour

EXAMPLES OF COMPOSITE TYPES
(indicating preferred order for description)

Loose brown very sandy subangular coarse GRAVEL with many pockets (<5mm across) of soft grey clay.

Firm thinly interlaminated brown SILT and CLAY.

Dense light brown clayey fine and medium SAND.

Density / Consistency / Peat Condition

For very coarse soils qualitative description by inspection of voids and particle packaging.

Standard Penetration Test in Boreholes for Coarse Soils

No of blows	Relative Density
<4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
>50	Very Dense
Slightly cemented	Visual Examination: pick removes soil in lumps which can be abraded.

Silty CLAY or clayey SILT – use prefix only when secondary constituent has significant affect on material characteristics. Terms 'slightly' or 'very' not applicable.

Consistency

Very soft	Finger easily pushed in up to 25mm. Exudes between fingers
Soft	Finger pushed in up to 10mm. Moulded by fingers
Firm	Thumb makes impression easily. Rolls to thread
Stiff	Can be indented slightly by thumb. Crumbles if rolled
Very Stiff	Indented by thumbnail. Cannot be moulded
Hard	Can be scratched by thumb nail
Firm Peat	Fibres compressed together
Spongy Peat	Very compressible, open
Plastic Peat	Moulded in hand, smears

Structure

Term	Field Identification
Homo-geneous	Deposit consists essentially of one type
Interbedded or interlaminated	Alternating layers of varying types. Pre-qualified by thickness term if in equal proportions. Otherwise thickness of, and spacing between, subordinate layers defined
Hetero-geneous	A mixture of types
Weathered (granular)	Particles may be weakened and may show concentric layering
Weathered (cohesive)	Usually has crumb or columnar structure
Fissured	Breaks into blocks along unpolished discontinuities
Sheared	Breaks into blocks along polished discontinuities
Intact	No fissures
Fibrous Peat	Plant remains recognisable and retain some strength. When squeezed only water, no solids
Pseudo-fibrous Peat	Plant remains recognisable, strength lost. Partial decomposition. Turbid water when squeezed, <50% solids
Amorphous Peat	Recognisable plant remains absent, full decomposition. When squeezed only paste with >50% solids
Gyttja	Decomposed plant & animal remains, maybe inorganic constituents
Humus	Plant remains, living organisms & inorganic constituents in topsoil

Interval Scales

Scale of Bedding Spacing	Mean Spacing (mm)	Scale of Spacing of Other Discontinuities / [Blocks]
Very thickly bedded	over 2000	Very widely spaced / [Very large]
Thickly bedded	2000-600	Widely spaced / [Large]
Medium bedded	600-200	Medium spaced / [Medium]
Thinly bedded	200-60	Closely spaced / [Small]
Very thinly bedded	60-20	Very closely / [Very small]
Thickly laminated	20-6	Extremely closely spaced
Thinly laminated	under 6	

Spacing terms may also be used for distance between partings, isolated beds or laminae, desiccation cracks, rootlets etc. Terms such as partings or dustings may be used for laminae less than 2mm and less than 0.6mm respectively.

Discontinuity Shape (See Standard for Persistence/Openness)	Small scale (mm's) rough, smooth Medium scale (cm's) planar, stepped, undulating Large scale (m's) wavy, curved, straight

Particle Nature

Particle Shape & Form

Very angular
(Sub) angular
(Sub) rounded
Well rounded

Low Sphericity
Flat or Elongate

High Sphericity
Cubic

Particle Surface Texture

Rough

Smooth

Polished

NOTES Identification and descriptive method, and descriptions, generally in accordance with BS5930:1999 Section 6 clauses 41 and 43 and BS EN ISO 14688-1:2002
Additional notes relating to BS EN ISO 14688-2:2004 – modified terms for content of secondary fraction given in Annex B Table B1 are not comparable to 5930 and are not be used.
Organic Content :- Low – 2 to 6%; Medium - 6 to 20%; High - >20%. Terms not used on borehole records
Carbonate content :- Only noted if field test with dilute HCl undertaken – Carbonate free if no effervescence; Calcareous if slight effervescence; Highly calcareous if strong reaction
Undrained shear strength :- terms from laboratory or in situ tests not given on borehole records.
Very Coarse Soils – described by initially removing very coarse materials and describing residue before adding back the very coarse soils. If residue is cohesive then described as '…….(COBBLES / BOULDERS) with low (cobble / boulder) content with (some / much etc) matrix of …..' If residue is granular then described as ' with matrix of ' or as a coarse soil.
Cobbles :- <10% - low cobble content; 10 to 20% - medium content; >20% - high content; **Boulders** <5% - low boulder content; 5 to 20% - medium content; >20% - high content

SCHEDULE OF BOREHOLES

Exploratory Hole Reference	Method of Construction	Grid Co-ordinates		Seabed Elevation	Hole Depth	Field Testing	Remarks*
		Easting [m]	Northing [m]	[m CD]	[m bsl]		
BH01	CP & RC	310365.10	970393.09	-2.95	25.50	SPT	Deck to mudline changed at the commencement of rotary core drilling as the rig was jacked up by 0.1m.
BH02	CP & RC	310383.17	970350.71	-4.25	24.80	SPT	-
BH03	CP & RC	310420.91	970276.83	-5.95	26.00	SPT	-
BH04	CP & RC	310443.63	970212.48	-7.05	25.50	SPT	-
BH05	CP	310495.51	970132.70	-6.65	5.00	SPT	-
BH06	CP	310507.86	970210.07	-6.95	5.00	SPT	-
BH07	CP	310494.34	970299.25	-6.65	5.00	SPT	-
BH08	CP	310455.80	970384.31	-4.65	7.50	SPT	-
BH09	CP & RC	310429.31	970461.23	-2.65	10.50	SPT	-
BH11	CP	310544.88	970373.93	-7.35	5.00	SPT	-
BH20	CP & RC	310292.33	970351.44	-4.75	8.50	SPT	-
BH21	CP & RC	310333.45	970373.51	-3.55	25.20	SPT	-
BH22	CP & RC	310357.33	970311.54	-5.85	25.40	SPT	-
BH23	CP & RC	310388.03	970250.84	-6.15	25.30	SPT	-
BH24a	CP & RC	310417.36	970174.76	-7.75	25.20	SPT	-
BH30	CP & RC	310219.11	970318.93	-3.95	7.65	SPT	-

Abbreviations:

CP	Cable Percussion Boring	m	Metres	m CD	Metres Chart Datum	SPT	Standard Penetration Testing
RC	Rotary Core Drilling	mm	Millimetres	m bsl	Metres below Seabed Level		

Notes:

* All boreholes were carried out overwater from the jack-up platform Skate 3A.

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID	**BH01**
Client	Scrabster Harbour Trust				
Fugro Reference	G180030U				
Coordinates (m)	E310365.10 N970393.09	Ground Elevation (m Datum)	-2.95	Sheet 1 of 1	
Hole Type	Cable Percussion and Rotary Coring			Status	Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	6.50	CP	08/11/2018	08/11/2018	Dando			MT/MG	LLR/SDB	
6.50	25.50	RC	08/11/2018	08/11/2018	Comacchio	Geobor S	146mm	MG/MT	LLR/SDB	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
08/11/2018	02:10:00	0.00	0.50		
08/11/2018	12:20:00	6.50	6.50		
08/11/2018	13:50:00	6.50	6.50		
08/11/2018	22:15:00	25.50	6.50		

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)
6.50	7.50	Water	50	Grey	00:12
7.50	9.00	Water	100	Grey	00:14
9.00	10.50	Water	100	Grey	00:15
10.50	12.00	Water	100	Grey	00:15
12.00	13.50	Water	100	Grey	00:15
13.50	15.00	Water	100	Grey	00:18
15.00	16.50	Water	100	Grey	00:18
16.50	18.00	Water	100	Grey	00:18
18.00	19.50	Water	100	Grey	00:24
19.50	21.00	Water	100	Grey	00:13
21.00	22.50	Water	100	Grey	00:16
22.50	24.00	Water	100	Grey	00:18
24.00	25.50	Water	100	Grey	00:25

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)
6.50	7.50	102
7.50	9.00	102
9.00	10.50	102
10.50	12.00	102
12.00	13.50	102
13.50	15.00	102
15.00	16.50	102
16.50	18.00	102
18.00	19.50	102
19.50	21.00	102
21.00	22.50	102
22.50	24.00	102
24.00	25.50	102

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
6.50	200	6.50	200
25.50	146		

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 11.20m; deck level was 8.25m CD.
At commencement of rotary coring operations (08/11/2018 13:00), the rig was jacked up 0.1m, increasing the deck to mudline to 11.30m and the deck level to 8.35m CD.
The borehole was advanced by cable percussion means to 6.50m, then rotary coring means to 25.50m.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	ROR/CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB
Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS				Print Date	15/03/2019

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH01**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310365.10 N970393.09	Ground Elevation (m Datum)	-2.95	Sheet 1 of 6
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details					Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
0.00 - 1.00 0.00 - 1.00	B ES	2 1							Dark grey, locally greyish brown, slightly silty slightly gravelly SAND with rare to some shell fragments (<20mm). Sand is fine and medium. Gravel is subangular and subrounded fine and medium of mudstone, siltstone and sandstone.					
0.50 - 0.95 0.50 - 0.95	D SPT	3	N = 13 (S)						Below 0.50m; medium dense.					
1.00 - 1.50 1.00 - 1.50	B D	4 5						1	1.00m to 1.50m; with some organic material (<10mm).	(2.50)				
1.50 - 1.95 1.50 - 2.50 1.50 - 1.95	D B SPT	6 7	N = 23 (S)					2	1.50m to 2.50m; with rare organic material (<10mm).					
2.50 - 2.95 2.50 - 3.50 2.50 - 2.95	D ES SPT	8 9	N = 50 (S)					3	Dense dark grey becoming greyish brown slightly gravelly slightly silty SAND with rare shell fragments (<10mm). Sand is mainly fine and medium. Gravel is subangular and subrounded fine and medium of mudstone, siltstone and sandstone.	2.50	-5.45			
3.50 - 3.95 3.50 - 3.95 3.50 - 4.50 3.50 - 3.95	B D B SPT	10 11 12	N = 42 (S)					4		(3.50)				
4.50 - 4.95 4.50 - 5.50 4.50 - 4.95	D B SPT	13 14	N = 35 (S)											
									Continued next page					

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH01**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310365.10 N970393.09	Ground Elevation (m Datum)	-2.95	Sheet 2 of 6
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SAND. See previous sheet.						
5.50 - 5.95	D	15													
5.50 - 6.00	B	17							5.50m to 6.00m; greyish brown, with rare mica.						
5.50 - 6.00	ES	16													
5.50 - 5.95	SPT		N = 50 (S)												
6.00 - 6.20	B	18						6	Dark grey slightly gravelly SAND with rare shell fragments (<20mm) and rare mica. Sand is mainly fine and medium. Gravel is angular to subrounded fine to coarse of siltstone and sandstone.	6.00	-8.95				
6.20 - 6.30	B	19								(0.30)					
6.30 - 6.50	B	20							6.20m to 6.30m; with low cobble content. Cobbles are angular of siltstone and sandstone.	6.30	-9.25				
6.50 - 6.56	SPT		50/35 mm (C)						Very dense dark brownish grey slightly sandy GRAVEL with low cobble content. Gravel is angular to subrounded fine to coarse of siltstone, sandstone and quartzite. Cobbles (<70mm x 80mm) are angular to subrounded of sandstone and siltstone.	(0.49)					
6.93 - 7.50	B	30							Below 6.50m; with high cobble content (possible fractured boulder).	6.79	-9.74				
6.50 - 7.50				87	N/A	N/A		7	Very stiff dark brown calcareous sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of sandstone and siltstone. Cobbles (<60mm x 100mm) are angular to rounded of sandstone and siltstone.						
7.50 - 8.00	B	28							7.37m to 7.50m; assumed zone of core loss.						
8.00 - 8.89	B	31						8							
7.50 - 9.00				93	N/A	N/A									
9.00 - 9.42	D	21						9							
9.00 - 9.42	SPT		50/270 mm (S)												
9.50 - 10.00	B	29													
9.00 - 10.50				100	N/A	N/A									
10.00 - 10.63	B	32							Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID
	Client	Scrabster Harbour Trust		**BH01**
	Fugro Reference	G180030U		
	Coordinates (m)	E310365.10 N970393.09	Ground Elevation (m Datum) -2.95	Sheet 3 of 6
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SILT. See previous sheet.	(7.21)					
10.63 - 10.93	C	22							10.63m to 10.93m; very high strength.						
								11							
10.50 - 12.00				100	N/A	N/A									
12.00 - 12.30	D	23						12	12.00m to 14.00m; recovered as firm to stiff.						
12.00 - 12.70	B	33													
12.00 - 12.30	SPT		50/150 mm (S)												
12.00 - 13.50				47	N/A	N/A			12.70m to 13.65m; assumed zone of core loss (boulder jammed in core bit).						
								13							
								14		14.00	-16.95				
14.00 - 14.14							NI		Extremely weak light greyish green fine grained SANDSTONE. Slightly weathered. Recovered as very silty gravelly sand. Sand is fine. Gravel is angular fine and medium of sandstone.	(0.14)					
13.50 - 15.00				90	11	8				14.14	-17.09				
14.14 - 14.67									Weak, locally medium strong, thinly to thickly bedded, locally highly fractured, light greenish grey fine grained SANDSTONE. Slightly weathered. Bedding fractures are closely and medium spaced, locally very closely spaced, inclined (20-30 degrees), planar, smooth and rough, with silt veneer. Joints are closely and medium spaced, locally very closely spaced, inclined (50-70 degrees), planar and undulating, rough, locally smooth, with sandy						
14.67 - 15.12							11								
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH01**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310365.10 N970393.09	Ground Elevation (m Datum)	-2.95	Sheet 4 of 6
	Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
									silt veneer, locally clean.					
									14.56m to 14.60m; non intact (assumed drilling induced).					
									15.12m to 16.05m; extremely weak to very weak, highly fractured, recovered as non intact. Probable sheared zone, dipping (40-50 degrees).					
15.12 - 16.05							NI							
15.00 - 16.50				100	21	17				(3.38)				
								16						
									16.09m to 16.91m; medium strong.					
16.05 - 16.35							10							
16.35 - 16.50							NI		16.35m to 16.50m; non intact (possibly drilling induced).					
16.50 - 16.65	C	27												
16.50 - 16.71							10							
16.71 - 16.91									16.71m to 16.91m; non intact (assumed drilling induced).					
								17	16.91m to 17.32m; highly fractured, recovered as non intact. Probable shear zone.					
16.91 - 17.32							NI							
16.50 - 18.00				100	60	10								
17.32 - 17.52							20		17.32m to 17.52m; with fractured medium strong greyish brown medium grained sandstone clasts (<100mm x 200mm). Displacement feature (50mm) noted at 17.50m along fracture. Probable shear zone.					
										17.52	-20.47			
									Extremely weak to very weak light green and dark brown FAULT BRECCIA. Possibly moderately weathered. Partially non intact (assumed drilling disturbed), recovered as slightly sandy silt with frequent to abundant fragmented (<63mm) sandstone and siltstone lithorelics with cataclastic structure. Joints are possibly closely and medium spaced, inclined (40-50 degrees), planar, smooth, with silt veneer, with brown staining.					
17.52 - 18.12							NI							
								18						
									17.52m to 18.12m; non intact (assumed drilling disturbed).					
									18.12m to 19.05m; highly fractured possible sandstone. Probably shear zone.					
18.12 - 19.05							14							
18.00 - 19.50				100	29	0				(2.27)				
								19						
									19.05m to 19.70m; non intact (assumed drilling distubed).					
19.05 - 19.79							NI							
										19.79	-22.74			
									Very weak to weak thinly bedded, locally thickly laminated, highly fractured light greenish grey fine grained SANDSTONE. Bedding fractures					
									Continued next page					

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID **BH01**
	Client	Scrabster Harbour Trust		
	Fugro Reference	G180030U		
	Coordinates (m)	E310365.10 N970393.09	Ground Elevation (m Datum) -2.95	Sheet 5 of 6
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
19.79 - 20.68 19.50 - 21.00				100	11	0	22		are very closely and closely spaced, locally medium spaced, inclined (20-30 degrees), planar, smooth and rough, with silt veneer. Joints are very closely and closely spaced, inclined (50-75 degrees), planar, locally stepped, rough, locally smooth, locally partly open, with gravelly silt infill. 19.95m to 20.40m; inclined (80-90 degrees) joint, undulating, rough, with sandy silt veneer.						
20.68 - 20.86							NI		20.68m to 20.86m; non intact (possibly drilling induced).						
21.00 - 21.19	C	23						21	21.00m to 21.50m; possibly with inclined (80-90 degrees) joint, undulating, rough, with sandy silt veneer.	(2.71)					
20.86 - 22.50 21.00 - 22.50				100	21	0			21.70m to 22.50m; highly fractured. Possible shear zone.						
21.97 - 22.04	C	24						22							
22.50 - 22.60							NI		Very weak to weak becoming medium strong thinly bedded, locally thinly laminated, light greenish grey fine grained SANDSTONE. Slightly weathered. Bedding fractures are closely spaced, inclined (20-30 degrees), planar, smooth and rough, with silt veneer. Joints are possibly closely and medium spaced, inclined (50-75 degrees), planar, locally stepped, rough, locally smooth, locally partly open, with gravelly silt infill. 22.50m to 22.60m; non intact (possibly drilling induced). 22.60m to 22.73m; extremely weak thinly laminated siltstone. 22.85m to 22.95m; non intact (possibly drilling induced). Below 23.15m; medium strong.	22.50	-25.45				
22.60 - 22.85							9								
22.85 - 22.95							NI								
22.50 - 24.00				100	73	21		23		(1.28)					
22.95 - 23.78							9								
23.62 - 23.77	C	25													
24.00 - 24.17 23.78 - 24.25	C	26					4	24	Very weak to weak thinly laminated to thinly bedded light green, locally dark brown, SILTSTONE. Slightly weathered. Bedding fractures are very closely to medium spaced, locally extremely closely spaced, inclined (40-50 degrees), planar, smooth, with silt veneer. Joints are closely to medium spaced, inclined (60-80 degrees), stepped, rough, clean, locally with silt veneer. 24.25m to 24.66m; extremely weak to very weak Non intact (assumed drilling disturbed), recovered as silt with some fragmented (<63mm) siltstone. Possible shear zone.	23.78	-26.73				
24.25 - 24.66							NI			(1.72)					
24.00 - 25.50 24.66 - 24.88				100	73	11	9		24.66m to 24.88m; possible fault breccia/shear zone. 24.76m to 24.88m; extremely weak to very weak. Partially non intact (assumed drilling disturbed), recovered as silt with some fragmented (<63mm)						

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID
	Client	Scrabster Harbour Trust		**BH01**
	Fugro Reference	G180030U		
	Coordinates (m)	E310365.10 N970393.09	Ground Elevation (m Datum) -2.95	Sheet 6 of 6
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
24.88 - 25.36							25		siltstone. 24.88m to 25.36m; dark brown, possibly carbonaceous/weathered. Bedding fractures are extremely closely spaced to very closely spaced. Possible shear zone.						
25.36 - 25.50							14								
									End of Borehole at 25.50 m	25.50	-28.45				
								26							
								27							
								28							
								29							

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
Client	Scrabster Harbour Trust			**BH02**
Fugro Reference	G180030U			
Coordinates (m)	E310383.17 N970350.71	Ground Elevation (m Datum)	-4.25	Sheet 1 of 1
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	7.00	CP	06/11/2018	06/11/2018	Dando			MT	LLR	
7.00	24.80	RC	07/11/2018	07/11/2018	Comacchio	Geobor S	146mm	MG	SDB	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
06/11/2018	20:30:00	0.00			
06/11/2018	23:00:00	7.00	7.00		
07/11/2018	03:46:00	7.00	7.00		
07/11/2018	16:00:00	24.80			

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)
7.00	8.30	Water	100	Grey	00:18
8.30	9.10	Water	100	Grey	00:16
9.10	9.80	Water	100	Grey	00:16
9.80	11.30	Water	100	Grey	00:12
11.30	12.80	Water	100	Grey	00:13
12.80	14.30	Water	100	Grey	00:14
14.30	15.80	Water	100	Grey	00:13
15.80	17.30	Water	100	Grey	00:12
17.30	18.80	Water	100	Light grey	00:12
18.80	20.30	Water	100	Light grey	00:16
20.30	21.80	Water	100	Light grey	00:16
21.80	23.30	Water	100	Light grey	00:17
23.30	24.80	Water	100	Light grey	00:16

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)
7.00	8.30	102
8.30	9.10	102
9.10	9.80	102
9.80	11.30	102
11.30	12.80	102
12.80	14.30	102
14.30	15.80	102
15.80	17.30	102
17.30	18.80	102
18.80	20.30	102
20.30	21.80	102
21.80	23.30	102
23.30	24.80	102

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
7.00	200	7.00	200
24.80	146		

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 11.70m; deck level was 7.45m CD.
The borehole was advanced by cable percussion means to 7.00m, then rotary coring means to 24.80m.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	ROR/CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB

Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS — Print Date: 15/03/2019

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH02**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310383.17 N970350.71	Ground Elevation (m Datum)	-4.25	Sheet 1 of 5
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
0.00 - 0.50	ES	1							Medium dense dark grey, locally greyish brown, slightly silty SAND with some shell fragments (<20mm). Sand is fine and medium. 0.00m to 0.50m; slightly gravelly. Gravel is subrounded fine to coarse of mudstone and sandstone.						
0.50 - 0.95	D	2							0.50m to 1.50m; with occasional thin laminae of fine to coarse sand with frequent shell fragments (<5mm).						
0.50 - 1.50	B	3													
0.50 - 0.95	SPT		N = 10 (S)												
								1		(2.50)					
1.50 - 1.95	D	4													
1.50 - 2.50	D	6													
1.50 - 2.50	ES	5													
1.50 - 1.95	SPT		N = 23 (S)												
								2							
2.50 - 2.95	D	7							Dense dark grey slightly silty SAND with rare shell fragments (<10mm). Sand is fine and medium.	2.50	-6.75				
2.50 - 3.50	B	8													
2.50 - 2.95	SPT		N = 37 (S)												
								3							
3.50 - 3.95	D	9								(2.00)					
3.50 - 4.50	B	10													
3.50 - 3.95	SPT		N = 49 (S)												
								4							
4.50 - 4.93	D	11							Very dense dark grey slightly gravelly slightly silty SAND with occasional thin laminae of fine to coarse sand, and with rare shell fragments (<10mm). Sand is mainly fine and medium. Gravel is angular to subrounded fine to coarse of mudstone and sandstone.	4.50	-8.75				
4.50 - 5.50	D	13													
4.50 - 5.50	ES	12													
4.50 - 4.93	SPT		50/280 mm (S)												
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID	**BH02**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310383.17 N970350.71	Ground Elevation (m Datum) -4.25	Sheet 2 of 5	
	Hole Type	Cable Percussion and Rotary Coring		Status	Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SAND. See previous sheet.						
5.50 - 5.93	D	14								(2.00)					
5.50 - 5.93	SPT		50/280 mm (S)					6							
6.50 - 7.00	D	15							Very stiff dark greyish brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is subangular and subrounded fine to coarse of mudstone, siltstone and sandstone. Cobbles (<80mm x 90mm x 140mm) are subrounded of basalt.	6.50	-10.75				
										(0.60)					
7.00 - 7.15	D	16						7	7.00m to 7.40m; assumed zone of core loss.						
7.00 - 7.80	B	34								7.10	-11.35				
7.00 - 7.15	SPT		50/60 mm (S)						Possibly extremely weak, locally weak, medium bedded dark brown calcareous fine grained SANDSTONE thickly interlaminated with brown grey siltstone, with disseminated pyrite. Moderately weathered. Non intact, recovered as fragments (<100mm). Probably boulder sized clasts/corestone.						
7.15 - 7.30	D	18													
7.00 - 8.30				69	0	0				(1.20)					
8.00 - 8.06	B	29						8							
									Very stiff (locally extremely weak) medium bedded brown slightly sandy slightly gravel SILT. Gravel is subangular and subrounded fine and medium of siltstone and sandstone.	8.30	-12.55				
8.70 - 9.20	B	35		100	N/A	N/A				(0.80)					
8.30 - 9.10								9							
									Recovered as greyish brown GRAVEL with low cobble content. Gravel is subangular and subrounded fine to coarse of laminated siltstone. Driller noted boulder.	9.10	-13.35				
9.25 - 9.80	B	36													
9.10 - 9.80				71	N/A	N/A				(0.70)					
									9.60m to 9.80m; assumed zone of core loss.						
9.80 - 10.04	D	17							Very stiff (locally extremely weak) thickly laminated to thinly bedded brown slightly sandy	9.80	-14.05				
9.80 - 10.30	B	31													
9.80 - 10.04	SPT		50/90 mm (S)												

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID	**BH02**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310383.17 N970350.71	Ground Elevation (m Datum) -4.25	Sheet 3 of 5	
	Hole Type	Cable Percussion and Rotary Coring		Status	Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details					Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
									gravelly SILT. Gravel is subangular and subrounded fine to coarse of siltstone with some sandstone.					
9.80 - 11.30				100	N/A	N/A				(1.30)				
								11						
									Very stiff (locally extremely weak) brown slightly gravelly silty CLAY.	11.10 (0.15)	-15.35			
11.30 - 11.48 11.30 - 11.80 11.30 - 11.48	D B SPT	19 32	50/85 mm (S)						Very stiff (locally extremely weak) thickly bedded brown calcareous slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is angular and subangular fine to coarse.	11.25	-15.50			
11.30 - 12.80				100	N/A	N/A		12	11.99m to 12.60m; coarse gravel with low cobble content and 1 No. possible boulder of laminated siltstone (full core diameter x 180mm).	(1.55)				
12.60 - 12.80	C	20												
									Very stiff (locally extremely weak) thinly to medium bedded brown calcareous slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is subangular fine and medium.	12.80	-17.05			
								13						
13.10 - 14.80	B	33							13.06m to 13.22m; gravelly, with 1 No. cobble.	(0.59)				
									Very stiff (locally extremely weak) thinly laminated to very thinly bedded becoming medium bedded, brown calcareous slightly sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of siltstone and sandstone. Cobbles are angular to subrounded of siltstone and sandstone.	13.39	-17.64			
12.80 - 14.30				100	N/A	N/A								
								14		(1.56)				
									14.30m to 14.95m; medium bedded.					
14.80 - 15.80	B	37												
										14.95	-19.20			
									Continued next page					

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID	**BH02**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310383.17 N970350.71	Ground Elevation (m Datum) -4.25	Sheet 4 of 5	
	Hole Type	Cable Percussion and Rotary Coring		Status	Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
14.30 - 15.80				100	N/A	N/A			Very stiff (locally extremely weak) medium bedded brown slightly sandy slightly gravelly becoming gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is subangular and subrounded fine and medium. 15.20m to 15.80m; gravelly.	(0.85)					
15.50 - 15.80	C	21													
										15.80	-20.05				
									Very stiff (locally extremely weak) medium bedded brown calcareous slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is angular and subangular fine of siltstone and sandstone.	(0.30)					
								16		16.10	-20.35				
16.10 - 16.70	B	38							Very stiff (locally extremely weak) medium bedded brown calcareous slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of siltstone and sandstone.	(0.58)					
15.80 - 17.30				95	N/A	N/A									
										16.68	-20.93				
									Very stiff (locally extremely weak) very thinly bedded brown calcareous slightly sandy gravelly SILT with very thin beds of calcareous sandy gravelly silt. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse.	(0.62)					
								17							
17.30 - 17.73	D	22								17.30	-21.55				
17.30 - 18.00	B	39							Very stiff (locally extremely weak) medium and thickly bedded brown calcareous slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of siltstone and sandstone.						
17.30 - 17.73	SPT		85/275 mm (S)												
										(1.31)					
								18							
17.30 - 18.80				100	N/A	N/A			18.10m to 18.41m; very gravelly.						
18.42 - 18.61	C	23													
										18.61	-22.86				
18.61 - 18.80							0		Very weak to weak thinly laminated bluish green fine and medium SANDSTONE. Slightly weathered. Non intact (assumed drilling induced), recovered as fragments (<100mm).	(0.19)					
										18.80	-23.05				
								19	Very weak to weak, locally medium strong, thinly and medium bedded bluish green fine and medium SANDSTONE, locally with extremely closely spaced wavy dark grey to black possible organic laminae. Slightly weathered. Bedding fractures are medium spaced, locally closely spaced, inclined (0-5 degrees), planar, smooth and rough. 18.99m to 19.13m; inclined (85 degrees) fracture, planar, smooth. 19.08m to 19.41m; with laminae. 19.28m to 19.33m; inclined (75 degrees) fracture, planar, rough. 19.59m to 19.70m; with laminae.						
18.80 - 20.30				97	97	97	5			(1.50)					
18.80 - 20.30															
19.70 - 19.85	C	24													
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID
	Client	Scrabster Harbour Trust		**BH02**
	Fugro Reference	G180030U		
	Coordinates (m)	E310383.17 N970350.71	Ground Elevation (m Datum) -4.25	Sheet 5 of 5
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details					Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
									19.97m to 20.08m; with laminae.					
20.30 - 20.46	C	25								20.30	-24.55			
20.30 - 21.80 20.30 - 21.80				100	89	71	10	21	Very weak to weak thinly and medium bedded bluish green fine and medium SANDSTONE with extremely closely to medium spaced wavy dark grey to black possibly organic laminae. Slightly weathered. Bedding fractures are closely to medium spaced, locally extremely closely to very closely spaced, inclined (5-10 degrees), planar, rarely stepped, rough. 20.46m to 20.51m; inclined (80 degrees) fracture, planar, rough. 20.75m to 20.94m; inclined (70 degrees) fracture, undulating, rough. 21.09m to 21.35m; inclined (75 degrees) fracture, undulating, rough.	(1.50)				
										21.80	-26.05			
22.19 - 22.47	C	26						22	Very weak to weak thinly and medium bedded bluish green fine and medium SANDSTONE with closely to medium spaced wavy dark grey to black possible organic laminae. Slightly weathered. Bedding fractures are closely and medium spaced, inclined (5-20, predominantly 5 degrees), planar, locally undulating, rarely stepped. 22.05m to 22.19m; inclined (75 degrees) fracture, planar, rough.					
22.50 - 22.59 21.80 - 23.30	B	30		97	88	78			22.53m to 22.59m; non intact. At 22.59m; inclined (5 degrees) fracture, moderately wide, with sandy silt infill.					
21.80 - 24.80							6	23		(3.00)				
23.38 - 23.50	C	28							23.39m to 23.46m; non intact.					
23.30 - 24.80				100	95	71		24						
24.17 - 24.35	C	27							24.11m to 24.19m; inclined (35 degrees) fracture, undulating, rough. 24.35m to 24.43m; inclined (40 degrees) fracture, stepped, rough. 24.50m to 24.63m; inclined (55 degrees) fracture, undulating, rough.					
									End of Borehole at 24.80 m	24.80	-29.05			

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
Client	Scrabster Harbour Trust			**BH03**
Fugro Reference	G180030U			
Coordinates (m)	E310420.91 N970276.83	Ground Elevation (m Datum)	-5.95	Sheet 1 of 1
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	5.00	CP	09/11/2018	09/11/2018	Dando			MG	SDB	
5.00	26.00	RC	10/11/2018	10/11/2018	Comacchio	Geobor S	146mm	MG	SDB/LLR	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
09/11/2018	11:00:00	0.00	0.50		Wind
09/11/2018	15:00:00	5.00	5.00		
10/11/2018	10:35:00	5.00	5.00		
10/11/2018	18:20:00	26.00	5.00		

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
5.00	200	5.00	200
26.00	146		

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)
5.00	6.50	Water	100	Brown	00:10
6.50	8.00	Water	100	Brown	00:10
8.00	9.50	Water	100	Brown	00:07
9.50	11.00	Water	100	Brown	00:10
11.00	12.50	Water	100	Brown	00:10
12.50	14.00	Water	100	Brown	00:10
14.00	15.50	Water	100	Brown	00:10
15.50	17.00	Water	100	Brown	00:10
17.00	18.50	Water	100	Brown	00:10
18.50	20.00	Water	100	Brown	00:10
20.00	21.50	Water	100	Grey	00:12
21.50	23.00	Water	100	Grey	00:14
23.00	24.50	Water	100	Grey	00:12
24.50	26.00	Water	100	Grey	00:10

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)
5.00	6.50	102
6.50	8.00	102
8.00	9.50	102
9.50	11.00	102
11.00	12.50	102
12.50	14.00	102
14.00	15.50	102
15.50	17.00	102
17.00	18.50	102
18.50	20.00	102
20.00	21.50	102
21.50	23.00	102
23.00	24.50	102
24.50	26.00	102

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 13.90m; deck level was 7.95m CD.
The borehole was advanced by cable percussion means to 5.00m, then rotary coring means to 26.00m.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB

Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS — Print Date: 15/03/2019

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID
Client	Scrabster Harbour Trust		**BH03**
Fugro Reference	G180030U		
Coordinates (m)	E310420.91 N970276.83	Ground Elevation (m Datum) -5.95	Sheet 1 of 6
Hole Type	Cable Percussion and Rotary Coring		Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
0.00 - 0.50	B	2							Dark greyish brown calcareous slightly gravelly silty SAND with rare mica, with rare plastic possible plant material, locally with iron staining. Sand is mainly fine and medium. Gravel is angular fine of sandstone.	(0.50)					
0.00 - 0.50	ES	1													
0.50 - 0.95	D	3								0.50	-6.45				
0.50 - 1.00	ES	4							Loose dark greyish brown calcareous slightly gravelly silty SAND with plant material, locally with disseminated pyrite. Sand is mainly fine. Gravel is subangular and subrounded medium and coarse of sandstone.						
0.50 - 1.50	B	5													
0.50 - 0.95	SPT		N = 7 (S)												
								1		(1.00)					
1.50 - 1.95	D	6								1.50	-7.45				
1.50 - 2.00	B	8							Dense dark brownish grey and dark greyish brown calcareous silty SAND, locally with plastic plant material, mica and disseminated pyrite. Sand is fine.						
1.50 - 2.00	ES	7													
1.50 - 1.95	SPT		N = 46 (S)												
2.00 - 2.50	B	9						2	2.00m to 2.50m; sand is fine and medium.	(1.00)					
2.50 - 2.92	D	10								2.50	-8.45				
2.50 - 3.00	ES	11							Very dense dark grey and dark brownish grey calcareous, locally slightly gravelly, slightly silty SAND with rare dark plant material, and with rare disseminated pyrite. Sand is mainly fine and medium. Gravel is subangular and subrounded fine and medium of sandstone and siltstone.						
2.50 - 3.50	B	12													
2.50 - 2.92	SPT		50/275 mm (S)												
								3		(1.20)					
3.50 - 3.85	D	13							3.50m to 4.00m; locally light yellow to greenish grey slightly gravelly sand with 2 No. cobbles, with some pyrite. Cobbles (<100mm x 160mm) are of granite and flagstone.						
3.50 - 4.00	B	14													
3.50 - 3.85	SPT		50/200 mm (S)							3.70	-9.65				
4.00 - 4.50	B	15						4	Very dense dark greyish brown calcareous very gravelly SAND with rare pyrite. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone, siltstone and granite.	(1.10)					
4.50 - 4.95	D	16													
4.50 - 5.00	B	18							Below 4.50m; becoming dense to very dense slightly silty, locally slightly gravelly, sand.						
4.50 - 5.00	ES	17													
4.50 - 4.95	SPT		N = 50 (S)												
										4.80	-10.75				
									Very stiff (locally extremely weak) dark greyish brown becoming dark brown calcareous sandy						
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID	**BH03**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310420.91 N970276.83	Ground Elevation (m Datum) -5.95	Sheet 2 of 6	
	Hole Type	Cable Percussion and Rotary Coring		Status	Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									gravelly becoming slightly gravelly SILT. Sand is fine to coarse. Gravel is very angular to subrounded fine to coarse of sandstone, siltstone and rare quartzite. 4.80m to 5.00m; sandy slightly gravelly clayey silt. Sand is fine and medium. 5.00m to 6.50m; very thinly to medium bedded. 5.52m to 5.57m; clayey band.						
5.00 - 6.50				100	N/A	N/A									
								6							
6.22 - 6.50	C	19							6.22m to 6.50m; extremely high strength.						
										(3.20)					
6.50 - 6.79	B	36													
								7							
6.50 - 8.00				95	N/A	N/A			At 7.14m; with 1 No. subrounded cobble (90mm x 120mm) of sandstone. 7.45m to 8.00m; thinly interbedded sandy slightly gravelly silt and silty sandy gravel.						
								8		8.00	-13.95				
									Very stiff (locally extremely weak) dark brown calcareous thinly bedded slightly gravelly very sandy clayey SILT. Sand is fine to coarse. Gravel is angular to subrounded fine and medium of sandstone and siltstone. 8.11m to 8.22m; thin bed of gravel. Gravel is subangular and subrounded medium and coarse. 8.43m to 8.59m; thin bed of fine sand, with disseminated pyrite, with slump fissures.						
8.00 - 9.50				73	N/A	N/A				(1.50)					
8.96 - 9.05	C	20						9							
									9.05m to 9.09m; slightly calcareous slightly silty sand with some brown plant material. 9.09m to 9.50m; assumed zone of core loss.						
9.50 - 9.76	D	21								9.50	-15.45				
9.50 - 9.76	SPT		50/110 mm (S)						Very stiff (locally extremely weak) dark brown slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is angular to subrounded fine and medium of sandstone and siltstone. 9.50m to 9.74m; hard (extremely weak, locally very weak) slightly calcareous very sandy silt. 9.50m to 9.76m (SPT D); slightly calcareous sandy						

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID	**BH03**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310420.91 N970276.83	Ground Elevation (m Datum) -5.95	Sheet 3 of 6	
	Hole Type	Cable Percussion and Rotary Coring		Status	Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details					Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
10.14 - 10.34	B	37							silt with some brown plant material and traces of disseminated pyrite. 9.79m to 9.85m; very thin bed of gravel. Gravel is fine to coarse. 9.91m to 9.93m; thick lamination of gravel. Gravel is fine to coarse. 9.96m to 9.99m; very thin bed of gravel. Gravel is fine to coarse. 10.33m to 10.42m; interbedded with slightly sandy silt.	(1.50)				
9.50 - 11.00				100	N/A	N/A								
11.00 - 11.32	C	22						11	Very stiff (locally extremely weak) dark brown calcareous sandy gravelly SILT. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and siltstone.	11.00	-16.95			
11.00 - 12.50				100	N/A	N/A								
								12	At 12.21m; with 1 No. cobble (60mm x 90mm).	(2.49)				
12.50 - 12.90	D	23							Below 12.50m; very thinly to medium bedded slightly gravelly sandy silt with gravel bands/ pockets. 12.50m to 12.90m (SPT D); highly calcareous slightly gravelly sandy silt.					
12.50 - 12.90	SPT		50/250 mm (S)											
								13						
12.50 - 14.00				100	N/A	N/A								
13.50 - 16.00	B	38							Very stiff (locally extremely weak) dark brown calcareous slightly gravelly sandy SILT with low cobble content, with medium and widely spaced thin and medium beds of sandy gravelly silt. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and siltstone. Cobbles (<70mm x 90mm) are subangular and subrounded of siltstone.	13.49	-19.44			
14.00 - 14.35	C	30						14	14.00m to 14.35m; high strength					
14.00 - 15.50				100	N/A	N/A								
									Continued next page					

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID **BH03**
	Client	Scrabster Harbour Trust		
	Fugro Reference	G180030U		
	Coordinates (m)	E310420.91 N970276.83	Ground Elevation (m Datum) -5.95	Sheet 4 of 6
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SILT. See previous sheet.						
15.50 - 15.88	D	24													
15.50 - 15.88	SPT		50/235 mm (S)												
								16							
										(5.29)					
15.50 - 17.00				100	N/A	N/A									
16.40 - 16.75	C	31													
								17							
17.00 - 18.50				93	N/A	N/A									
								18							
18.15 - 18.50	C	32													
18.50 - 18.93	D	25													
18.50 - 18.93	SPT		50/285 mm (S)												
										18.78	-24.73				
								19	Very stiff (locally extremely weak) dark brown calcareous sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and siltstone. Cobbles (<70mm x 90mm) are subangular and subrounded of siltstone.						
18.50 - 20.00				100	N/A	N/A									
										(1.71)					
19.75 - 20.00	C	33													
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID **BH03**
	Client	Scrabster Harbour Trust		
	Fugro Reference	G180030U		
	Coordinates (m)	E310420.91 N970276.83	Ground Elevation (m Datum) -5.95	Sheet 5 of 6
	Hole Type	Cable Percussion and Rotary Coring		Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SILT. See previous sheet.						
20.49 - 20.59										20.49	-26.44				
20.00 - 21.50 20.59 - 21.07				100	67	47	11		Very weak and weak yellowish brown fine and medium grained SANDSTONE. Slightly weathered. Bedding fractures are extremely closely to closely spaced, inclined (5-10 degrees), planar, rough. 20.49m to 20.59m; extremely weak. Non intact (assumed drilling induced), recovered as very gravelly sand. Sand is fine and medium. 20.87m to 20.93m; extremely weak. Non intact (assumed drilling induced), recovered as silty sand. Sand is fine and medium.	(0.58)					
								21		21.07	-27.02				
21.24 - 21.50	C	26							Weak and medium strong light greenish grey, locally yellowish brown, thinly and medium bedded, locally thickly laminated, fine and medium grained SANDSTONE. Slightly weathered. Bedding fractures are closely and medium spaced, locally very closely spaced, inclined (5-25 degrees), planar and undulating, rough, locally with sandy silt veneer. Joints are inclined (80-90 degrees), undulating, rough. 21.44m to 21.59m; with extremely closely spaced thick black laminae At 21.88m; extremely weak. Non intact (40mm thick) (assumed drilling induced), recovered as silty sand. Sand is fine and medium.						
21.94 - 22.08	C	27						22							
21.50 - 23.00				100	100	73			22.48m to 23.36m; with closely and medium spaced thick black laminae. 22.61m to 22.74m; extremely weak and very weak. Non intact (assumed drilling induced), recovered as gravelly sand. Sand is fine and medium.						
21.07 - 24.50							8								
23.00 - 23.14	C	34						23							
23.42 - 23.52	C	28								(4.93)					
23.00 - 24.50				100	100	43			23.52m to 23.61m; extremely weak. Non intact (assumed drilling induced), recovered as silty very gravelly sand. Sand is fine and medium. 23.79m to 24.00m; extremely weak. Non intact (assumed drilling induced), recovered as silty very gravelly sand. Sand is fine and medium.						
24.02 - 24.08	B	35						24	24.05m to 24.50m; with extremely closely and very closely spaced thin and thick black laminae. 24.15m to 24.35m; extremely weak. Non intact (assumed drilling induced), recovered as silty slightly gravelly sand. Sand is fine and medium.						
24.50 - 24.75							NR		24.50m to 24.75m; assumed zone of core loss. 24.65m to 25.55m; with extremely closely and very closely spaced thin and thick black laminae.						
24.75 - 25.25							12		Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH03**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310420.91 N970276.83	Ground Elevation (m Datum)	-5.95	Sheet 6 of 6
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
									SANDSTONE. See previous sheet.					
24.50 - 26.00				83	79	21								
25.25 - 25.36							NI		25.25m to 25.36m; non intact (possibly drilling induced), recovered as gravelly sand. Sand is fine and medium. Possibly extremely weak and very weak.					
25.43 - 25.55	C	29												
25.36 - 26.00							9		At 25.73m; extremely weak and very weak. Non intact (40mm thick) (assumed drilling induced), recovered as gravelly sand. Sand is fine and medium.					
								26	End of Borehole at 26.00 m	26.00	-31.95			
								27						
								28						
								29						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
Client	Scrabster Harbour Trust			**BH04**
Fugro Reference	G180030U			
Coordinates (m)	E310443.63 N970212.48	Ground Elevation (m Datum)	-7.05	Sheet 1 of 1
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	5.20	CP	04/11/2018	04/11/2018	Dando			MG	SDB/LLR	
5.20	25.50	RC	04/11/2018	05/11/2018	Commachio	Geobor S	146mm	MT/MG	SDB/LLR	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
04/11/2018	13:30:00	0.00			Wind
04/11/2018	20:55:00	5.20	4.40		
04/11/2018	22:37:00	5.20	4.95		
05/11/2018	06:10:00	16.50	4.95		
05/11/2018	08:10:00	16.50	4.95		
05/11/2018	12:55:00	25.50	4.95		

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)
5.20	6.00	Water	100	Grey	00:08
6.00	7.00	Water	100	Grey	00:08
7.00	7.50	Water	100	Grey	00:04
7.50	9.00	Water	100	Grey	00:10
9.00	10.50	Water	100	Grey	00:11
10.50	12.00	Water	100	Grey	00:10
12.00	13.50	Water	100	Grey	00:10
13.50	15.00	Water	100	Grey	00:12
15.00	16.50	Water	100	Grey	00:11
16.50	18.00	Water	100	Brown	00:07
18.00	19.50	Water	100	Brown	00:11
19.50	21.00	Water	100	Brown	00:11
21.00	22.50	Water	100	Grey	00:11
22.50	24.00	Water	100	Grey	00:11
24.00	24.50	Water	100	Grey	00:14

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)
5.20	6.00	102
6.00	7.00	102
7.00	7.50	102
7.50	9.00	102
9.00	10.50	102
10.50	12.00	102
12.00	13.50	102
13.50	15.00	102
15.00	16.50	102
16.50	18.00	102
18.00	19.50	102
19.50	21.00	102
21.00	22.50	102
22.50	24.00	102
24.00	25.50	102

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
4.50	200	4.40	200
5.20	150	4.95	150
25.50	146		

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 14.70m; deck level was 7.65m CD.
The borehole was advanced by cable percussion means to 5.20m, then rotary coring means to 25.50m.
Driller noted sand/very weak fractured sandstone at run 16.50m-18.00m, PureBore added to flush.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB
Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS				Print Date	15/03/2019

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH04**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310443.63 N970212.48	Ground Elevation (m Datum)	-7.05	Sheet 1 of 6
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details					Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
0.00 - 0.50	B	2							Dark grey, yellow, dark green to dark greyish brown highly calcareous slightly gravelly slightly silty SAND, with some shells, shell fragments and spines, Sand is mainly fine. Gravel is fine of possible siltstone and sandstone. Sulphurous odour. Oily sheen.	(0.50)				
0.00 - 0.50	ES	1												
0.50 - 0.95	D	3							Medium dense dark greyish brown highly calcareous slightly gravelly SAND with some metal fragments and with rare shells and spines. Sand is fine. Gravel is subangular fine of siltstone, ironstone, with rare subangular and subrounded medium of sandstone.	0.50	-7.55			
0.50 - 1.00	B	4												
0.50 - 0.95	SPT		N = 19 (S)											
1.00 - 1.50	B	5						1	1.00m to 1.50m; slightly silty.	(1.00)				
1.50 - 1.84	D	6							Dense to very dense dark greyish brown highly calcareous slightly gravelly and gravelly slightly silty SAND with some shell fragments, and with rare metal fragments and paint spots. Sand is fine. Gravel is subangular and subrounded fine and medium of siltstone and sandstone.	1.50	-8.55			
1.50 - 2.00	B	7												
1.50 - 1.84	SPT		50/185 mm (S)											
2.00 - 2.50	B	8						2	1.50m to 1.84m; gravel is subangular medium and coarse of siltstone. 1.50m to 2.50m; sulphurous odour.					
2.50 - 2.95	D	9												
2.50 - 3.00	B	11												
2.50 - 3.00	ES	10												
2.50 - 2.95	SPT		N = 50 (S)							(2.90)				
3.00 - 3.50	B	12						3	3.00m to 3.50m; with 1 No. cobble. Gravel is angular and subangular fine and medium of siltstone, sandstone, quartz and rare mudstone.					
3.50 - 3.94	D	13							3.50m to 4.00m; sand is fine and medium. Gravel is subangular fine and medium of micaceous sandstone with 1 No. siltstone.					
3.50 - 4.00	B	14												
3.50 - 3.94	SPT		50/285 mm (S)											
4.00 - 4.40	B	15						4	4.00m to 4.40m; slightly gravelly clayey sand.					
4.00 - 4.40	ES	16												
4.40 - 4.50	B	17							Very stiff dark brown calcareous slightly gravelly CLAY. Gravel is subrounded coarse of siltstone.	4.40	-11.45			
4.50 - 4.89	D	18							4.50m to 4.89m; sandy. Gravel is angular and subangular fine.					
4.50 - 5.20	B	19												
4.50 - 4.89	SPT		50/245 mm (S)											

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH04**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310443.63 N970212.48	Ground Elevation (m Datum)	-7.05	Sheet 2 of 6
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									CLAY. See previous sheet.						
									5.20m to 5.30m; assumed zone of core loss.						
5.20 - 6.00				88	N/A	N/A									
6.00 - 6.34	D	20						6							
6.00 - 6.34	SPT		50/195 mm (S)						6.00m to 6.35m; assumed zone of core loss. 6.00m to 6.35m (SPT D) and 6.35m to 6.40m; with extremely closely spaced thick laminae of clayey fine and medium sand.						
6.00 - 7.00				65	N/A	N/A			6.45m to 6.70m; gravelly.						
								7							
7.00 - 7.50				100	N/A	N/A									
7.30 - 7.50	C	27							7.30m to 7.50m; extremely high strength.						
7.50 - 7.84	D	21													
7.50 - 8.00	B	36													
7.50 - 7.84	SPT		50/195 mm (S)												
								8							
7.50 - 9.00				73	N/A	N/A			8.15m to 9.38m; with closely spaced thin and thick laminations of clayey fine and medium sand.						
									8.60m to 9.00m; assumed zone of core loss.						
9.00 - 9.40	D	22						9							
9.00 - 9.50	B	37													
9.00 - 9.40	SPT		50/250 mm (S)												
									9.65m to 9.83m; gravelly.						
9.00 - 10.50				100	N/A	N/A									
9.85 - 10.20	C	28													
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH04**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310443.63 N970212.48	Ground Elevation (m Datum)	-7.05	Sheet 3 of 6
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									CLAY. See previous sheet.						
									10.21m to 10.83m; with extremely closely to closely spaced thin and thick laminae of clayey fine and medium sand.	(12.10)					
10.50 - 10.86	D	23													
10.50 - 10.86	SPT		50/215 mm (S)												
									Below 10.86m; gravelly. Gravel is angular to subrounded fine to coarse of mixed lithogies, including sandstone, siltstone and mudstone.						
								11							
10.50 - 12.00				100	N/A	N/A									
11.35 - 11.65	C	29													
									At 11.90m; with 1 No. subangular cobble of siltstone.						
12.00 - 12.30	D	24						12							
12.00 - 12.30	SPT		50/155 mm (S)												
12.00 - 13.50				100	N/A	N/A									
								13							
13.15 - 13.50	C	30													
13.50 - 13.82	D	25													
13.50 - 14.15	B	38													
13.50 - 13.82	SPT		50/175 mm (S)												
								14							
14.15 - 15.00	B	39													
13.50 - 15.00				100	N/A	N/A									
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID	**BH04**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310443.63 N970212.48	Ground Elevation (m Datum) -7.05	Sheet 4 of 6	
	Hole Type	Cable Percussion and Rotary Coring		Status	Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									15.00m to 15.13m; 1 No. subangular cobble of siltstone.						
15.35 - 15.70	C	31													
15.00 - 16.50				100	N/A	N/A		16							
16.50 - 16.70							NI		Very weak yellowish brown thinly laminated fine and medium grained SANDSTONE. Moderately weathered. Bedding fractures are possibly extremely closely to closely spaced, inclined (5 degrees), planar, smooth.	16.50	-23.55				
16.70 - 16.85							7								
16.85 - 16.93									16.50m to 16.66m (SPT D); recovered as yellowish brown fine and medium sand.	(0.70)					
16.93 - 17.03							10	17	16.50m to 16.70m; non intact (possibly drilling induced/disturbed), recovered as subangular and subrounded gravel and cobble sized fragments.						
17.03 - 17.20							NI		16.85m to 16.93m; non intact (assumed drilling induced), recovered as subangular fragments (<20mm).						
16.50 - 18.00				47	35	9			16.95m to 17.01m; inclined (70 degrees) joint, planar, smooth.	17.20	-24.25				
17.20 - 18.00							NR		17.03m to 17.20m; non intact, recovered as yellowish brown fine sand. Possibly residual soil. SAND/SANDSTONE (Driller's description). Assumed zone of core loss.	(0.80)					
18.00 - 18.16	D	26						18		18.00	-25.05				
18.00 - 18.16	SPT		50/80 mm (S)												
18.00 - 18.30							7		Extremely weak, locally very weak, yellowish brown and dark brown thinly laminated fine grained SANDSTONE. Moderately weathered. Bedding fractures are widely spaced, locally closely spaced, inclined (10-20 degrees), planar, smooth.						
18.00 - 19.50				97	89	89			18.00m to 18.13m; extremely weak fine grained sandstone.	(1.50)					
18.30 - 19.34							1		18.21m to 18.30m; inclined (50 degrees) joint, planar, smooth.						
								19	18.43m to 18.50m; with reddish brown discolouration.						
19.34 - 19.50							NI		19.34m to 19.45m; non intact, recovered as angular and subangular fragments (<63m).						
									Very weak, locally very weak and weak, orangish brown thinly laminated to very thinly bedded fine grained SANDSTONE. Bedding fractures are closely and medium spaced, inclined (10-15 degrees), planar, smooth. Joints are very closely and closely spaced, inclined (20-30 degrees), planar, rough. Joints are	19.50	-26.55				

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH04**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310443.63 N970212.48	Ground Elevation (m Datum)	-7.05	Sheet 5 of 6
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
20.08 - 20.24	C	35							closely and medium spaced, inclined (50-70 degrees), planar and undulating, smooth. 20.06m to 20.33m; very weak and weak. 20.15m to 20.24m; greyish blue.					
19.50 - 21.00 19.50 - 21.00				99	99	39	17			(1.50)				
								21	Very weak and weak greyish green medium and thickly bedded of thinly laminated fine grained SANDSTONE. Slightly weathered. Bedding fractures are medium spaced, inclined (10-20 degrees), planar, smooth.	21.00	-28.05			
21.00 - 22.50 21.00 - 22.50				100	100	100	3		21.66m to 21.80m; dark grey.	(1.50)				
								22						
22.22 - 22.37	C	1												
										22.50	-29.55			
22.50 - 23.30							4		Weak greyish green, locally yellowish brown, medium and thickly bedded of thinly laminated fine and medium grained SANDSTONE with some iron staining. Slightly weathered. Bedding fractures are closely and medium spaced, inclined (10-15 degrees), planar, smooth. 22.68m to 22.84m; inclined (70 degrees) joint, planar, smooth.					
								23						
22.50 - 24.00				97	87	87				(1.50)				
23.51 - 23.83	C	2												
23.30 - 24.00							1							
								24		24.00	-31.05			
									Weak greyish green, locally yellowish brown, thinly to thickly bedded of thinly laminated fine and medium grained SANDSTONE. Unweathered. Bedding fractures are medium spaced, inclined (10 degrees), planar, smooth. 24.45m to 24.51m; with iron staining.					
24.00 - 25.50 24.00 - 25.50				100	100	100	2			(1.50)				
24.97 - 25.27	C	3												

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID **BH04**
Client	Scrabster Harbour Trust		
Fugro Reference	G180030U		
Coordinates (m)	E310443.63 N970212.48	Ground Elevation (m Datum) -7.05	Sheet 6 of 6
Hole Type	Cable Percussion and Rotary Coring	Status	Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SANDSTONE. See previous sheet. 25.20m to 25.50m; with iron staining. 25.29m to 25.38m; inclined (70 degrees) joint, planar, smooth. 25.33m to 25.44m; purplish grey.						
									End of Borehole at 25.50 m	25.50	-32.55				
								26							
								27							
								28							
								29							

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH05**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310495.51 N970132.70	Ground Elevation (m Datum)	-6.65	Sheet 1 of 1
Hole Type	Cable Percussion			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	5.00	CP	11/11/2018	11/11/2018	Dando			MG	LLR/SDB	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
11/11/2018	05:10:00	0.00	0.50		
11/11/2018	09:40:00	5.00	4.50		

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
5.00	200	4.50	200

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 14.00m; deck level was 7.35m CD.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	ROR/CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB

Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS — Print Date: 15/03/2019

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID	**BH05**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310495.51 N970132.70	Ground Elevation (m Datum) -6.65	Sheet 1 of 1	
	Hole Type	Cable Percussion		Status	Draft

Sampling and In Situ Testing				Strata Details					Groundwater	
Depth (m)	Type	No.	Test Results	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
0.00 - 1.00 0.00 - 1.00	ES B	1 2			Medium dense dark grey and black slightly gravelly slightly silty SAND with rare shell fragments (<15mm). Sand is mainly fine and medium. Gravel is subangular and subrounded fine to coarse of granite, sandstone and tile. Slight hydrocarbon odour.					
0.50 - 0.95 0.50 - 0.95	D SPT	3	N = 16 (S)							
1.00 - 1.50	B	4		1		(2.50)				
1.50 - 1.95 1.50 - 2.50 1.50 - 1.95 1.50 - 2.50	D ES SPT B	5 6 7	 N = 17 (S) 		1.50m to 2.50m; with low cobble content. Cobbles (<60mm x 80mm x 100mm) are subrounded of sandstone.					
				2						
2.50 - 2.83 2.50 - 3.00 2.50 - 3.00 2.50 - 2.83	D B ES SPT	8 10 9 	 50/180 mm (S)		Very dense dark greyish brown slightly silty SAND with 1 No. subrounded coarse gravel. Sand is fine and medium.	2.50 (0.50)	-9.15			
3.00 - 3.50	B	11		3	Dark brownish grey, locally gravelly, slightly silty SAND with low cobble content, rare plant debris and disseminated pyrite, Sand is mainly fine and medium. Gravel is subangular and subrounded medium and coarse of siltstone. Cobbles (60mm x 70mm x 90mm) are subrounded of siltstone.	3.00 (0.50)	-9.65			
3.50 - 3.94 3.50 - 4.00 3.50 - 4.40 3.50 - 3.94	D ES B SPT	12 13 14 	 50/290 mm (S)		Very dense dark brownish grey gravelly SAND, with low cobble content and rare disseminated pyrite. Sand is fine to coarse. Gravel is subangular and subrounded predominantly fine and medium of siltstone. Cobbles (<70mm x 90mm x 120mm) are of siltstone. 3.50m to 3.94m; slightly silty.	3.50	-10.15			
				4		(1.00)				
4.40 - 4.50	B	15			4.40m to 4.50m; gravel is fine.					
4.50 - 4.70 4.50 - 4.78	B SPT	16 	 50/135 mm (C)		Very dense dark brownish grey sandy slightly silty GRAVEL with low cobble content. Sand is fine to coarse. Gravel is angular and subangular fine to coarse of siltstone, with some sandstone and rare pink/green possible granite/sandstone. Cobbles are <120mm.	4.50 (0.20)	-11.15			
4.70 - 5.00	B	17			Recovered as dark brown gravelly COBBLES. Gravel is subrounded coarse of siltstone. Cobbles are subangular and subrounded possibly of compacted till material.	4.70 (0.30)	-11.35			
					End of Borehole at 5.00 m	5.00	-11.65			

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH06**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310507.86 N970210.07	Ground Elevation (m Datum)	-6.95	Sheet 1 of 1
Hole Type	Cable Percussion			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	5.00	CP	05/11/2018	05/11/2018	Dando			MG/MB	SDB/LLR	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
05/11/2018	18:10:00	0.00			Wind
05/11/2018	19:25:00	2.50	2.50		
05/11/2018	20:30:00	2.50	2.50		
05/11/2018	23:30:00	5.00	5.00		

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
5.00	200	5.00	200

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark
3.50	4.50	01:30	Piping sand

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 14.60m; deck level was 7.65m CD.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB

Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS — Print Date: 15/03/2019

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID	**BH06**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310507.86 N970210.07	Ground Elevation (m Datum) -6.95	Sheet 1 of 1	
	Hole Type	Cable Percussion		Status	Draft

Sampling and In Situ Testing				Strata Details					Groundwater	
Depth (m)	Type	No.	Test Results	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
0.00 - 0.50	B	1			Dark brownish grey highly calcareous slightly gravelly SAND with some iron staining, with some black mineral (possible coal, <5mm), and with rare mica. Sand is mainly fine and medium. Gravel is fine of siltstone.	(0.50)				
0.50 - 0.95 0.50 - 1.50 0.50 - 0.95	D B SPT	2 3	N = 5 (S)		Loose dark brownish grey highly calcareous SAND with some iron staining, with some black mineral (possible coal, <5mm), with some mica, and with traces of dark brown and black plant debris (<5mm). Sand is fine and medium. 0.50m to 0.95m; slightly gravelly. Gravel is subangular fine and medium of sandstone.	0.50	-7.45			
				1		(1.00)				
1.50 - 1.95 1.50 - 2.50 1.50 - 1.95	D B SPT	4 5	N = 47 (S)		Dense dark brownish grey highly calcareous SAND with rare mica (<2mm). Sand is fine and medium.	1.50	-8.45			
				2		(1.00)				
2.50 - 2.88 2.50 - 3.50 2.50 - 2.88	D B SPT	6 7	50/225 mm (S)		Very dense dark grey slightly silty SAND with rare shells and shell fragments (<10mm). Sand is fine and medium. 2.50m to 2.88m; sand, with rare shell fragments (<3mm).	2.50	-9.45			
3.00	D	8		3		(1.50)				
3.50 - 3.80 3.50 - 3.80	D SPT	9	50/155 mm (S)							
4.00 4.00 - 4.50	D B	10 11		4	Very dense dark grey slightly gravelly slightly silty SAND with rare shells and shell fragments (<10mm). Sand is mainly fine and medium. Gravel is subangular and subrounded fine to coarse of sandstone, siltstone, mudstone and quartz.	4.00	-10.95			
4.50 - 4.85 4.50 - 5.00 4.50 - 4.85	D B SPT	12 13	50/200 mm (S)		Below 4.50m; with low cobble content. Cobbles are subrounded of granite (<50mm x 60mm x 80mm).	(1.00)				
					End of Borehole at 5.00 m	5.00	-11.95			

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH07**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310494.34 N970299.25	Ground Elevation (m Datum)	-6.65	Sheet 1 of 1
Hole Type	Cable Percussion			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	5.00	CP	06/11/2018	06/11/2018	Dando			MB	LLR	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
06/11/2018	02:00:00	0.00			Wind
06/11/2018	05:45:00	5.00	5.00		

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
5.00	200	5.00	200

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 14.40m; deck level was 7.75m CD.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB

Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS — Print Date: 15/03/2019

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH07**
	Fugro Reference	G180030U			
	Coordinates (m)	E310494.34 N970299.25	Ground Elevation (m Datum)	-6.65	Sheet 1 of 1
	Hole Type	Cable Percussion			Status: Draft

Sampling and In Situ Testing				Strata Details					Groundwater	
Depth (m)	Type	No.	Test Results	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
0.00 - 0.50	ES	1			Dark grey, locally brownish grey, SAND with rare shell fragments (<15mm). Sand is fine and medium.	(0.50)				
0.50 - 0.95	D	2			Medium dense dark grey, locally brownish grey, slightly gravelly SAND with rare shell fragments (<15mm). Sand is mainly fine and medium. Gravel is angular to subrounded fine to coarse of sandstone, siltstone, mudstone and slag.	0.50	-7.15			
0.50 - 1.50	B	3								
0.50 - 0.95	SPT		N = 14 (S)							
1.00 - 1.50	ES	4		1						
1.50 - 1.95	D	5								
1.50 - 2.50	B	6								
1.50 - 1.95	SPT		N = 20 (S)							
				2						
2.50 - 2.95	D	7			2.50m to 3.95m; slight hydrocarbon/organic odour. Oily sheen.					
2.50 - 3.50	ES	8								
2.50 - 2.95	SPT		N = 20 (S)			(4.50)				
				3						
3.50	D	9								
3.50 - 3.95	D	10								
3.50 - 4.50	B	11								
3.50 - 3.95	SPT		N = 26 (S)							
				4						
4.50 - 4.95	D	12								
4.50 - 5.00	D	13								
4.50 - 4.95	SPT		N = 26 (S)							
					End of Borehole at 5.00 m	5.00	-11.65			

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH08**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310455.80 N970384.31	Ground Elevation (m Datum)	-4.65	Sheet 1 of 1
Hole Type	Cable Percussion			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	7.50	CP	06/11/2018	06/11/2018	Dando			MG	SDB	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
06/11/2018	11:20:00	0.00	0.50		
06/11/2018	15:45:00	7.50	6.50		

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
7.50	200	6.50	200

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 11.70m; deck level was 7.05m CD.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	AF/ROR/CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB
Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS				Print Date	15/03/2019

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID	
	Client	Scrabster Harbour Trust		**BH08**	
	Fugro Reference	G180030U			
	Coordinates (m)	E310455.80 N970384.31	Ground Elevation (m Datum) -4.65	Sheet 1 of 2	
	Hole Type	Cable Percussion		Status	Draft

Sampling and In Situ Testing				Strata Details					Groundwater	
Depth (m)	Type	No.	Test Results	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
0.00 - 0.50	B	2			Dark brownish grey gravelly SAND with rare plant material and rare shell fragments. Sand is mainly fine and medium. Gravel is subangular and subrounded medium possibly of sandstone, siltstone and quartz.					
0.00 - 0.50	ES	1			0.00m to 0.50m; with occasional broken tile fragments.					
0.50 - 0.95	D	3			0.50m to 0.95m; loose.					
0.50 - 1.50	B	4								
0.50 - 0.95	SPT		N = 4 (S)			(1.50)				
				1						
1.50 - 1.95	D	5			Medium dense becoming dense dark greyish brown, locally slightly gravelly, slightly silty SAND with rare plant debris (<2mm) and disseminated pyrite. Sand is mainly fine and medium. Gravel is subangular and subrounded fine of sandstone and siltstone. Slight oily sheen.	1.50	-6.15			
1.50 - 2.00	ES	6			1.50m to 1.95m; with rare pockets of silt.					
1.50 - 2.50	B	7								
1.50 - 1.95	SPT		N = 19 (S)							
				2						
2.50 - 2.95	D	8								
2.50 - 3.00	B	9								
2.50 - 2.95	SPT		N = 28 (S)							
3.00 - 3.50	ES	10		3		(3.00)				
3.50 - 3.95	D	11								
3.50 - 4.50	B	12								
3.50 - 3.95	SPT		N = 46 (S)							
				4						
4.50 - 4.90	D	13			Very dense dark brownish grey slightly silty becoming silty SAND with rare plant debris (<2mm) and disseminated pyrite. Sand is fine. Faint odour of hydrogen sulphide.	4.50	-9.15			
4.50 - 5.00	ES	14			4.50m to 4.90m; with 1 No. subrounded coarse gravel of siltstone.					
4.50 - 5.50	B	15			4.50m to 5.50m; with 1 No. subrounded coarse gravel of siltstone.					
4.50 - 4.90	SPT		50/250 mm (S)							
					Continued next page					

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH08**
	Fugro Reference	G180030U			
	Coordinates (m)	E310455.80 N970384.31	Ground Elevation (m Datum)	-4.65	Sheet 2 of 2
	Hole Type	Cable Percussion			Status: Draft

Sampling and In Situ Testing				Strata Details					Groundwater	
Depth (m)	Type	No.	Test Results	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
5.50 - 5.92	D	16			Very dense dark brownish grey slightly silty becoming silty SAND with rare plant debris (<2mm) and disseminated pyrite. Sand is fine. Faint odour of hydrogen sulphide.					
5.50 - 6.50	B	17								
5.50 - 5.92	SPT		50/265 mm (S)							
				6		(3.00)				
6.50 - 6.92	D	18								
6.50 - 7.50	B	19								
6.50 - 6.92	SPT		50/275 mm (S)							
				7						
					End of Borehole at 7.50 m	7.50	-12.15			
				8						
				9						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
Client	Scrabster Harbour Trust			**BH09**
Fugro Reference	G180030U			
Coordinates (m)	E310429.31 N970461.23	Ground Elevation (m Datum)	-2.65	Sheet 1 of 1
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	6.45	CP	15/11/2018	15/11/2018	Dando			MG	SDB	
6.45	10.50	RC	15/11/2018	15/11/2018	Comacchio	Geobor S	146mm	MG	SDB/LLR	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
15/11/2018	11:00:00	0.00	0.50		Wind
15/11/2018	18:00:00	10.50	6.45		

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)
6.45	8.00	Water	100	Grey	00:28
8.00	9.50	Water	100	Grey	00:28
9.50	10.50	Water	100	Grey	00:17

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)
6.45	8.00	102
8.00	9.50	102
9.50	10.50	102

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
6.45	200	6.45	200
10.50	146		

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 9.20m; deck level was 6.55m CD.
The borehole was advanced by cable percussion means to 6.45m, then rotary coring means to 10.50m.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	ROR/CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB

Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS — Print Date: 15/03/2019

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID	**BH09**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310429.31 N970461.23	Ground Elevation (m Datum) -2.65	Sheet 1 of 3	
	Hole Type	Cable Percussion and Rotary Coring		Status	Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details					Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
0.00 - 0.50	B	2							Dark greyish brown sandy slightly silty GRAVEL with low cobble content, with abundant shells/ shell fragments and with some seaweed. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of siltstone and sandstone. Cobbles are of siltstone and sandstone, possibly with 1 No. of brick.	(0.50)				
0.00 - 0.50	ES	1												
0.50 - 0.95	D	3							Loose dark brownish grey gravelly slightly silty SAND. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of siltstone.	0.50	-3.15			
0.50 - 1.00	B	4												
0.50 - 0.95	SPT		N = 7 (S)											
1.00 - 1.50	B	5						1	1.00m to 1.50m; with shell fragments.	(1.00)				
1.50 - 1.95	D	6							Medium dense dark greyish brown slightly gravelly slightly silty SAND with traces of plant material. Sand is mainly fine and medium. Sand is fine to coarse. Gravel is subangular and subrounded fine of siltstone.	1.50	-4.15			
1.50 - 2.00	ES	7												
1.50 - 2.50	B	8												
1.50 - 1.95	SPT		N = 12 (S)											
								2		(1.00)				
2.50 - 2.95	D	9							Loose dark greyish brown slightly silty SAND with traces of plant material. Sand is fine and medium.	2.50	-5.15			
2.50 - 3.50	B	10												
2.50 - 2.95	SPT		N = 9 (S)											
								3		(1.00)				
3.50 - 3.95	D	11							Medium dense dark brown SAND with traces of plant material. Sand is fine and medium.	3.50	-6.15			
3.50 - 4.00	ES	12												
3.50 - 4.50	B	13												
3.50 - 3.95	SPT		N = 28 (S)											
								4		(1.00)				
4.50 - 4.95	D	14							Dense dark greyish brown gravelly SAND with some shell fragments. Sand is mainly fine. Gravel is angular and subangular fine and medium of siltstone.	4.50	-7.15			
4.50 - 5.00	B	16												
4.50 - 5.00	ES	15												
4.50 - 4.95	SPT		N = 39 (S)											
										(1.00)				

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH09**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310429.31 N970461.23	Ground Elevation (m Datum)	-2.65	Sheet 2 of 3
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SAND. See previous sheet.						
5.50 - 5.95	D	17													
5.50 - 6.00	B	18													
5.50 - 5.95	SPT		N = 19 (S)						Medium dense dark greyish brown SAND becoming gravelly SAND with rare shell fragments (<6mm). Sand is mainly fine and medium. Gravel is subangular and subrounded fine and medium of siltstone with rare sandstone.	5.50	-8.15				
6.00 - 6.40	B	20						6		(0.95)					
6.00 - 6.40	ES	19							6.00m to 6.45m; gravelly. Sand is fine to coarse.						
6.40 - 6.45	B	21							6.40m to 6.45m; dark brown, with 1 No. subangular and subrounded cobble (90mm x 120mm).	6.45	-9.10				
6.82 - 7.00	C	22						7	Extremely strong thinly interlaminated dark greyish green and dark grey SILTSTONE, light grey fine grained SANDSTONE and black MUDSTONE, with occasional clasts (<4mm x 40mm) of sandstone, and with closely to medium spaced, inclined (75-80 degrees) quartz veins (<0.5mm). Fresh. Bedding fractures are possibly inclined (0 degrees), planar, smooth, open, with gravel infill (<1mm).						
6.45 - 8.00				98	98	98	1			(1.55)					
6.45 - 8.00															
								8	Strong dark greenish grey thinly to medium bedded interlaminated SILTSTONE and light grey fine and medium grained SANDSTONE, with occasional inclined (75-80 degrees) quartz veins (<3mm). Fresh. Bedding fractures are closely to medium spaced, inclined (5-10 degrees), planar, rough, clean, locally with silt veneer. Joints are inclined (75-80 degrees), planar, rough, locally along quartz veins.	8.00	-10.65				
8.40 - 8.74	C	23							8.00m to 8.05m; non intact.						
8.00 - 9.50				100	95	80			8.83m to 9.36m; inclined (80-90 degrees) fracture, stepped, rough, with silt veneer.						
								9							
8.00 - 10.50							8			(2.50)					
									At 9.36m; extremely weak, recovered as gravelly silt (20mm-50mm thick). Gravel is angular fine and medium.						
9.50 - 9.69	C	24													
9.50 - 10.50				100	97	68									
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID
	Client	Scrabster Harbour Trust		**BH09**
	Fugro Reference	G180030U		
	Coordinates (m)	E310429.31 N970461.23	Ground Elevation (m Datum) -2.65	Sheet 3 of 3
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details					Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
									SILTSTONE/SANDSTONE. See previous sheet. 10.39m to 10.42m; non intact.					
									End of Borehole at 10.50 m	10.50	-13.15			
								11						
								12						
								13						
								14						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
Client	Scrabster Harbour Trust			**BH11**
Fugro Reference	G180030U			
Coordinates (m)	E310544.88 N970373.93	Ground Elevation (m Datum)	-7.35	Sheet 1 of 1
Hole Type	Cable Percussion			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	5.00	CP	10/11/2018	11/11/2018	Dando			MT	LLR	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
10/11/2018	22:30:00	0.00	0.50		
11/11/2018	01:30:00	5.00	5.00		

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
5.00	200	5.00	200

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 14.60m; deck level was 7.25m CD.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	AF/ROR/CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB
Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS				Print Date	15/03/2019

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH11**
	Fugro Reference	G180030U			
	Coordinates (m)	E310544.88 N970373.93	Ground Elevation (m Datum)	-7.35	Sheet 1 of 1
	Hole Type	Cable Percussion			Status: Draft

Sampling and In Situ Testing				Strata Details					Groundwater	
Depth (m)	Type	No.	Test Results	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
0.00 - 1.00 0.00 - 1.00	B ES	2 1			Dark grey slightly gravelly slightly silty SAND with rare shell fragments (<15mm) and rare organic material (<10mm). Sand is mainly fine and medium. Gravel is subangular and subrounded fine to coarse of siltstone, mudstone and sandstone.	(0.50)				
0.50 - 0.95 0.50 - 0.95	D SPT	3	N = 11 (S)		Medium dense dark grey slightly gravelly slightly silty SAND with rare shell fragments (<15mm). Sand is mainly fine and medium. Gravel is subangular and subrounded fine to coarse of siltstone, mudstone and sandstone.	0.50	-7.85			
1.50 - 1.95 1.50 - 1.95 1.50 - 2.50 1.50 - 2.50	D SPT ES B	4 5 6	N = 13 (S)			(2.00)				
2.50 - 2.95 2.50 - 3.50 2.50 - 3.50 2.50 - 2.95	D B ES SPT	7 9 8 	N = 42 (S)		Dense dark grey slightly gravelly slightly silty SAND with rare shell fragments (<15mm). Sand is mainly fine and medium. Gravel is subangular and subrounded fine to coarse of siltstone, mudstone and sandstone. 2.50m to 3.50m; with rare organic material (<5mm).	2.50	-9.85			
3.50 - 3.95 3.50 - 4.50 3.50 - 3.95	D B SPT	10 11 	N = 34 (S)			(2.50)				
4.50 - 4.95 4.50 - 5.00 4.50 - 4.95	D B SPT	12 13 	N = 44 (S)							
					End of Borehole at 5.00 m	5.00	-12.35			

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH20**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310292.33 N970351.44	Ground Elevation (m Datum)	-4.75	Sheet 1 of 1
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	2.50	CP	12/11/2018	12/11/2018	Dando			MG	LLR	
2.50	8.50	RC	12/11/2018	12/11/2018	Comacchio	Geobor S	146mm	MG	LLR	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
12/11/2018	10:20:00	0.00	0.50		
12/11/2018	15:40:00	8.50	2.50		

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)
2.50	4.00	Water	100	Brown	00:12
4.00	5.50	Water	100	Brown	00:12
5.50	7.00	Water	100	Brown	00:12
7.00	8.50	Water	100	Brown	00:10

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)
2.50	4.00	102
4.00	5.50	102
5.50	7.00	102
7.00	8.50	102

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
2.50	200	2.50	200
8.50	146		

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 11.10m; deck level was 6.35m CD.
The borehole was advanced by cable percussion means to 2.50m, then rotary coring means to 8.50m.
Sample B2 (0.00m-0.50m) depleted for ES1 (0.00m-0.50m) subsampling.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	ROR/CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB

Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS — Print Date: 15/03/2019

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH20**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310292.33 N970351.44	Ground Elevation (m Datum)	-4.75	Sheet 1 of 2
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
0.00 - 0.50	B	2							Dark brownish grey slightly gravelly slightly silty SAND. Sand is mainly fine and medium. Gravel is coarse of sandstone.	(0.50)					
0.00 - 0.50	ES	1													
0.50 - 0.95	D	3							Medium dense dark greyish brown slightly gravelly slightly silty SAND with rare disseminated pyrite. Sand is mainly fine and medium. Gravel is angular and subangular medium and coarse of sandstone and siltstone.	0.50	-5.25				
0.50 - 1.00	B	5													
0.50 - 1.00	ES	4													
0.50 - 0.95	SPT		N = 15 (S)												
1.00 - 1.50	B	6						1		(1.30)					
1.50 - 1.80	B	9							1.50m to 1.88m; very dense.						
1.50 - 1.80	ES	8													
1.50 - 1.88	D	7													
1.50 - 1.88	SPT		50/225 mm (S)												
1.80 - 2.00	B	10							Very dense dark grey slightly sandy becoming sandy GRAVEL with high cobble content. Gravel is angular to subrounded fine to coarse of sandstone and siltstone with rare granite. Cobbles are subangular and subrounded of sandstone and siltstone.	1.80	-6.55				
2.00 - 2.50	B	11						2		(0.70)					
2.50 - 2.86	D	12							Very stiff (locally extremely weak) very closely to medium bedded dark brown sandy gravelly, locally very gravelly, SILT with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of sandstone and siltstone with rare granite. Cobbles (<80mm x 140mm) are subangular to rounded of sandstone and siltstone.	2.50	-7.25				
2.50 - 2.86	SPT		50/220 mm (S)												
2.50 - 4.00				100	N/A	N/A		3	2.50m to 4.00m; highly calcareous, with thin clayey beds.						
4.00 - 4.62	B	17						4	4.00m to 5.50m; slightly calcareous.						
4.00 - 5.50				100	N/A	N/A									

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID
	Client	Scrabster Harbour Trust		**BH20**
	Fugro Reference	G180030U		
	Coordinates (m)	E310292.33 N970351.44	Ground Elevation (m Datum) -4.75	Sheet 2 of 2
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details					Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
5.19 - 5.50	C	13							5.00m to 5.54m; with closely spaced very thin clayey beds (<30mm).					
5.50 - 5.75	D	14								(6.00)				
5.50 - 5.75	SPT		50/120 mm (S)						5.50m to 7.00m; hightly calcareous.					
6.00 - 6.65	B	18						6						
5.50 - 7.00				100	N/A	N/A			6.20m to 7.00m; with closely spaced very thin clayey beds.					
6.65 - 7.00	C	15												
								7	7.00m to 8.50m; hard (weak, locally very weak to weak), slightly calcareous, very gravelly, with medium spaced very thin clayey beds.					
7.00 - 8.50				100	N/A	N/A								
								8						
8.15 - 8.50	C	16												
									End of Borehole at 8.50 m	8.50	-13.25			
								9						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
Client	Scrabster Harbour Trust			**BH21**
Fugro Reference	G180030U			
Coordinates (m)	E310333.45 N970373.51	Ground Elevation (m Datum)	-3.55	Sheet 1 of 1
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	4.70	CP	13/11/2018	13/11/2018	Dando			MG	SDB	
4.70	25.20	RC	13/11/2018	14/11/2018	Comacchio	Geobor S	146mm	MT/MG	LLR/SDB	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
13/11/2018	15:20:00	0.00			
13/11/2018	18:10:00	4.70	4.70		
13/11/2018	21:20:00	4.70	4.70		
14/11/2018	06:45:00	20.00	4.70		
14/11/2018	08:40:00	20.00	4.70		
14/11/2018	10:40:00	25.20	4.70		

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)
4.70	5.50	Water	100	Brown	00:15
5.50	7.00	Water	100	Brown	00:15
7.00	8.50	Water	50	Brown	00:12
8.50	10.00	Water	50	Brown	00:17
10.00	10.40	Water	100	Grey	00:06
10.40	11.50	Water	100	Grey	00:07
11.50	13.00	Water	100	Grey	00:11
13.00	14.50	Water	100	Grey	00:19
14.50	15.40	Water	100	Grey	00:25
15.40	16.00	Water	100	Grey	00:10
16.00	17.50	Water	100	Grey	00:30
17.50	19.00	Water	50	Grey	00:40
19.00	20.00	Water	100	Grey	00:40
20.00	21.50	Water	100	Brown	00:24
21.50	23.00	Water	100	Grey	00:22
23.00	24.50	Water	100	Grey	00:22
24.50	25.20	Water	100	Grey	00:12

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)
4.70	5.50	102
5.50	7.00	102
7.00	8.50	102
8.50	10.00	102
10.00	10.40	102
10.40	11.50	102
11.50	13.00	102
13.00	14.50	102
14.50	15.40	102
15.40	16.00	102
16.00	17.50	102
17.50	19.00	102
19.00	20.00	102
20.00	21.50	102
21.50	23.00	102
23.00	24.50	102
24.50	25.20	102

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
4.70	200	4.70	200
25.20	146		

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack up platform Skate3A.
Deck to mudline was 10.00m; deck level was 6.45m CD.
The borehole was advanced by cable percussion means to 4.70m, then rotary coring means to 25.20m.
SPT samples not recovered at depths 0.50m (D3), 1.50m (D5), 2.50m (D9), 3.50m (D13) and 4.50m (D16).

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	ROR/CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB
Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS				Print Date	15/03/2019

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID **BH21**
	Client	Scrabster Harbour Trust		
	Fugro Reference	G180030U		
	Coordinates (m)	E310333.45 N970373.51	Ground Elevation (m Datum) -3.55	Sheet 1 of 6
	Hole Type	Cable Percussion and Rotary Coring	Status	Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
0.00 - 0.50	B	2							Dark grey organic slightly gravelly very sandy SILT. Sand is fine to coarse. Gravel is angular and subangular of siltstone. Sulphurous odour.	(0.50)					
0.00 - 0.50	ES	1													
0.50 - 0.95	D	3							Possibly very loose dark grey organic sandy gravelly SILT. Sand is mainly coarse. Gravel is subangular to rounded fine to coarse. Sulphurous odour.	0.50	-4.05				
0.50 - 1.50	B	4													
0.50 - 0.95	SPT		N = 1 (S)					1		(1.50)					
1.50 - 1.95	D	5							1.50m to 2.00m; with 1 No. subangular cobble (95mm x 100mm).						
1.50 - 2.00	B	7													
1.50 - 2.00	ES	6													
1.50 - 1.95	SPT		N = 1 (S)												
2.00 - 2.50	B	8						2	Dark grey sandy silty GRAVEL with 1 No. glass jar fragment and 2 No. broken tile fragments (10mm x 10mm). Sand is mainly fine and medium. Gravel is subangular and subrounded predominantly fine and medium of siltstone.	2.00 (0.50)	-5.55				
2.50 - 2.95	D	9							Very loose dark greyish brown gravelly silty SAND with rare shell fragments (<2mm). Sand is mainly fine and medium. Gravel is subangular and subrounded fine and medium of siltstone and sandstone.	2.50	-6.05				
2.50 - 3.00	B	10													
2.50 - 2.95	SPT		N = 2 (S)												
3.00 - 3.50	B	12						3		(1.00)					
3.00 - 3.50	ES	11													
3.50 - 3.95	D	13							Medium dense dark greyish brown slightly gravelly slightly silty becoming silty SAND. Sand is mainly fine and medium. Gravel is subrounded fine of siltstone.	3.50	-7.05				
3.50 - 4.00	B	14													
3.50 - 3.95	SPT		N = 24 (S)												
4.00 - 4.50	B	15						4	4.00m to 4.50m; silty.	(1.00)					
4.50 - 4.58	D	16							Dark greyish brown sandy silty GRAVEL. Sand is fine to coarse. Gravel is subangular and subrounded fine to coarse of sandstone and siltstone with rare quartz.	4.50 (0.20)	-8.05				
4.50 - 4.70	B	17								4.70	-8.25				
4.50 - 4.58	SPT		50/5 mm (S)						Dark grey GRAVEL with medium cobble content (probable fragmented boulder). Gravel is subangular and subrounded fine to coarse of	(0.55)					
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH21**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310333.45 N970373.51	Ground Elevation (m Datum)	-3.55	Sheet 2 of 6
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
4.70 - 5.50				100	N/A	N/A			sandstone and siltstone. Cobbles (<80mm x 100mm) are subangular of siltstone.						
										5.25	-8.80				
5.50 - 5.73	D	18							Very stiff thinly to medium bedded dark brownish grey slightly calcareous slightly sandy gravelly SILT. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including siltstone, sandstone and quartzite.						
5.50 - 5.73	SPT		50/105 mm (S)						5.50m to 5.73m; disturbed by SPT.						
								6							
6.05 - 6.40	C	19							6.05m to 6.40m; extremely high strength.						
5.50 - 7.00				100	N/A	N/A									
								7							
									7.24m to 8.34m; with closely to medium spaced thin beds of very stiff slightly gravelly sandy clay. Gravel is angular to subrounded fine and medium of siltstone and sandstone.						
7.45 - 7.80	C	20													
7.00 - 8.50				100	N/A	N/A									
								8							
									8.37m to 10.65m; with low cobble content. Cobbles (<60mm x 90mm) are subangular of siltstone and sandstone.						
								9							
										(7.66)					
9.25 - 9.60	C	21		100	N/A	N/A									
8.50 - 10.00															
10.00 - 10.38	D	22													
10.00 - 10.38	SPT		50/225 mm (S)						Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID **BH21**
	Client	Scrabster Harbour Trust		
	Fugro Reference	G180030U		
	Coordinates (m)	E310333.45 N970373.51	Ground Elevation (m Datum) -3.55	Sheet 3 of 6
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
10.00 - 10.40				100	N/A	N/A			10.00m to 10.38m; disturbed by SPT.						
10.70 - 11.05	C	23													
10.40 - 11.50				100	N/A	N/A		11	11.12m to 12.91m; with very closely to medium spaced thin beds of very stiff slightly gravelly sandy clay. Gravel is angular to subrounded fine and medium of siltstone and sandstone.						
11.50 - 12.07	B	34													
12.10 - 12.45	C	24						12							
11.50 - 13.00				100	N/A	N/A									
										12.91	-16.46				
13.00 - 13.50	B	35						13	Very stiff medium bedded dark greyish brown slightly sandy gravelly CLAY with some shell fragments (<5mm). Sand is fine to coarse. Gravel is subangular and subrounded fine to coarse of sandstone and siltstone.						
13.50 - 13.85	C	25							13.50m to 13.85m; extremely high strength.	(1.07)					
13.00 - 14.50				100	18	7									
								14	Extremely weak light greyish green probable FAULT BRECCIA. Possibly glacially weathered/ deformed (slightly weathered).	13.98	-17.53				
14.00 - 14.50							8		13.98m to 14.05m; recovered as slightly sandy silt with frequent fragments (<63mm).						
14.50 - 15.05							NI		14.50m to 15.05m; non intact (assumed drilling disturbed), recovered as sandy fragments (<63mm).	(1.42)					
14.50 - 15.40				100	3	0									

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID
	Client	Scrabster Harbour Trust		**BH21**
	Fugro Reference	G180030U		
	Coordinates (m)	E310333.45 N970373.51	Ground Elevation (m Datum) -3.55	Sheet 4 of 6
	Hole Type	Cable Percussion and Rotary Coring		Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details					Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
15.05 - 15.40							14		14.98m to 15.00m; recovered as sandy gravelly clay (20mm thick). Probable fault gouge. 15.05m to 15.26m; medium strong fine and medium grained sandstone.					
										15.40	-18.95			
15.40 - 16.00 15.40 - 16.00				100	81	57	8		Extremely weak thinly laminated dark brown, locally light green, SILTSTONE. Slightly weathered. Locally recovered as non intact (due to cleavage/possible shearing). 15.56m to 16.00m; possibly locally sheared/with cleavages.					
16.00 - 16.50							NI	16	16.00m to 16.50m; predominantly non intact. Possible shear zone.	(2.10)				
16.00 - 17.50				98	53	53								
16.50 - 17.34							3	17	16.92m to 16.94m; non intact (assumed drilling induced).					
17.41 - 17.47 17.34 - 17.50	D	27					NI		17.34m to 17.50m; predominantly non intact, possible shear zone.					
										17.50	-21.05			
17.50 - 18.20							17		Very weak medium bedded greyish green FAULT BRECCIA with quartz veins. Possibly glacially weathered/deformed (slightly weathered). Predominantly non intact (assumed drilling disturbed), recovered as gravel and cobble sized fragments of fine grained sandstone, with silt. Joints (with foliation cleavages) are possibly very closely spaced to medium spaced, locally extremely closely spaced, inclined (40-80 degrees), planar and undulating, smooth, open, possibly along quartz veins. 17.63m to 17.70m; with inclined (80 degrees) quartz veins. 17.57m to 17.62m; non intact. 17.91m to 18.01m; brown foliated siltstone.	(0.70)				
17.50 - 19.00				100	82	77		18		18.20	-21.75			
18.20 - 18.77							4			(0.80)				
18.77 - 19.00 18.90 - 19.00	D	28					NI		Very weak thinly laminated dark brown FAULT BRECCIA/sheared SILTSTONE. Possibly glacially weathered/deformed (slightly weathered). Partially non intact (assumed drilling disturbed), recovered as intensely foliated matrix with some fragments (<63mm). Joints are possibly very closely spaced to medium spaced, inclined (45-50 degrees), planar, smooth. 18.49m to 18.59m; highly fractured/sheared. 18.77m to 19.00m; non intact, recovered as siltstone fragments (<63mm).					
								19		19.00	-22.55			
19.00 - 19.74							7		Extremely weak dark brown to grey FAULT BRECCIA/sheared MUDSTONE. Possibly glacially weathered/deformed (slightly weathered). Joints (with intense penetration cleavage) are possibly very closely spaced to medium spaced, inclined (40-45 degrees), planar, smooth. 19.44m to 19.58m; joint, inclined (80 degrees), planar, smooth. 19.74m to 19.85m; non intact, recovered as					
19.00 - 20.00				98	74	67				(1.00)				
19.85 - 19.98 19.74 - 20.00	D	29					NI							
										20.00	-23.55			

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH21**
	Fugro Reference	G180030U			
	Coordinates (m)	E310333.45 N970373.51	Ground Elevation (m Datum)	-3.55	Sheet 5 of 6
	Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
20.13 - 20.33	C	30							angular mudstone fragments (<20mm). 19.85m to 19.98m; weathered to clayey gravel.						
20.00 - 21.09							NI		Very weak, locally extremely weak, light green FAULT BRECCIA/sheared SILTSTONE. Possibly glacially weathered/deformed/fault gouge (slightly to moderately weathered). Non intact (possibly drilling disturbed), recovered as fragments (<20mm), with dark brown slightly sandy silt, with remnant lenses. 20.00m to 20.56m; recovered as silty fragments (<63mm) with indistinct variably orientated fabric. 20.07m to 20.13m; non intact. 20.58m to 20.66m; with intense slightly foliated parallel fabric (<3mm) of dark red and light green laminae.	(1.09)					
20.00 - 21.50				100	26	26		21	20.95m to 21.08m; weakly parallel foliated (45 degrees) black cataclasite of slightly silty fragments (<6mm) of ironstone with some green siltstone. 21.01m to 21.05m; clay infill (most intense sheer). 21.08m to 21.20m; very weak very weakly foliated cataclasite of fragmented (<20mm) ironstone and light green siltstone.	21.09	-24.64				
21.09 - 22.80							3	22	Very weak variably foliated fine grained light green SANDSTONE. Slightly weathered. 21.09m to 21.50m; locally weak, moderately weathered. 21.77m to 22.22m; joint, inclined (80 degrees), planar, smooth, polished.	(1.71)					
21.50 - 23.00				100	100	100			22.49m to 22.91m; joint, inclined (90 degrees), undulating, smooth, producing partially non intact core.						
22.80 - 23.00	C	31								22.80	-26.35				
22.80 - 23.00							5	23	Extremely weak to very weak foliated dark brown and pale green possibly FAULT BRECCIA/sheared SILTSTONE. Possibly glacially weathered/deformed (slightly weathered). Joints are possibly closely to medium spaced, locally very closely spaced, inclined (40-70 degrees), undulating, smooth, moderately wide, with sandy clay infill. 23.00m to 23.37m; non intact.	(0.57)					
23.00 - 23.37							NI			23.37	-26.92				
23.37 - 23.93							5	24	Extremely weak to very weak foliated dark brown and pale green SILTSTONE, possibly with shear zones. Slightly weathered. Joints are closely to medium spaced, locally very closely spaced, inclined (40-70 degrees), undulating, smooth, moderately wide, with sandy clay infill. 23.37m to 23.90m; with intense foliation (possible shear zone). 23.93m to 24.48m; very weak to weak light green fine grained sandstone.						
23.00 - 24.50				97	60	32									
24.20 - 24.25	C	32					10			(1.83)					
23.93 - 24.48															
24.70 - 24.80	D	33							24.50m to 25.20m; locally with intense foliation (possible shear zone).						
24.48 - 25.13							4								
24.50 - 25.20				100	71	63									
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH21**
	Fugro Reference	G180030U			
	Coordinates (m)	E310333.45 N970373.51	Ground Elevation (m Datum)	-3.55	Sheet 6 of 6
	Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
25.13 - 25.20							NI		25.13m to 25.20m; non intact (possibly drilling induced), recovered as silty sandy fragments (<63mm).	25.20	-28.75			
									End of Borehole at 25.20 m					
								26						
								27						
								28						
								29						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
Client	Scrabster Harbour Trust			**BH22**
Fugro Reference	G180030U			
Coordinates (m)	E310357.33 N970311.54	Ground Elevation (m Datum)	-5.85	Sheet 1 of 1
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	4.50	CP	12/11/2018	13/11/2018	Dando			MT	LLR	
4.50	25.40	RC	13/11/2018	13/11/2018	Comacchio	Geobor S	146mm	MT/MG	LLR/SDB	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
12/11/2018	21:00:00	0.00	0.50		
13/11/2018	00:30:00	4.50	4.50		
13/11/2018	02:00:00	4.50	4.50		
13/11/2018	06:10:00	16.40	4.50		
13/11/2019	08:45:00	16.40	4.50		
13/11/2019	10:55:00	25.40	4.50		

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)
4.50	5.90	Water	100	Brown	00:12
5.90	7.40	Water	100	Brown	00:12
7.40	8.90	Water	100	Brown	00:13
8.90	10.40	Water	100	Brown	00:15
10.40	11.90	Water	100	Brown	00:11
11.90	13.40	Water	100	Brown	00:11
13.40	14.90	Water	100	Brown	00:10
14.90	16.40	Water	100	Brown	00:10
16.40	17.90	Water	50	Brown	00:11
17.90	19.40	Water	50	Brown	00:11
19.40	20.90	Water	100	Grey	00:11
20.90	22.40	Water	100	Grey	00:12
22.40	23.90	Water	100	Grey	00:12
23.90	25.40	Water	100	Grey	00:12

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)
4.50	5.90	102
5.90	7.40	102
7.40	8.90	102
8.90	10.40	102
10.40	11.90	102
11.90	13.40	102
13.40	14.90	102
14.90	16.40	102
16.40	17.90	102
17.90	19.40	102
19.40	20.90	102
20.90	22.40	102
22.40	23.90	102
23.90	25.40	102

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
4.50	200	4.50	200
25.40	146		

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 12.30m; deck level was 6.45m CD.
The borehole was advanced by cable percussion means to 4.50m, then rotary coring means to 25.40m.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	ROR/CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB

Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS — Print Date: 15/03/2019

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID **BH22**
	Client	Scrabster Harbour Trust		
	Fugro Reference	G180030U		
	Coordinates (m)	E310357.33 N970311.54	Ground Elevation (m Datum) -5.85	Sheet 1 of 6
	Hole Type	Cable Percussion and Rotary Coring	Status	Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
0.00 - 0.50	ES	1							Dark brownish grey calcareous slightly gravelly slightly silty SAND with low cobble content, and rare shell fragments (<20mm). Sand is mainly fine and medium. Gravel is subangular and subrounded fine to coarse of granite, sandstone and siltstone. Cobbles (<50mm x 60mm x 80mm) are subangular of sandstone and siltstone.						
0.50 - 0.95	D	2							0.50m to 0.95m; medium dense.						
0.50 - 1.50	B	3													
0.50 - 0.95	SPT		N = 14 (S)												
								1							
1.50 - 1.95	D	4							1.50m to 1.95m; dense.	(3.00)					
1.50 - 2.50	B	5													
1.50 - 1.95	SPT		N = 33 (S)												
								2							
2.50 - 2.90	D	6							2.50m to 2.90m; very dense.						
2.50 - 3.00	B	7													
2.50 - 2.90	SPT		50/250 mm (S)												
3.00 - 3.50	ES	8						3	Very dense dark brownish grey calcareous gravelly slightly silty SAND with low cobble content. Sand is mainly fine and medium. Gravel is subangular fine and medium of siltstone and sandstone. Cobbles are subangular of sandstone and siltstone.	3.00	-8.85				
3.50 - 3.88	D	9													
3.50 - 4.00	B	10													
3.50 - 3.88	SPT		50/235 mm (S)							(1.70)					
4.00 - 4.50	B	11						4	4.00m to 4.50m; with some pockets (<100mm) of slightly gravelly sand.						
4.50 - 4.88	D	12							4.50m to 4.65m; assumed zone of core loss.						
4.50 - 4.88	SPT		50/225 mm (S)						4.65m to 4.88m; disturbed by SPT.						
4.70 - 4.88	D	13							Recovered as very stiff dark brownish grey thinly and medium bedded slightly calcareous slightly sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is	4.70	-10.55				

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID
	Client	Scrabster Harbour Trust		**BH22**
	Fugro Reference	G180030U		
	Coordinates (m)	E310357.33 N970311.54	Ground Elevation (m Datum) -5.85	Sheet 2 of 6
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details					Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
5.20 - 5.50 4.50 - 5.90	C	14		89	N/A	N/A			angular to subrounded fine to coarse of mixed lithologies including granite, sandstone and siltstone. Cobbles (<100mm x 170mm) are subangular of siltstone and siltstone.					
								6						
5.90 - 7.40 6.70 - 7.05	C	15		100	N/A	N/A								
								7						
7.40 - 7.78 7.40 - 8.05 7.40 - 7.78	D B SPT	16 31	50/225 mm (S)						7.40m to 7.78m; disturbed by SPT.					
								8						
8.05 - 8.40 7.40 - 8.90	C	17		100	N/A	N/A								
8.90 - 9.50	B	32								(8.55)				
								9						
9.65 - 10.00 8.90 - 10.40	C	18		100	N/A	N/A								
									Continued next page					

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH22**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310357.33 N970311.54	Ground Elevation (m Datum)	-5.85	Sheet 3 of 6
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									10.24m to 10.40m; with 1 No. cobble (full core diameter).						
								11							
10.40 - 11.90				100	N/A	N/A									
11.30 - 11.60	C	19							11.30m to 11.60m; extremely high strength.						
11.90 - 12.35	D	20							11.90m to 12.35m; disturbed by SPT.						
11.90 - 12.35	SPT		N = 41 (S)					12							
11.90 - 13.40				100	N/A	N/A									
13.00 - 13.32	C	21						13							
									Recovered as very stiff dark brownish grey thinly and medium bedded slightly calcareous sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including granite, sandstone and siltstone. Cobbles (<100mm x 170mm) are subangular of siltstone and siltstone.	13.25	-19.10				
								14		(1.65)					
13.40 - 14.90				100	N/A	N/A									
14.45 - 14.80	C	22													
									Very stiff (locally extremely weak) dark brown,	14.90	-20.75				
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH22**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310357.33 N970311.54	Ground Elevation (m Datum)	-5.85	Sheet 4 of 6
	Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									locally slightly calcareous, sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is angular and subangular fine to coarse of siltstone and fine grained sandstone. Cobbles (<70mm x 100mm) are angular and subangular of siltstone.						
14.90 - 16.40				100	N/A	N/A				(1.50)					
15.95 - 16.30	C	23						16							
16.40 - 16.77	D	24								16.40	-22.25				
16.40 - 16.77	SPT		50/225 mm (S)						Very stiff (locally extremely weak) thinly and medium bedded dark brown sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is angular and subangular fine to coarse of siltstone and sandstone. Cobbles (<60mm x 90mm) are subangular and subrounded of sandstone and siltstone.						
									16.40m to 16.66m; highly calcareous, with sandy pockets (8-12mm).	(0.94)					
								17							
16.40 - 17.90				100	N/A	N/A				17.34	-23.19				
									Very stiff (locally extremely weak) dark brown silty CLAY.						
17.59 - 17.90	C	25								(0.56)					
									At 17.83m; very thin bed (20mm) of angular and subangular of gravel.	17.90	-23.75				
								18	Very stiff (locally extremely weak) thinly to medium bedded dark brown slightly calcareous slightly gravelly, locally gravelly, sandy SILT. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of multicoloured sandstone and siltstone.						
									18.29m to 18.53m; dark brown slightly calcareous silty gravelly sand. Sand is fine. Gravel is angular and subangular fine.	(1.04)					
18.53 - 18.88	C	26													
17.90 - 19.40				95	0	0									
								19	Very weak to weak very thinly bedded thinly laminated light greenish grey fine grained SANDSTONE. Moderately weathered becoming slightly weathered.	18.94	-24.79				
18.94 - 19.40							NI		18.94m to 18.98m; non intact, recovered as angular to subrounded fragments (<63mm).	(0.46)					
									18.96m to 19.06m; joint, inclined (80 degrees), undulating, smooth.						
									19.05m to 19.22m; non intact, recovered as angular and subangular fragments (<63mm).	19.40	-25.25				
									19.22m to 19.29m; joint, inclined (45 degrees), stepped, smooth.						
									Weak, locally very weak, thinly to medium bedded greyish green fine and medium grained SANDSTONE, with light grey laminae. Fresh. Bedding fractures are very closely to widely						
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID **BH22**
	Client	Scrabster Harbour Trust		
	Fugro Reference	G180030U		
	Coordinates (m)	E310357.33 N970311.54	Ground Elevation (m Datum) -5.85	Sheet 5 of 6
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
19.40 - 20.90 19.40 - 20.90				94	94	64	4		spaced, inclined (0-5 degrees), undulating, smooth, very tight to tight, with quartz infill. Joints are medium to widely spaced, inclined (45-50 degrees), planar and undulating, smooth, with staining. Joints are very closely to medium spaced, inclined (80-90 degrees), undulating and planar, smooth, open, quartz infill. 19.86m to 19.96m; with dark laminae. 20.28m to 20.41m; non intact (assumed drilling induced). At 20.43m; inclined (5 degrees) quartz vein. 20.43m to 20.50m; with 1 to 2 No. inclined (85-90 degrees) quartz veins. 20.58m to 20.81m; with dark laminae.	(1.50)				
20.59 - 20.81	C	27													
20.90 - 21.20	C	30								20.90	-26.75				
								21	Very weak to weak medium bedded thinly laminated greyish green fine and medium grained SANDSTONE. Slightly weathered, locally moderately weathered. Bedding fractures are very closely to widely spaced, inclined (0-15 degrees), planar and undulating, rough. At 20.93m; inclined (5 degrees) quartz vein. 21.14m to 21.22m; joint, inclined (45 degrees), planar, smooth. 21.25m to 21.48m; joint, inclined (80 degrees), planar, smooth.						
20.90 - 22.25							6								
20.90 - 22.40				90	90	89				(1.50)					
21.88 - 22.08	C	28													
								22							
22.25 - 22.40							NR		22.25m to 22.40m; assumed zone of core loss.						
										22.40	-28.25				
									Weak to medium strong thinly and medium bedded light greenish grey fine and medium grained SANDSTONE. Slightly weathered. Bedding fractures are closely to medium spaced, inclined (0-5 degrees), planar, rough, locally moderately wide, clean or with sandy silt infill. Joints are widely spaced, inclined (20-40 degrees), undulating, rough, with silt veneer.						
								23							
22.40 - 23.90				100	99	93									
23.35 - 23.69	C	29													
22.40 - 25.40							5			(3.00)					
								24							
23.90 - 25.40				100	100	100									
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH22**
	Fugro Reference	G180030U			
	Coordinates (m)	E310357.33 N970311.54	Ground Elevation (m Datum)	-5.85	Sheet 6 of 6
	Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SANDSTONE. See previous sheet.						
									End of Borehole at 25.40 m	25.40	-31.25				
								26							
								27							
								28							
								29							

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
Client	Scrabster Harbour Trust			**BH23**
Fugro Reference	G180030U			
Coordinates (m)	E310388.03 N970250.84	Ground Elevation (m Datum)	-6.15	Sheet 1 of 1
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	4.00	CP	14/11/2018	14/11/2018	Dando			MG	SDB	
4.00	25.30	RC	14/11/2018	15/11/2018	Comacchio	Geobor S	146mm	MT	LLR/SDB	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
14/11/2018	16:05:00	0.00	0.50		
14/11/2018	18:10:00	4.00	4.00		
14/11/2018	21:01:00	4.00	4.00		
15/11/2018	05:28:00	25.30			

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)
4.00	4.80	Water	100	Brown	00:04
4.80	6.30	Water	100	Brown	00:10
6.30	7.80	Water	100	Brown	00:07
7.80	9.30	Water	100	Brown	00:09
9.30	10.80	Water	100	Brown	00:10
10.80	12.30	Water	100	Brown	00:14
12.30	13.80	Water	100	Brown	00:18
13.80	15.30	Water	100	Brown	00:14
15.30	16.80	Water	100	Brown	00:06
16.80	18.30	Water	100	Brown	00:11
18.30	19.80	Water	100	Grey	00:12
19.80	21.30	Water	100	Grey	00:12
21.30	22.80	Water	100	Grey	00:18
22.80	24.30	Water	100	Grey	00:38
24.30	25.30	Water	100	Grey	00:25

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)
4.00	4.80	102
4.80	6.30	102
6.30	7.80	102
7.80	9.30	102
9.30	10.80	102
10.80	12.30	102
12.30	13.80	102
13.80	15.30	102
15.30	16.80	102
16.80	18.30	102
18.30	19.80	102
19.80	21.30	102
21.30	22.80	102
22.80	24.30	102
24.30	25.30	102

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
4.00	200	4.00	200
25.30	146		

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 12.20m; deck level was 6.05m CD.
The borehole was advanced by cable percussion means to 4.00m, then rotary coring means to 25.30m.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	ROR/CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB

Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS — Print Date: 15/03/2019

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID
Client	Scrabster Harbour Trust		**BH23**
Fugro Reference	G180030U		
Coordinates (m)	E310388.03 N970250.84	Ground Elevation (m Datum) -6.15	Sheet 1 of 6
Hole Type	Cable Percussion and Rotary Coring		Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
0.00 - 0.50	B	2							Medium dense dark grey organic slightly gravelly very sandy SILT. Sand is fine to coarse. Gravel is subangular and subrounded fine and medium of siltstone and sandstone.						
0.00 - 0.50	ES	1													
0.50 - 0.95	D	3													
0.50 - 1.00	ES	4													
0.50 - 1.50	B	5													
0.50 - 0.95	SPT		N = 10 (S)							(1.50)					
								1							
1.50 - 1.95	D	6								1.50	-7.65				
1.50 - 2.00	B	8							Medium dense dark brownish grey slightly gravelly very silty SAND. Sand is mainly fine and medium. Gravel is subangular to rounded fine to coarse of siltstone and sandstone.						
1.50 - 2.00	ES	7							1.50m to 2.00m; with rare shell fragments.						
1.50 - 1.95	SPT		N = 26 (S)												
2.00 - 2.50	B	9						2		(1.00)					
2.50 - 2.95	D	10								2.50	-8.65				
2.50 - 3.00	B	11							Dense dark brownish grey slightly gravelly silty SAND. Sand is fine to coarse. Gravel is subangular and subrounded fine and medium of siltstone and sandstone.						
2.50 - 2.95	SPT		N = 33 (S)												
3.00 - 3.50	B	12						3	3.00m to 3.50m; with low cobble content. Cobble (60mm x 60mm x 70mm) is subrounded and rounded.	(1.40)					
3.50 - 3.85	D	13							3.50m to 3.90m; very dense, gravelly. Gravel is angular to subrounded fine to coarse of siltstone and sandstone.						
3.50 - 3.90	B	14													
3.50 - 3.85	SPT		50/200 mm (S)												
3.90 - 4.00	D	15								3.90	-10.05				
								4	Very stiff medium bedded dark greyish brown slightly calcareous slightly sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including siltstone, sandstone and quartzite. Cobbles (<80mm x 120mm) are subangular and subrounded of siltstone and sandstone.						
4.30 - 4.60	C	16													
4.00 - 4.80				100	N/A	N/A									
4.80 - 5.25	D	17							4.80m to 5.25m; disturbed by SPT.						
4.80 - 5.25	SPT		N = 45 (S)							(2.12)					
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH23**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310388.03 N970250.84	Ground Elevation (m Datum)	-6.15	Sheet 2 of 6
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SILT. See previous sheet.						
5.45 - 5.80	C	18													
4.80 - 6.30				93	N/A	N/A									
								6		6.02	-12.17				
									Recovered as firm dark brown slightly calcareous slightly gravelly sandy CLAY with rare shell fragments (<3mm). Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of siltstone and sandstone.	(0.18)					
										6.20	-12.35				
									Assumed zone of core loss. Driller noted till.	(0.60)					
										6.80	-12.95				
6.30 - 7.80				67	N/A	N/A		7	Recovered as firm to very stiff thinly to medium bedded dark brown slightly calcareous slightly gravelly sandy CLAY with rare shell fragments (<3mm), and locally with very closely to medium spaced thin and thick laminae of silty fine and medium sand. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of siltstone and sandstone.	(1.00)					
7.40 - 7.65	C	19													
7.80 - 8.15	D	20								7.80	-13.95				
7.80 - 8.15	SPT		50/200 mm (S)						Assumed zone of core loss. Driller noted clay/ sand.	(0.50)					
								8		8.30	-14.45				
7.80 - 9.30				67	N/A	N/A			Recovered as firm to very stiff thinly to medium bedded dark brown slightly calcareous slightly gravelly sandy CLAY with rare shell fragments (<3mm), and locally with very closely to medium spaced thin to thick laminae of silty fine and medium sand. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of siltstone and sandstone.						
8.90 - 9.20	B	21							At 8.50m; with 1 No. subrounded cobble (50mm x 100mm) of sandstone.						
								9	8.90m to 9.20m; recovered as silty gravelly sand with rare shell fragments (<5mm). Sand is fine to coarse. Gravel is subrounded medium and coarse of siltstone and sandstone.	(1.54)					
9.30 - 9.70	D	22													
9.30 - 9.70	SPT		50/250 mm (S)						9.30m to 9.70m; disturbed by SPT.						
9.72 - 9.82	C	23													
										9.84	-15.99				
									Very stiff thinly to medium bedded dark brownish grey slightly calcareous slightly sandy						

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH23**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310388.03 N970250.84	Ground Elevation (m Datum)	-6.15	Sheet 3 of 6
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details					Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
9.30 - 10.80				100	N/A	N/A			gravelly SILT. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of mixed lithologies including siltstone, sandstone and granite.					
10.20 - 10.80	B	36												
11.00 - 11.35	C	24						11	11.00m to 11.35m; extremely high strength.					
10.80 - 12.30				100	N/A	N/A								
11.70 - 12.30	B	37												
								12						
12.30 - 12.68	D	25							12.30m to 12.68m; disturbed by SPT.					
12.30 - 12.68	SPT		50/230 mm (S)											
									12.75m to 15.30m; with low cobble content. Cobbles (<100mm x 100mm) are subangular and subrounded of siltstone and sandstone.					
12.30 - 13.80				100	N/A	N/A		13						
13.20 - 13.50	C	26							13.20m to 13.50m; extremely high strength.					
								14		(8.81)				
13.80 - 15.30				100	N/A	N/A								
14.80 - 15.12	C	27												
									Continued next page					

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH23**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310388.03 N970250.84	Ground Elevation (m Datum)	-6.15	Sheet 4 of 6
	Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SILT. See previous sheet.						
16.00 - 16.35 15.30 - 16.80	C	28		100	N/A	N/A		16							
									Below 16.36m; with rare shell fragments.						
16.80 - 17.17 16.80 - 17.17	D SPT	29	50/220 mm (S)					17							
16.80 - 18.30				100	N/A	N/A									
17.70 - 18.05	C	30						18							
										18.65	-24.80				
18.65 - 19.18 18.30 - 19.80				100	41	33	NI	19	Very weak to weak, locally medium strong, thinly and medium bedded greenish grey fine and medium grained SANDSTONE. Slightly weathered to fresh. Bedding fractures very closely to medium spaced, inclined (5-15 degrees), planar, rough, clean, locally with silt veneer. Joints are widely spaced, inclined (40-60 degrees), planar, rough, with sandy silt veneer. 18.65m to 19.18m; non intact (assumed drilling disturbed), recovered as slightly sandy fragments (<63mm).						
19.18 - 20.46							13								
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH23**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310388.03 N970250.84	Ground Elevation (m Datum)	-6.15	Sheet 5 of 6
	Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
20.05 - 20.15	C	31							20.14m to 20.75m; yellowish brown.						
20.50 - 20.81 19.80 - 21.30	C	32		100	89	33			At 20.47m; recovered as silty gravelly sand (60mm thick).						
20.46 - 21.30							4	21							
21.30 - 21.63	C	33													
21.30 - 22.80 21.30 - 22.80				100	100	100	2	22	21.78m to 21.80m; with 1 No. quartz vein. 21.78m to 22.60m; with iron stained pockets (15mm-30mm). 21.95m to 22.02m; non intact (assumed drilling induced), with iron banding, pyrite grains. 21.95m to 22.25m; with thin black laminae and lenses. 22.43m to 22.57m; non intact (assumed drilling induced). 22.65m to 22.77m; joint, inclined (85 degrees), planar, smooth.	(6.65)					
22.80 - 24.30 22.80 - 24.30				100	100	93	2	23							
24.04 - 24.30	C	34						24	24.30m to 24.46m; joint, inclined (80 degrees), planar, smooth (possibly drilling induced). 24.43m to 24.52m; joint, inclined (90 degrees), planar, smooth (possibly drilling induced).						
24.70 - 25.07 24.30 - 25.30 24.30 - 25.30	C	35		98	98	98	3								

Continued next page

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH23**
	Fugro Reference	G180030U			
	Coordinates (m)	E310388.03 N970250.84	Ground Elevation (m Datum)	-6.15	Sheet 6 of 6
	Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SANDSTONE, See previous sheet.						
									End of Borehole at 25.30 m	25.30	-31.45				
								26							
								27							
								28							
								29							

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
Client	Scrabster Harbour Trust			**BH24a**
Fugro Reference	G180030U			
Coordinates (m)	E310417.36 N970174.76	Ground Elevation (m Datum)	-7.75	Sheet 1 of 1
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	3.00	CP	11/11/2018	11/11/2018	Dando			MG	SDB/LLR	
3.00	25.20	RC	11/11/2018	12/11/2018	Comacchio	Geobor S	146mm	MG/MT	SDB/LLR	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
11/11/2018	13:40:00	0.00	0.50		
11/11/2018	19:00:00	7.20	2.50		
11/11/2018	20:30:00	7.20	2.50		
12/11/2018	05:45:00	25.20	2.50		

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
3.00	200	2.50	200
25.20	146		

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)
3.00	4.20	Water	100	Brown	00:08
4.20	5.70	Water	100	Brown	00:07
5.70	7.20	Water	100	Brown	00:10
7.20	8.70	Water	100	Grey	00:07
8.70	10.20	Water	100	Grey	00:10
10.20	11.70	Water	100	Grey	00:10
11.70	13.20	Water	100	Grey	00:09
13.20	14.70	Water	100	Grey	00:10
14.70	16.20	Water	100	Grey	00:06
16.20	17.70	Water	100	Grey	00:06
17.70	19.20	Water	100	Grey	00:06
19.20	20.70	Water	100	Grey	00:05
20.70	22.20	Water	100	Grey	00:04
22.20	23.70	Water	100	Grey	00:03
23.70	25.20	Water	100	Grey	

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)
3.00	4.20	102
4.20	5.70	102
5.70	7.20	102
7.20	8.70	102
8.70	10.20	102
10.20	11.70	102
11.70	13.20	102
13.20	14.70	102
14.70	16.20	102
16.20	17.70	102
17.70	19.20	102
19.20	20.70	102
20.70	22.20	102
22.20	23.70	102
23.70	25.20	102

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 14.30m; deck level was 6.55m CD.
The borehole was advanced by cable percussion means to 3.00m, then rotary coring means to 25.20m.
Sample B2 (0.00m-0.50m) depleted for ES1 (0.00m-0.50m) subsampling.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	ROR/CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB
Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS				Print Date	15/03/2019

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
Client	Scrabster Harbour Trust			**BH24a**
Fugro Reference	G180030U			
Coordinates (m)	E310417.36 N970174.76	Ground Elevation (m Datum)	-7.75	Sheet 1 of 6
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
0.00 - 0.50	B	2							Dark brownish grey slightly gravelly silty SAND with rare finely disseminated pyrite and with 1 No. bivalve shell and 1 No. bryozoan fragment. Sand is fine to coarse. Gravel is angular and subangular fine of siltstone. Sulphurous odour.	(0.50)					
0.00 - 0.50	ES	1													
0.50 - 0.95	D	3							Medium dense dark brownish grey gravelly silty SAND with rare disseminated pyrite. Sand is fine to coarse. Gravel is angular and subangular fine and medium of siltstone.	0.50	-8.25				
0.50 - 1.00	B	5													
0.50 - 1.00	ES	4													
0.50 - 0.95	SPT		N = 20 (S)												
1.00 - 1.50	B	6						1		(1.00)					
1.50 - 1.95	D	7							Dense dark greyish brown gravelly SAND. Sand is mainly fine and medium becoming fine to coarse. Gravel is subangular and subrounded predominantly fine and medium of siltstone and sandstone. 1.50m to 1.95m; with rare dark plant material.	1.50	-9.25				
1.50 - 2.00	B	9													
1.50 - 2.00	ES	8													
1.50 - 1.95	SPT		N = 41 (S)												
2.00 - 2.50	B	10						2		(1.10)					
2.50 - 2.88	D	11													
2.50 - 3.00	B	12													
2.50 - 2.88	SPT		50/235 mm (S)												
									Very stiff (extremely weak) dark brown highly calcareous sandy gravelly SILT with high cobble content. Sand is fine to coarse. Gravel is subangular and subrounded of siltstone. Cobbles are subangular and subrounded of siltstone.	2.60 (0.40)	-10.35				
								3		3.00	-10.75				
									Very stiff (locally extremely weak) dark brown very thinly to medium bedded slightly calcareous slightly gravelly sandy SILT. 3.00m to 3.10m; gravelly sand. 3.31m to 3.34m; possibly gravelly sand.						
3.00 - 4.20				100	N/A	N/A			3.56m to 4.14m; with subangular and subrounded coarse gravel/cobbles.	(1.14)					
3.75 - 4.10	C	13							3.75m to 4.10m; extremely high strength.						
								4							
									4.10m to 4.20m; gravelly sand.	4.14	-11.89				
									Recovered as firm to stiff dark brownish grey thickly laminated to thinly bedded slightly calcareous slightly gravelly sandy SILT with low cobble content. Sand is fine to coarse. Gravel is subangular and subrounded fine to coarse of siltstone and sandstone. Cobbles (<100mm x 130mm) are subangular of siltstone. 4.20m to 4.45m; assumed zone of core loss.						
4.70 - 5.70	B	30													
4.20 - 5.70				83	N/A	N/A									
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH24a**
	Fugro Reference	G180030U			
	Coordinates (m)	E310417.36 N970174.76	Ground Elevation (m Datum)	-7.75	Sheet 2 of 6
	Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SILT. See previous sheet.						
5.70 - 6.14	D	14													
5.70 - 6.14	SPT		50/285 mm (S)												
5.80 - 6.70	B	31								(3.61)					
								6							
5.70 - 7.20				93	N/A	N/A			6.42m to 6.90m; very stiff, with rare gravel.						
6.60 - 6.90	C	15													
								7							
									7.20m to 7.35m; assumed zone of core loss.						
									7.60m to 7.75m; slightly sandy gravelly silt.						
									Very stiff thinly and medium bedded dark brownish grey slightly calcareous slightly sandy gravelly SILT with low cobble content. Gravel is angular to subrounded fine to coarse of siltstone and sandstone. Cobbles are angular and subangular of siltstone.	7.75	-15.50				
7.20 - 8.70				90	N/A	N/A									
8.00 - 8.35	C	17						8	7.75m to 7.97m; slightly sandy gravelly silt.						
8.70 - 12.92	B	32													
8.70 - 9.15	D	20							8.70m to 9.12m; recovered as firm to stiff slightly sandy gravelly silt.						
8.70 - 9.15	SPT		N = 35 (S)												
								9							
8.70 - 10.20				100	N/A	N/A			9.58m to 9.68m; recovered as firm to stiff slightly sandy gravelly silt.						
9.96 - 10.20	C	18													
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID **BH24a**
	Client	Scrabster Harbour Trust		
	Fugro Reference	G180030U		
	Coordinates (m)	E310417.36 N970174.76	Ground Elevation (m Datum) -7.75	Sheet 3 of 6
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SILT. See previous sheet.						
10.85 - 11.15	C	19													
10.20 - 11.70				100	N/A	N/A		11							
11.70 - 12.02	D	16								(7.75)					
11.70 - 12.02	SPT		50/175 mm (S)						11.70m to 11.75m; disturbed by SPT.						
								12							
11.70 - 13.20				100	N/A	N/A									
12.88 - 13.20	C	21						13							
13.20 - 14.70				100	N/A	N/A									
14.15 - 14.45	C	22						14							
14.70 - 15.12	D	23							14.70m to 14.75m; disturbed by SPT.						
14.70 - 15.12	SPT		50/275 mm (S)												
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID **BH24a**
	Client	Scrabster Harbour Trust		
	Fugro Reference	G180030U		
	Coordinates (m)	E310417.36 N970174.76	Ground Elevation (m Datum) -7.75	Sheet 4 of 6
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
15.17 - 15.45	C	24							15.17m to 15.45m; very high strength.						
14.70 - 16.20				53	N/A	N/A				15.50	-23.25				
									Assumed zone of core loss/possible cave-in. Recovered as dark grey gravelly sand with rare shell fragments.						
15.50 - 16.20							NR			(0.70)					
								16							
										16.20	-23.95				
16.20 - 16.48							NI		Very weak to weak thickly laminated to thinly bedded light greenish grey and yellowish brown fine and medium grained SANDSTONE. Slightly weathered. Bedding fractures are extremely closely to closely spaced, inclined (5-10 degrees), planar, rough, clean. Joints are medium to widely spaced, inclined (50-70 degrees), planar, rough, clean.						
16.56 - 16.62	C	25							16.20m to 16.48m; non intact, recovered as subangular and subrounded fragments (<63mm).						
16.20 - 17.70				100	67	0		17							
									At 17.50m; recovered as gravelly sand (30mm thick).						
18.01 - 18.14	C	26						18							
17.70 - 19.20				100	81	9									
16.48 - 20.58							25		At 18.63m; recovered as slightly gravelly sand (40mm thick). Sand is fine and medium.						
								19							
									19.12m to 19.20m; recovered as silty sand. Sand is fine and medium.						
19.20 - 20.70				93	81	0				(7.50)					
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

FUGRO	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID **BH24a**
	Client	Scrabster Harbour Trust		
	Fugro Reference	G180030U		
	Coordinates (m)	E310417.36 N970174.76	Ground Elevation (m Datum) -7.75	Sheet 5 of 6
	Hole Type	Cable Percussion and Rotary Coring		Status Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
									SANDSTONE. See previous sheet.						
20.30 - 20.39	C	27													
20.58 - 20.70							NI		20.58m to 20.70m; recovered as silty gravelly sand. Sand is fine and medium. 20.70m to 21.00m; assumed zone of core loss.						
20.70 - 21.00							NR								
								21							
21.26 - 21.37	C	28													
20.70 - 22.20				80	61	7									
								22							
21.00 - 23.29							25		22.20m to 22.42m; non intact (assumed drilling induced). 22.32m to 22.52m; joint, inclined (90 degrees), undulating, smooth, tight, with quartz. 22.64m to 22.92m; joint, inclined (90 degrees), undulating, smooth, tight, with quartz. 22.65m to 22.72m; joint, inclined (85 degrees), undulating, smooth, tight, with quartz.						
22.20 - 23.70				73	73	63		23							
23.29 - 23.70							NR		23.21m to 23.29m; non intact (assumed drilling induced). 23.29m to 23.70m; assumed zone of core loss.						
									Weak very thickly bedded to thinly laminated greyish green fine and medium grained SANDSTONE. Slightly weathered. 23.81m to 23.97m; joint, inclined (85 degrees), undulating, rough, very tight. 23.98m to 24.15m; joint, inclined (65 degrees), undulating, rough.	23.70	-31.45				
								24							
24.17 - 24.39	C	29													
23.70 - 25.20				97	97	97	-			(1.50)					
23.70 - 25.20									24.69m to 25.06m; joint, inclined (80 degrees), undulating, smooth, open.						
									Continued next page						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID
	Client	Scrabster Harbour Trust		**BH24a**
	Fugro Reference	G180030U		
	Coordinates (m)	E310417.36 N970174.76	Ground Elevation (m Datum) -7.75	Sheet 6 of 6
	Hole Type	Cable Percussion and Rotary Coring	Status	Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
									SANDSTONE. See previous sheet.					
									End of Borehole at 25.20 m	25.20	-32.95			
								26						
								27						
								28						
								29						

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID
Client	Scrabster Harbour Trust		**BH30**
Fugro Reference	G180030U		
Coordinates (m)	E310219.11 N970318.93	Ground Elevation (m Datum) -3.95	Sheet 1 of 1
Hole Type	Cable Percussion and Rotary Coring		Status: Draft

Equipment

Depth From (m)	Depth To (m)	Hole Type	Date From	Date To	Equipment	Core Barrel	Core Bit	Drilling Crew	Logged By	Remarks
0.00	0.50	CP	15/11/2018	15/11/2018	Dando			MT	LLR	
0.50	7.65	RC	16/11/2018	16/11/2018	Comacchio	Geobor S	146mm	MT	LLR	

Progress

Date (dd/mm/yyyy)	Time (hh:mm:ss)	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Weather
15/11/2018	00:00:00	0.00	0.50		
16/11/2018	05:23:00	7.65	0.50		

Rotary Details

Depth From (m)	Depth To (m)	Flush Type	Flush Return (%)	Flush Colour	Run Time (hh:mm)
0.50	1.50	Water	100	Brown	00:06
1.50	2.60	Water	100	Brown	00:09
2.60	4.10	Water	100	Brown	00:11
4.10	5.60	Water	100	Brown	00:08
5.60	7.10	Water	100	Brown	00:15
7.10	7.65	Water	100	Brown	

Core Details

Depth From (m)	Depth To (m)	Diameter (mm)
0.50	1.50	102
1.50	2.60	102
2.60	4.10	102
4.10	5.60	102
5.60	7.10	102
7.10	7.65	102

Hole and Casing

Depth To (m)	Hole Diameter (mm)	Depth To (m)	Casing Diameter (mm)
0.50	200	0.50	200
7.65	146		

Chiselling / Slow Progress

Depth From (m)	Depth To (m)	Duration (hh:mm)	Tool / Remark

Water Strike

Strike At (m)	Rise To (m)	Time Elapsed (mins)	Casing Depth (m)	Depth Sealed (m)

Water Added

Depth From (m)	Depth To (m)

Water Strike Remarks

Groundwater not observed as the borehole was constructed in sea environment.

General Remarks

The borehole was carried out overwater from the jack-up platform Skate 3A.
Deck to mudline was 10.90m; deck level was 6.95m CD.
The borehole was advanced by cable percussion means to 0.50m, then rotary coring means to 7.65m.

Installation

Type	ID	Response Zone Top (m)	Response Zone Base (m)	Installation Date

Pipe

ID	Top Depth (m)	Base Depth (m)	Diameter (mm)	Type

Backfill

Depth From (m)	Depth To (m)	Backfill Material	Date

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Checked By	ROR/CAY	Elevation Datum	Chart Datum	Grid Coordinate System	OSGB

Template: FGSL/HBSI/FGSL BH Summary.hbt/Config Fugro Rev5/12/03/2019/TS — Print Date: 15/03/2019

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH30**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310219.11 N970318.93	Ground Elevation (m Datum)	-3.95	Sheet 1 of 2
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details					Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend	Water Strike	Backfill / Installation
0.00 - 0.10	D	1							Dark grey slightly sandy GRAVEL with rare wire fragments (<40mm). Gravel is subangular fine to coarse of siltstone.	(0.10)				
0.10 - 0.50	ES	2							Stiff becoming very stiff to hard dark brownish grey slightly sandy gravelly SILT with rare shell fragments (<10mm). Gravel is angular to subrounded fine to coarse of mixed lithologies, including siltstone, sandstone and granite.	0.10	-4.05			
0.50 - 0.86	D	3							Below 0.50m; very stiff to hard.					
0.50 - 0.86	SPT		50/205 mm (S)						0.50m to 0.60m; assumed zone of core loss.					
0.60 - 1.15	ES	4							0.60m to 0.85m; disturbed by SPT.					
0.50 - 1.50				90	N/A	N/A		1						
1.15 - 1.50	C	5							1.15m to 1.50m; extremely high strength.					
									1.27m to 4.37m; with low cobble content. Cobbles (<100mm x 110mm) are subangular and subrounded of siltstone.					
1.50 - 1.86	D	6							1.50m to 1.86m; disturbed by SPT.					
1.50 - 1.86	SPT		50/210 mm (S)											
1.50 - 2.60				100	N/A	N/A		2						
2.25 - 2.60	C	7												
2.60 - 2.86	D	8							2.60m to 2.87m; disturbed by SPT.					
2.60 - 2.86	SPT		50/115 mm (S)											
2.90 - 3.55	ES	9						3						
2.60 - 4.10				100	N/A	N/A								
3.55 - 3.90	C	10								(7.55)				
								4						
4.10 - 4.42	D	11							4.10m to 4.42m; disturbed by SPT.					
4.10 - 4.70	B	16												
4.10 - 4.42	SPT		47/170 mm (S)											
4.10 - 5.60				100	N/A	N/A								
									Continued next page					

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH30**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310219.11 N970318.93	Ground Elevation (m Datum)	-3.95	Sheet 2 of 2
Hole Type	Cable Percussion and Rotary Coring			Status: Draft

Depth (m)	Sampling and In Situ Testing			Core Recovery				Strata Details						Groundwater	
	Type	No.	Test Results	TCR (%)	SCR (%)	RQD (%)	FI (-)	Depth (m)	Strata Descriptions	Depth (Thickness) (m)	Level (m Datum)	Legend		Water Strike	Backfill / Installation
5.05 - 5.40	C	12							SILT. See previous sheet.						
5.40 - 6.15	ES	13													
								6							
6.15 - 6.75	B	17													
5.60 - 7.10				100	N/A	N/A									
									Below 6.54m; becoming dark greyish brown.						
6.75 - 7.10	C	14													
								7							
7.10 - 7.29	D	15							7.10m to 7.29m; disturbed by SPT.						
7.10 - 7.29	SPT		50/85 mm (S)												
7.10 - 7.65				100	N/A	N/A									
									End of Borehole at 7.65 m	7.65	-11.60				
								8							
								9							

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

D. PHOTOGRAPHS

D.1 ROTARY CORE PHOTOGRAPHS

BH01	Plates BH01/1 to BH01/13
BH02	Plates BH02/1 to BH02/12
BH03	Plates BH03/1 to BH03/14
BH04	Plates BH04/1 to BH04/14
BH09	Plates BH09/1 to BH09/3
BH20	Plates BH20/1 to BH20/4
BH21	Plates BH21/1 to BH21/15
BH22	Plates BH22/1 to BH22/14
BH23	Plates BH23/1 to BH23/15
BH24a	Plates BH24a/1 to BH24a/14
BH30	Plates BH30/1 to BH30/6

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
DATE: 8th Nov 2018
SAMPLE REF: CR01
BOX REF: (1)
DEPTH TOP: 6·50 (m)
DEPTH BASE: 7·50 (m)
BASE
BH01 CR01
AZCL
6·50
7·50

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SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
SAMPLE REF: CR02
DEPTH TOP: 7·50 (m)
DATE: 8th Nov 2018
BOX REF: (2)
DEPTH BASE: 9·00 (m)
BASE
7·50m
BH02 CR02
AZCL
9·00
7·50
9·00

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SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
SAMPLE REF: CR03
DEPTH TOP: 9·00 (m)
DATE: 8th Nov 2018
BOX REF: (3)
DEPTH BASE: 10·50 (m)
BASE
BH01: CR03

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SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
SAMPLE REF: CR04
DEPTH TOP: 10·50 (m)
DATE: 8th Nov 2018
BOX REF: (4)
DEPTH BASE: 12·00 (m)
BASE
10·50m
BH01: CR04
12·05m
10·50
12·00

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SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
SAMPLE REF: CR05
DEPTH TOP: 12·00 (m)
DATE: 8th Nov 2018
BOX REF: (-5)
DEPTH BASE: 13·50 (m)
BASE
-CR 5-
AZCL 12·70-13·50M
12·00M
13·50M

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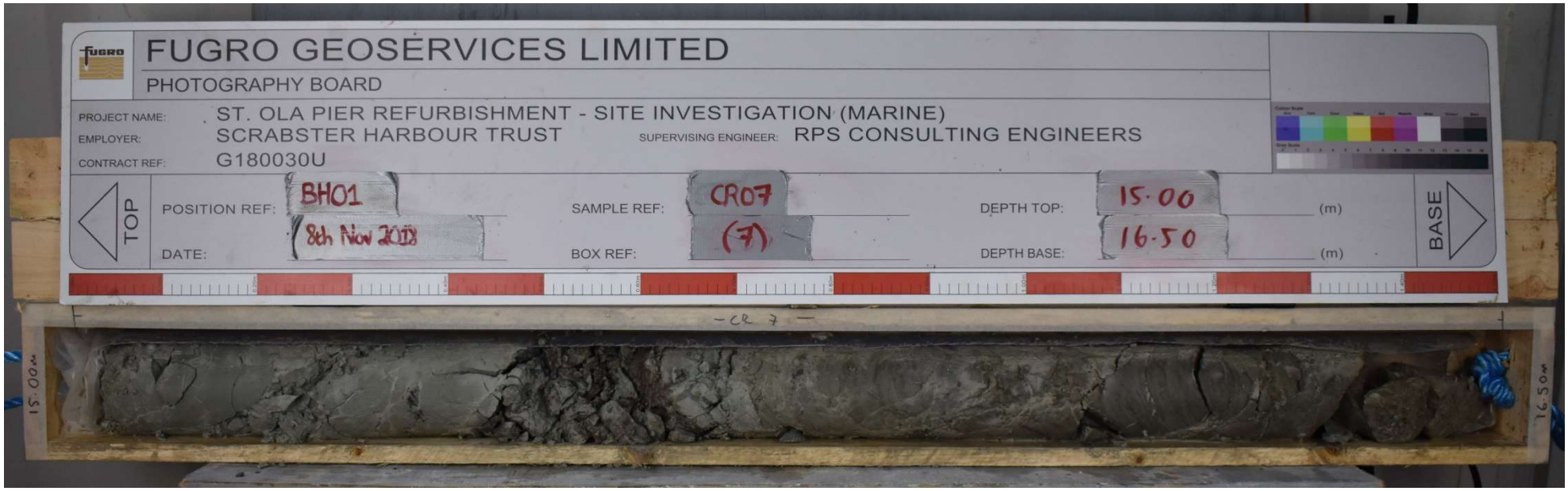
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
SAMPLE REF: CR06
DEPTH TOP: 13.50 (m)
DATE: 8th Nov 2018
BOX REF: (6)
DEPTH BASE: 15.00 (m)
BASE
AZCL 13.50 - 13.65m
— CR 6 —
13.50m
15.00m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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
SAMPLE REF: CR07
DEPTH TOP: 15.00 (m)
DATE: 8th Nov 2018
BOX REF: (7)
DEPTH BASE: 16.50 (m)
BASE
-CR 7-
15.00m
16.50m

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SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
SAMPLE REF: CR08
DEPTH TOP: 16.50 (m)
DATE: 8th Nov 2018
BOX REF: (8)
DEPTH BASE: 18.00 (m)
BASE
-CR 8-
16.50m
18.00m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
DATE: 8th Nov 2018
SAMPLE REF: CR09
BOX REF: (9)
DEPTH TOP: 18.00 (m)
DEPTH BASE: 19.50 (m)
BASE
— CR 9 —
18.00m
19.50m

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SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
SAMPLE REF: CR10
DEPTH TOP: 19.50 (m)
DATE: 8th Nov 2018
BOX REF: (10)
DEPTH BASE: 21.00 (m)
BASE
19.50 m
21.00 m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
SAMPLE REF: CR11
DEPTH TOP: 21.00 (m)
DATE: 8th Nov 2018
BOX REF: (11)
DEPTH BASE: 22.50 (m)
BASE
21.00m
21.50m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
SAMPLE REF: CR12
DEPTH TOP: 22.50 (m)
DATE: 8th Nov 2018
BOX REF: (12)
DEPTH BASE: 24.00 (m)
BASE
– CR 12 –
22.50m
24.00m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH01
DATE: 8th Nov 2018
SAMPLE REF: CR13
BOX REF: (13)
DEPTH TOP: 24.00 (m)
DEPTH BASE: 25.50 (m)
BASE
– CR 13 –
24.00
25.50m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH02
SAMPLE REF: CR 1
DEPTH TOP: 7.00 (m)
DATE: 07/11/2018
BOX REF: (1)
DEPTH BASE: 8.30 (m)
BASE
AZCL 7.00 - 7.40m
– CR 1 –
7.00 m
8.30 m
8.30 m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH02
SAMPLE REF: CR 2+3
DEPTH TOP: 8.30 (m)
DATE: 07/11/2018
BOX REF: (2)
DEPTH BASE: 9.80 (m)
BASE
CR 2
CR 3
8.30m
9.10m
9.60m
9.80m

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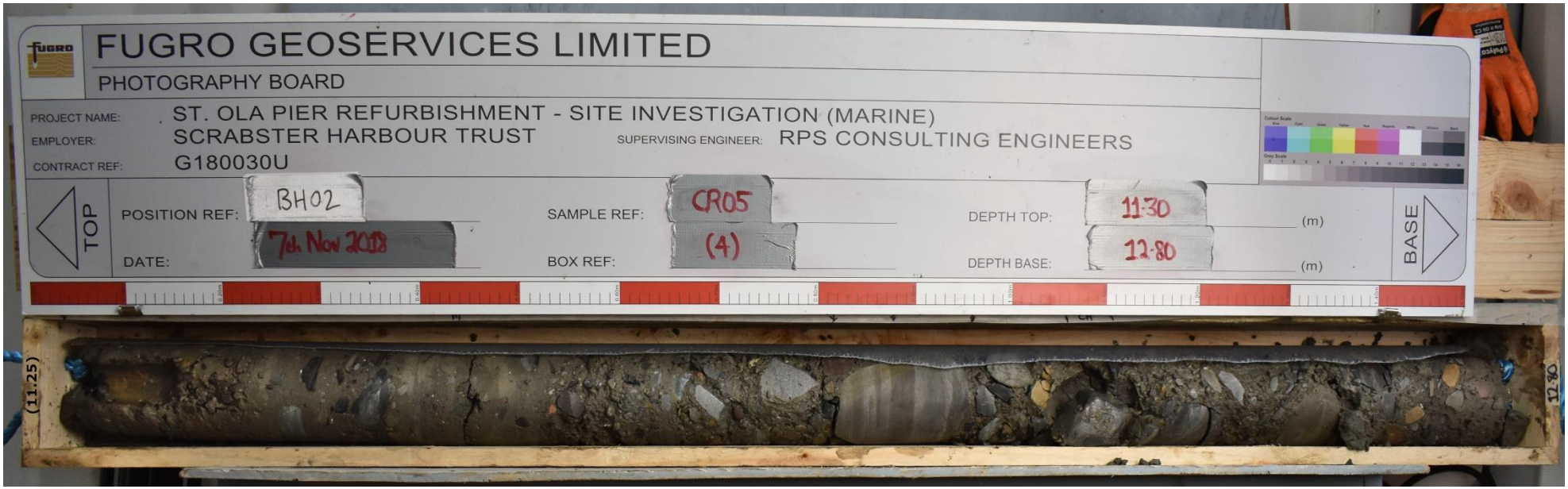
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH02
SAMPLE REF: CR4
DEPTH TOP: 9.80 (m)
DATE: 7th Nov 2018
BOX REF: (3)
DEPTH BASE: 11.30 (m)
BASE
(11.25)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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH02
SAMPLE REF: CR05
DEPTH TOP: 11.30 (m)
DATE: 7th Nov 2018
BOX REF: (4)
DEPTH BASE: 12.80 (m)
BASE
(11.25)
12.80

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH02
DATE: 7th Nov 2018
SAMPLE REF: CR06
BOX REF: (5)
DEPTH TOP: 12.80 (m)
DEPTH BASE: 14.30 (m)
BASE
12.80m CH
CH
CR06
14.30m
12.80
14.30

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH02
DATE: 7th Nov 2018
SAMPLE REF: CR07
BOX REF: (G)
DEPTH TOP: 14.30 (m)
DEPTH BASE: 15.80 (m)
BASE
14.30m
CR07
14.30
15.80

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PHOTOGRAPHY BOARD
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH02
DATE: 7th Nov 2018
SAMPLE REF: CR08
BOX REF: (7)
DEPTH TOP: 15·80 (m)
DEPTH BASE: 17·30 (m)
BASE
15·80m
CR08
15·80
17·30

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH02
SAMPLE REF: CR09
DEPTH TOP: 17.30 (m)
DATE: 7th Nov 2013
BOX REF: (8)
DEPTH BASE: 18.80 (m)
BASE

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH02
SAMPLE REF: CR10
DEPTH TOP: 18.80 (m)
DATE: 7th Nov 2018
BOX REF: (5)
DEPTH BASE: 20.30 (m)
BASE

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH02
SAMPLE REF: CR11
DEPTH TOP: 20.30 (m)
DATE: 7th Nov 2018
BOX REF: (10)
DEPTH BASE: 21.80 (m)
BASE
CR11
20.30m
21.80m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH02
DATE: 7th Nov 2018
SAMPLE REF: CR12
BOX REF: (11)
DEPTH TOP: 21.80 (m)
DEPTH BASE: 23.30 (m)
BASE
– CL 12 –
21.80m
23.30m

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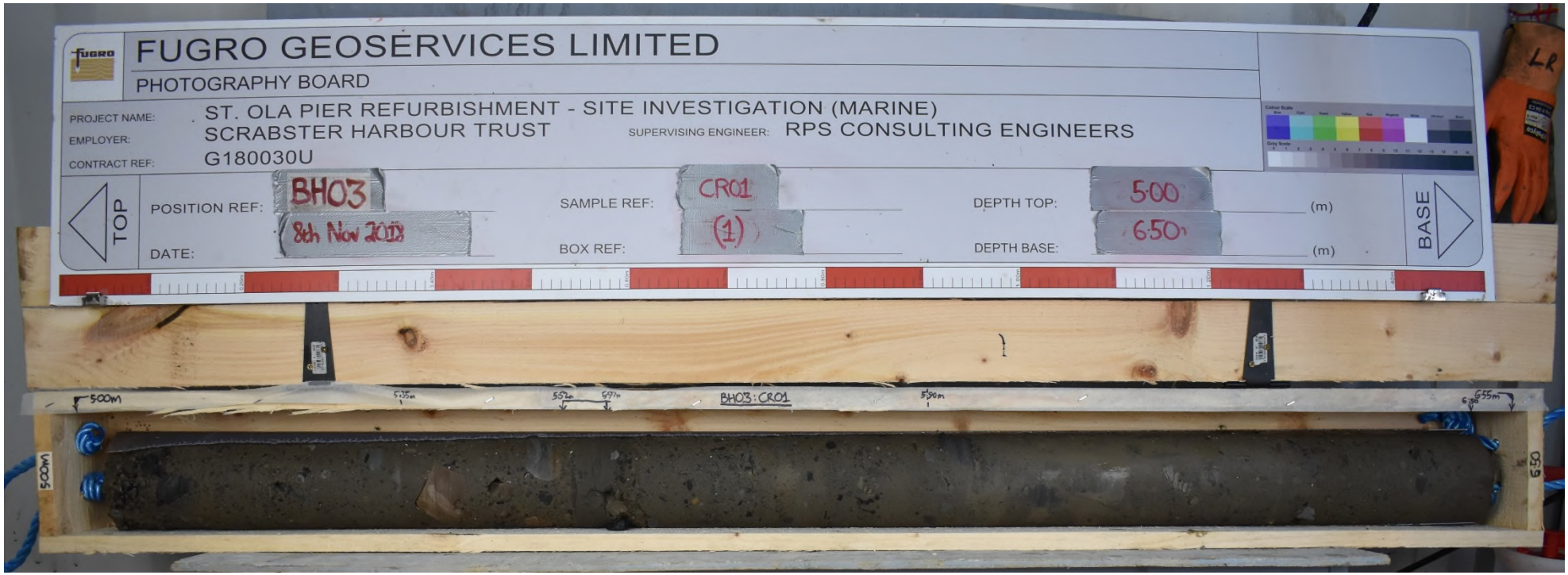
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH02
DATE: 7th Nov 2018
SAMPLE REF: CR13
BOX REF: (12)
DEPTH TOP: 23.30 (m)
DEPTH BASE: 24.80 (m)
BASE
CR 13
23.30m
24.80m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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
DATE: 8th Nov 2013
SAMPLE REF: CR01
BOX REF: (1)
DEPTH TOP: 5.00 (m)
DEPTH BASE: 6.50 (m)
BASE
BH03:CR01

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
SAMPLE REF: CR02
DEPTH TOP: 6·50 (m)
DATE: 10th Nov 2012
BOX REF: (2)
DEPTH BASE: 8·00 (m)
BASE
6·50m
BH3: CR02
7·92m
8·00m
6·50
8·00

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
SAMPLE REF: CR03
DEPTH TOP: 8.00 (m)
DATE: 10th Nov 2018
BOX REF: (3)
DEPTH BASE: 9.50 (m)
BASE

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
SAMPLE REF: CR04
DEPTH TOP: 9.50 (m)
DATE: 10th Nov 2013
BOX REF: (4)
DEPTH BASE: 11.00 (m)
BASE
BH03: CR04

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
DATE: 10th Nov 2018
SAMPLE REF: CR05
BOX REF: (5)
DEPTH TOP: 1100 (m)
DEPTH BASE: 1250 (m)
BASE
1100m
1170m
BH03: CR05
1184m
1221
1255m
1100
1150

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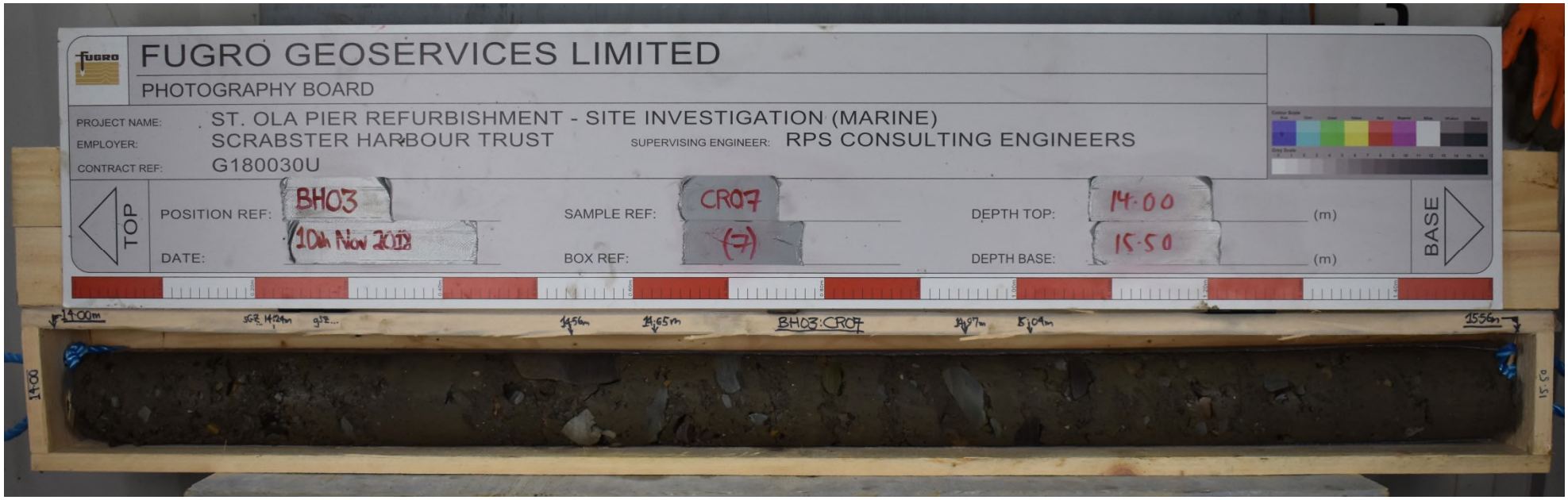
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
SAMPLE REF: CR06
DEPTH TOP: 12.50 (m)
DATE: 10th Nov 2018
BOX REF: (6)
DEPTH BASE: 14.00 (m)
BASE
12.50m
12.92m
BH03: CR06
13.40m
13.90m
14.05m
12.50
14.00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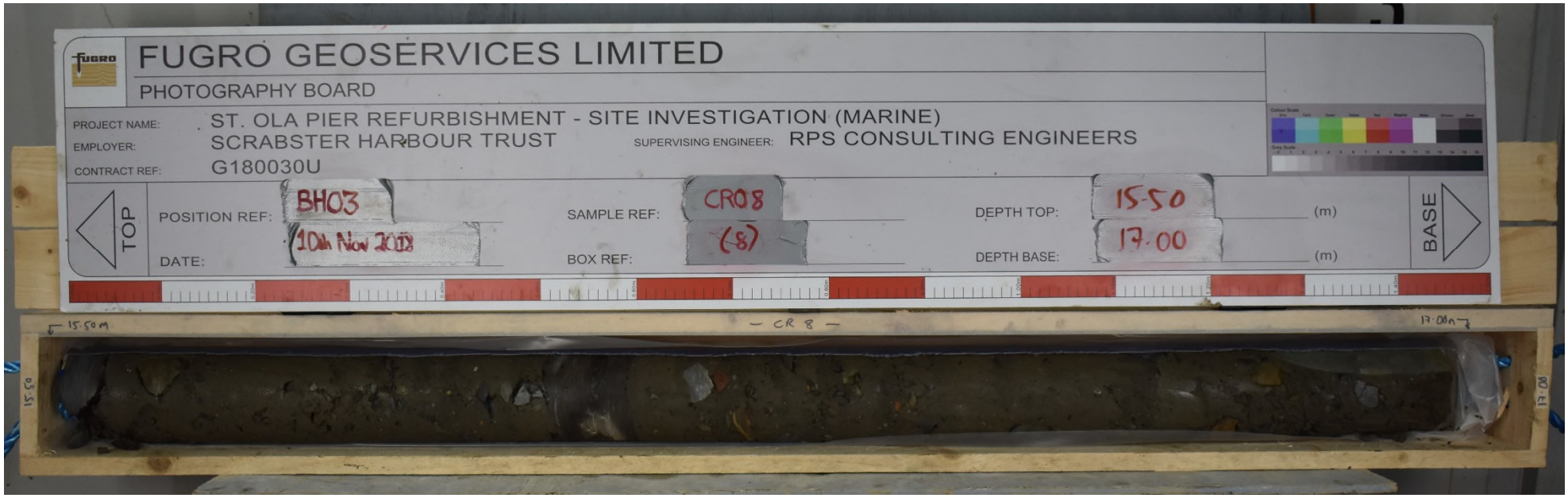
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
SAMPLE REF: CR07
DEPTH TOP: 14.00 (m)
DATE: 10th Nov 2018
BOX REF: (7)
DEPTH BASE: 15.50 (m)
BASE
BH03:CR07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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
SAMPLE REF: CR08
DEPTH TOP: 15.50 (m)
DATE: 10th Nov 2018
BOX REF: (8)
DEPTH BASE: 17.00 (m)
BASE
15.50m
CR 8
17.00m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
SAMPLE REF: CR09
DEPTH TOP: 17.00 (m)
DATE: 10th Nov 2018
BOX REF: (9)
DEPTH BASE: 18.50 (m)
BASE

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
SAMPLE REF: CR10
DEPTH TOP: 18.50 (m)
DATE: 10th Nov 2018
BOX REF: (10)
DEPTH BASE: 20.00 (m)
BASE
18.50m
– CR 10 –
2000

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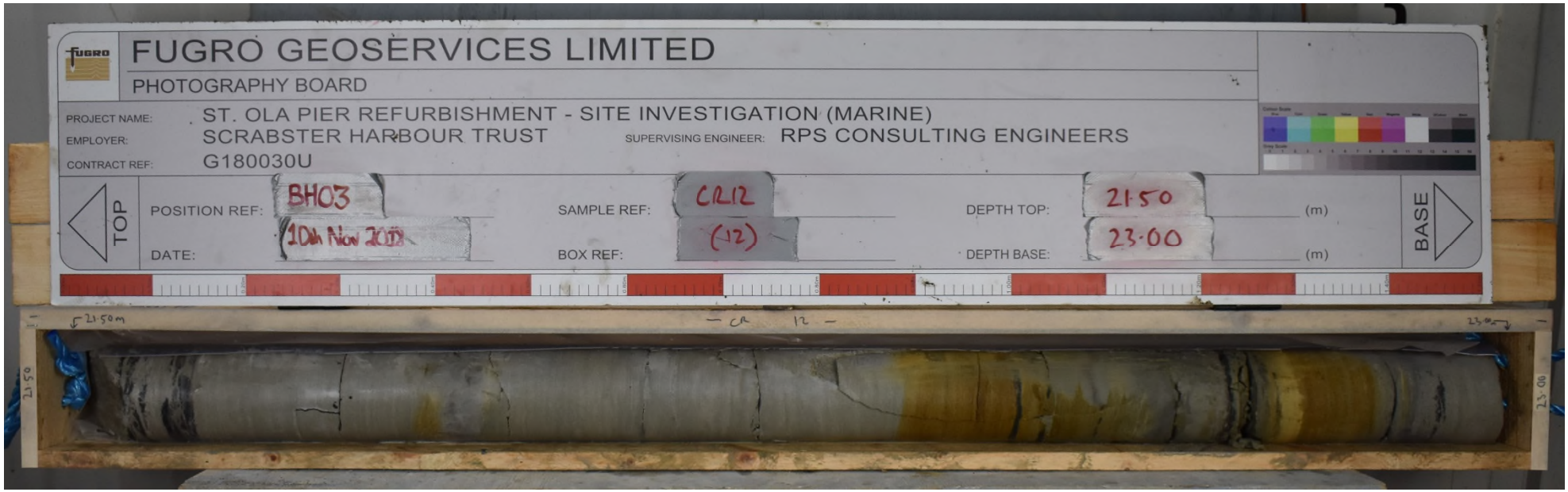
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
SAMPLE REF: CR11
DEPTH TOP: 20.00 (m)
DATE: 10th Nov 2018
BOX REF: (11)
DEPTH BASE: 21.50 (m)
BASE
20.00m
20.49m
CR 11
21.50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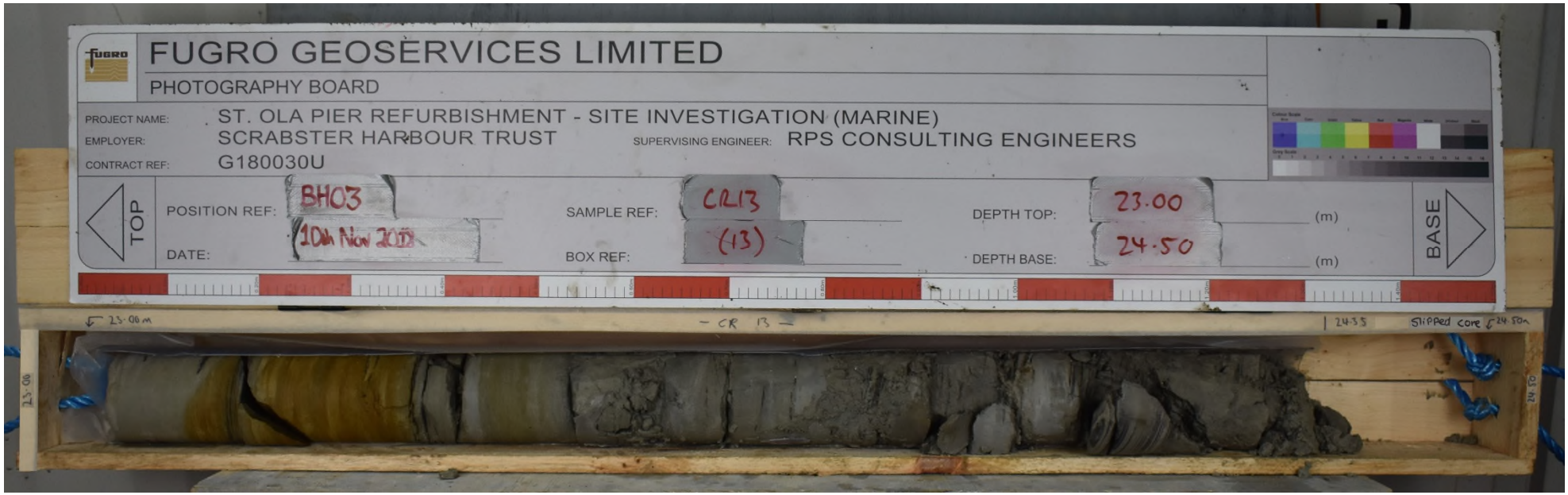
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
SAMPLE REF: CR12
DEPTH TOP: 21.50 (m)
DATE: 10th Nov 2018
BOX REF: (12)
DEPTH BASE: 23.00 (m)
BASE
21.50m
CR 12
23.00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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
DATE: 10th Nov 2018
SAMPLE REF: CR13
BOX REF: (13)
DEPTH TOP: 23.00 (m)
DEPTH BASE: 24.50 (m)
BASE
23.06m
CR 13
24.35
Slipped core 24.50m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH03
SAMPLE REF: CR14
DEPTH TOP: 24.50 (m)
DATE: 10th Nov 2018
BOX REF: (14)
DEPTH BASE: 26.00 (m)
BASE
24.35 - 24.58m PICKED UP CORE
AZCL 24.58 - 24.65m
CR 14
26.00m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR 1
DEPTH TOP: 5.20 (m)
DATE: 4th Nov 2018
BOX REF: (1)
DEPTH BASE: 6.00 (m)
BASE
5.20m
6.00m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR 2+3
DEPTH TOP: 6.00 (m)
DATE: 5th Nov 2018
BOX REF: (2)
DEPTH BASE: 7.50 (m)
BASE
AZCL 6.00-6.35m (SPT RANGE)
- CR2 -
- CR3 -
6.00m
7.50m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR 4
DEPTH TOP: 7.50 (m)
DATE: 5th Nov 2018
BOX REF: (3)
DEPTH BASE: 9.00 (m)
BASE
CR 4
AZCL 8.60 - 9.00m
7.50 m
9.00 m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR 5
DEPTH TOP: 9.00 (m)
DATE: 5th Nov 2018
BOX REF: (4)
DEPTH BASE: 10.50 (m)
BASE
CR 5
9.00m
10.50m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
DATE: 5th Nov 2018
SAMPLE REF: CR 6
BOX REF: (5)
DEPTH TOP: 10.50 (m)
DEPTH BASE: 12.00 (m)
BASE
— CR 6 —
10.50m
12.00m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR 7
DEPTH TOP: 12.00 (m)
DATE: 5th Nov 2018
BOX REF: (6)
DEPTH BASE: 13.50 (m)
BASE
CR 7
12.00 M
13.50 M

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR 8
DEPTH TOP: 13.50 (m)
DATE: 5th Nov 2018
BOX REF: (7)
DEPTH BASE: 15.00 (m)
BASE
CR 8
13.50m
15.00m

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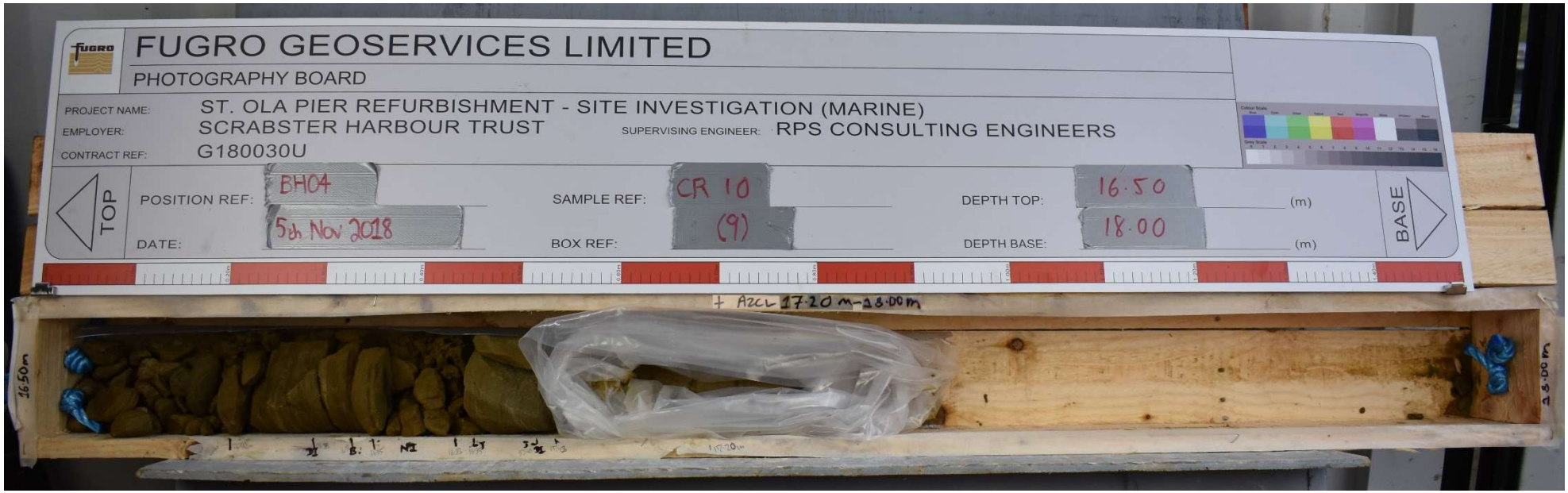
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR 9
DEPTH TOP: 15·00 (m)
DATE: 5th Nov 2018
BOX REF: (8)
DEPTH BASE: 16·50 (m)
BASE
— CR 9 —
15.00 m
16.50 m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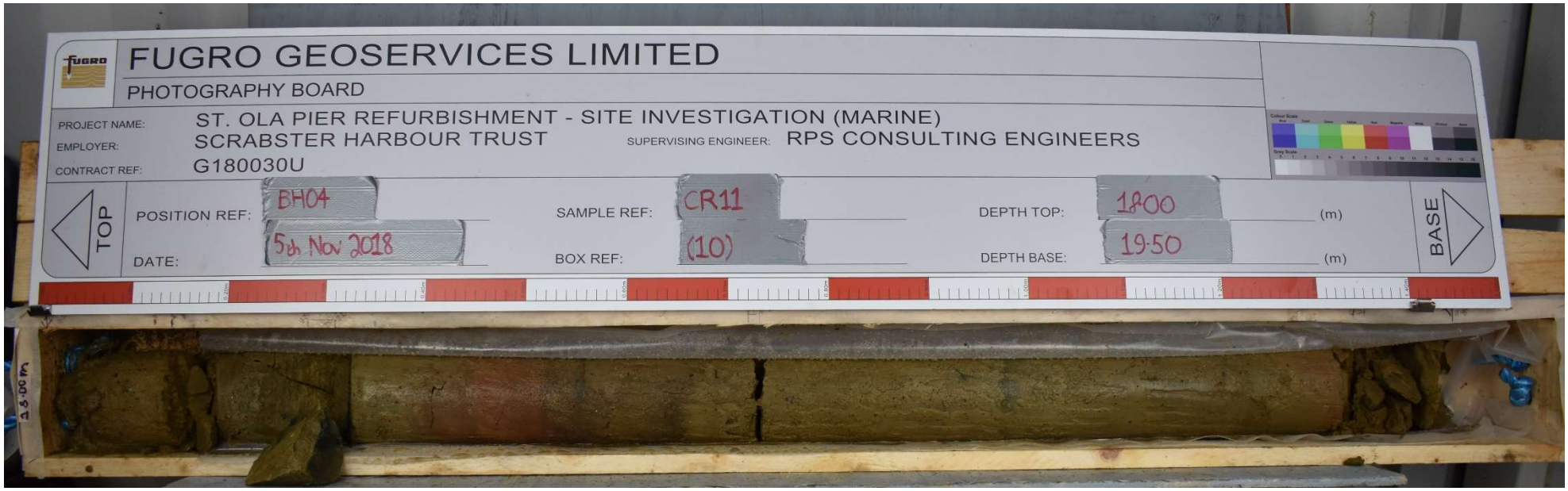
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR 10
DEPTH TOP: 16.50 (m)
DATE: 5th Nov 2018
BOX REF: (9)
DEPTH BASE: 18.00 (m)
BASE
+ A2CL 17.20 m-18.00m
16.50m
18.00m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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR11
DEPTH TOP: 18.00 (m)
DATE: 5th Nov 2018
BOX REF: (10)
DEPTH BASE: 19.50 (m)
BASE
18.00m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR12
DEPTH TOP: 19.50 (m)
DATE: 5th Nov 2018
BOX REF: (11)
DEPTH BASE: 21.00 (m)
BASE

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR13
DEPTH TOP: 21.00 (m)
DATE: 5th Nov 2018
BOX REF: (12)
DEPTH BASE: 22.50 (m)
BASE
21.00m
22.50m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR14
DEPTH TOP: 22.50 (m)
DATE: 5th Nov 2018
BOX REF: (13)
DEPTH BASE: 24.00 (m)
BASE

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH04
SAMPLE REF: CR15
DEPTH TOP: 24.00 (m)
DATE: 5th Nov 2018
BOX REF: (14)
DEPTH BASE: 25.50 (m)
BASE

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH09
DATE: 15th Nov 2018
SAMPLE REF: CR01
BOX REF: (1)
DEPTH TOP: 6.45 (m)
DEPTH BASE: 8.00 (m)
BASE
BH09:CR01

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH09
SAMPLE REF: CR02
DEPTH TOP: 8.00 (m)
DATE: 15th Nov 2018
BOX REF: (2)
DEPTH BASE: 9.50 (m)
BASE
8.00 m
CR 02
9.50

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH09
SAMPLE REF: CR03
DEPTH TOP: 9.50 (m)
DATE: 15th Nov 2018
BOX REF: (3)
DEPTH BASE: 10.50 (m)
BASE
9.50m
CR03
10.50m
9.50
10.50

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH20
SAMPLE REF: CR01
DEPTH TOP: 2.50 (m)
DATE: 12th Nov 2018
BOX REF: (1)
DEPTH BASE: 4.00 (m)
BASE

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH20
SAMPLE REF: CR02
DEPTH TOP: 4.00 (m)
DATE: 12th Nov 2018
BOX REF: (2)
DEPTH BASE: 5.50 (m)
BASE

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH20
SAMPLE REF: CR03
DEPTH TOP: 550 (m)
DATE: 12th Nov 2018
BOX REF: (3)
DEPTH BASE: 700 (m)
BASE

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH20
SAMPLE REF: CR04
DEPTH TOP: 7.00 (m)
DATE: 12th Nov 2018
BOX REF: (4)
DEPTH BASE: 8.50 (m)
BASE

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PHOTOGRAPHY BOARD
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR 01
DEPTH TOP: 4.70 (m)
DATE: 13/11/2018
BOX REF: (1)
DEPTH BASE: 5.50 (m)
BASE
4.70
CR 01
5.50m

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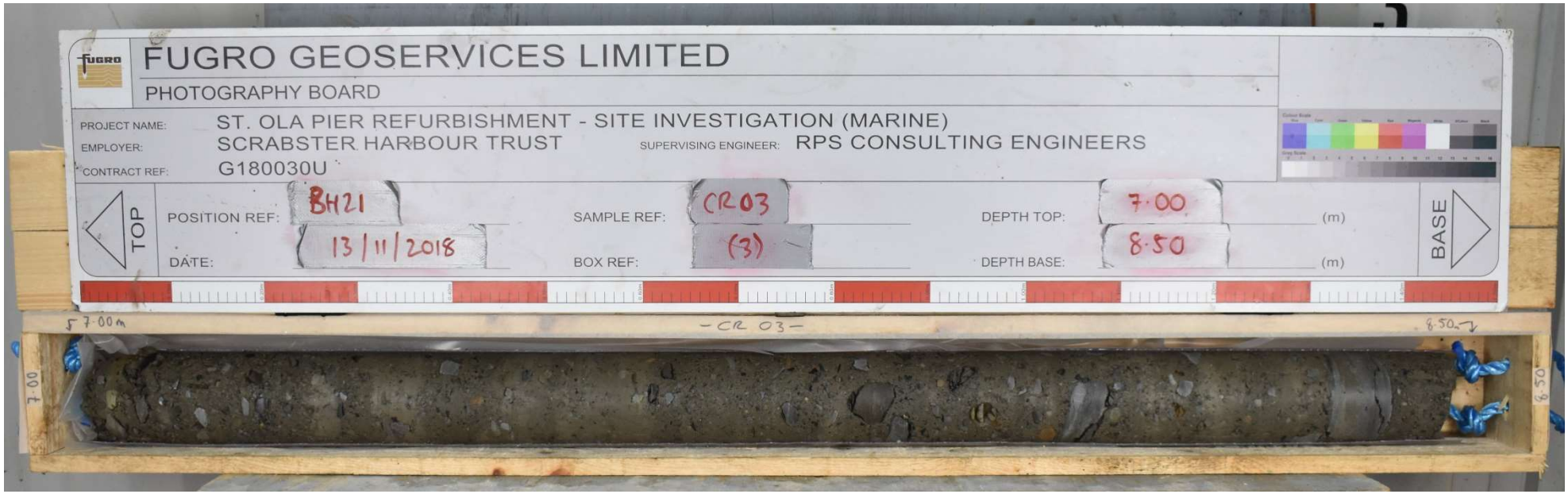
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR02
DEPTH TOP: 5.50 (m)
DATE: 13/11/2018
BOX REF: (2)
DEPTH BASE: 7.00 (m)
BASE
5.50
CR 02
7.00m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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR03
DEPTH TOP: 7.00 (m)
DATE: 13/11/2018
BOX REF: (3)
DEPTH BASE: 8.50 (m)
BASE
7.00m
CR 03
8.50

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR04
DEPTH TOP: 8.50 (m)
DATE: 13/11/2018
BOX REF: (4)
DEPTH BASE: 10.00 (m)
BASE
8.50m
CR 04
10.00m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR05+ CR06
DEPTH TOP: 10.00 (m)
DATE: 14/11/2018
BOX REF: (5)
DEPTH BASE: 11.50 (m)
BASE
10.00m
CR05
10.40m
CR06
11.50m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR07
DEPTH TOP: 11.50 (m)
DATE: 14/11/2018
BOX REF: (6)
DEPTH BASE: 13.00 (m)
BASE
11.50m
CR 07
13.00

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR08
DEPTH TOP: 13.00 (m)
DATE: 14/11/2018
BOX REF: (7)
DEPTH BASE: 14.50 (m)
BASE
5 13.00
— CR 08 —
14.50

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
DATE: 14/11/2018
SAMPLE REF: CR09+ CR10
BOX REF: (8)
DEPTH TOP: 14.50 (m)
DEPTH BASE: 16.00 (m)
BASE
5 14.50m
CR09
15.40m
CR10
16.00m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR11
DEPTH TOP: 16.00 (m)
DATE: 14/11/2018
BOX REF: (9)
DEPTH BASE: 17.50 (m)
BASE
16.00m
CR 11
17.50m
16.00
17.50

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR12
DEPTH TOP: 17.50 (m)
DATE: 14th Nov 2018
BOX REF: Box 10
DEPTH BASE: 19.00 (m)
BASE

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR13
DEPTH TOP: 19.00 (m)
DATE: 14th Nov 2018
BOX REF: (11)
DEPTH BASE: 20.00 (m)
BASE
LR

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR14
DEPTH TOP: 20.00 (m)
DATE: 14th Nov 2018
BOX REF: (12)
DEPTH BASE: 21.50 (m)
BASE

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR15
DEPTH TOP: 21.50 (m)
DATE: 14th Nov 2018
BOX REF: (13)
DEPTH BASE: 23.00 (m)
BASE
BH21:CR15
23.00

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR16
DEPTH TOP: 23.00 (m)
DATE: 14th Nov 2018
BOX REF: (14)
DEPTH BASE: 24.50 (m)
BASE
23.00 m
– CR16 –
24.50m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH21
SAMPLE REF: CR17
DEPTH TOP: 24.50 (m)
DATE: 14th Nov 2018
BOX REF: (15)
DEPTH BASE: 25.20 (m)
BASE
24.50m
CR 17
25.20

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CR01
DEPTH TOP: 4.50 (m)
DATE: 13/11/2018
BOX REF: (1)
DEPTH BASE: 5.90 (m)
BASE
AZCL 4.56-4.65
CR 01
5.90m
4.56
5.90

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CR02
DEPTH TOP: 5·90 (m)
DATE: 13/11/2018
BOX REF: (2)
DEPTH BASE: 7·40 (m)
BASE
5.90m
CR 02
7.40m

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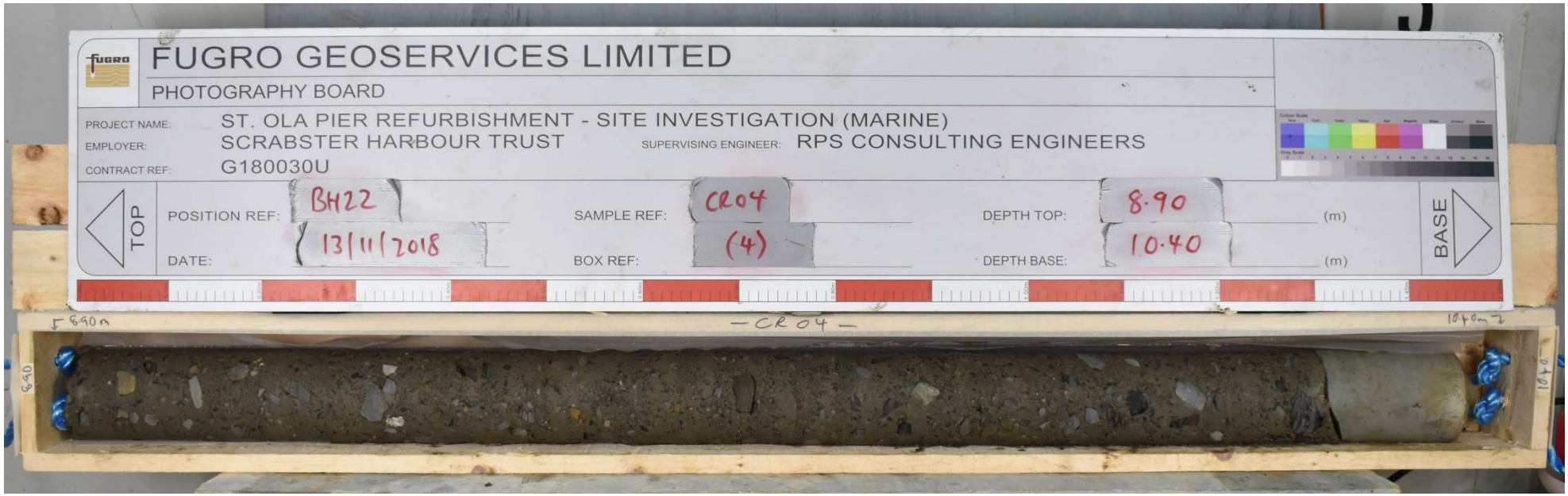
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CR03
DEPTH TOP: 7.40 (m)
DATE: 13/11/2018
BOX REF: (3)
DEPTH BASE: 8.90 (m)
BASE
7.40 m
CR03
8.90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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CR04
DEPTH TOP: 8.90 (m)
DATE: 13/11/2018
BOX REF: (4)
DEPTH BASE: 10.40 (m)
BASE
8.90m
CR04
10.40m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CR05
DEPTH TOP: 10.40 (m)
DATE: 13/11/2018
BOX REF: (5)
DEPTH BASE: 11.90 (m)
BASE
10.40m
CR 05
11.90m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CR06
DEPTH TOP: 11.90 (m)
DATE: 13/11/2018
BOX REF: (6)
DEPTH BASE: 13.40 (m)
BASE
11.90m
CR 06
13.40m

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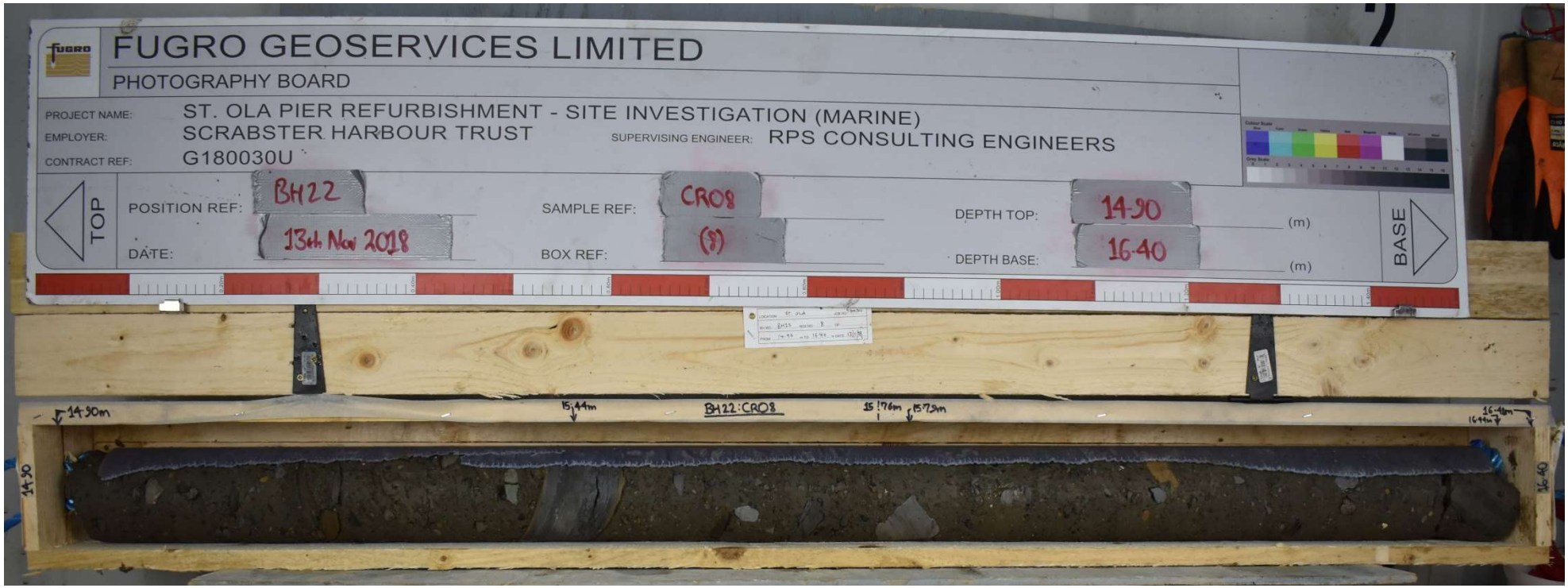
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CR07
DEPTH TOP: 13.40 (m)
DATE: 13/11/2018
BOX REF: (7)
DEPTH BASE: 14.90 (m)
BASE
13.40m
- CR 07 -
14.90m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PHOTOGRAPHY BOARD
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CRO8
DEPTH TOP: 14.90 (m)
DATE: 13th Nov 2018
BOX REF: (8)
DEPTH BASE: 16.40 (m)
BASE
14.90m
15.44m
BH22:CRO8
15.76m
15.79m
16.40m
16.44m
14.90
16.40

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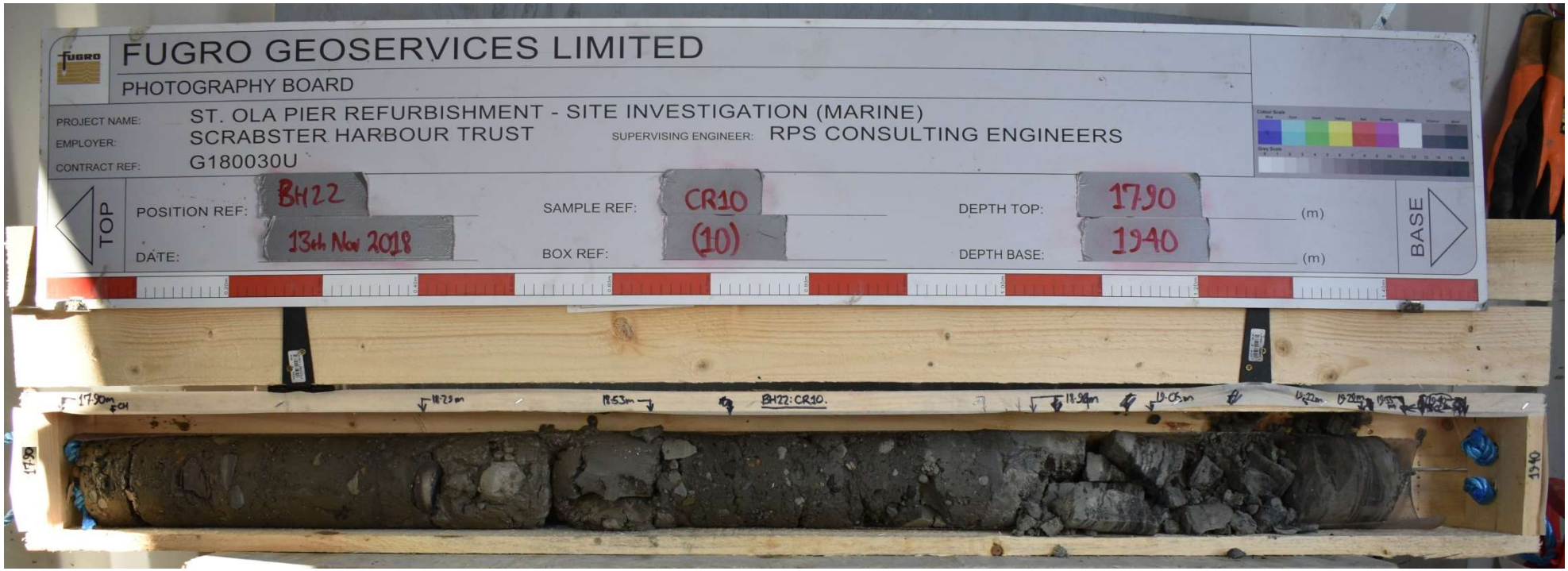
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CR09
DEPTH TOP: 16.40 (m)
DATE: 13th Nov 2018
BOX REF: (9)
DEPTH BASE: 17.90 (m)
BASE
16.40m
16.86m
17.01m
BH22:CR09
17.34m
17.83m
17.94m
16.40
17.90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PHOTOGRAPHY BOARD
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
DATE: 13th Nov 2018
SAMPLE REF: CR10
BOX REF: (10)
DEPTH TOP: 17.90 (m)
DEPTH BASE: 19.40 (m)
BASE
BH22: CR10.

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CR11
DEPTH TOP: 19.40 (m)
DATE: 13th Nov 2018
BOX REF: (11)
DEPTH BASE: 20.90 (m)
BASE
BH22: CR11
19.40
20.90

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CR12
DEPTH TOP: 20.90 (m)
DATE: 13th Nov 2018
BOX REF: (12)
DEPTH BASE: 22.40 (m)
BASE
20.90m
BH22: CR12.

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CR13
DEPTH TOP: 22.40 (m)
DATE: 13th Nov 2018
BOX REF: (13)
DEPTH BASE: 23.90 (m)
BASE
22.40m
CR 13
23.90m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH22
SAMPLE REF: CR14
DEPTH TOP: 23.90 (m)
DATE: 13th Nov 2018
BOX REF: (14)
DEPTH BASE: 25.40 (m)
BASE
23.90m
– CR 14 –
25.40m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR01
DEPTH TOP: 4.00 (m)
DATE: 14/11/2018
BOX REF: (1)
DEPTH BASE: 4.80 (m)
BASE
4.00m
CR01
4.80m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR02
DEPTH TOP: 4.80 (m)
DATE: 14/11/2018
BOX REF: (2)
DEPTH BASE: 6.30 (m)
BASE
4.80m
CR02
6.20m
AZCL 6.20-6.30m
4.80
6.30

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR03
DEPTH TOP: 6.30 (m)
DATE: 14/11/2018
BOX REF: (3)
DEPTH BASE: 7.80 (m)
BASE
A2CL 6.30-6.80m
CR03
7.80m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR04
DEPTH TOP: 7.80 (m)
DATE: 14/11/2018
BOX REF: (4)
DEPTH BASE: 9.30 (m)
BASE
ALL 780-830m
CR04
930m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR05
DEPTH TOP: 9.30 (m)
DATE: 14/11/2018
BOX REF: (5)
DEPTH BASE: 10.80 (m)
BASE
9.30m
CR05
10.80m
9.30
10.80

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR06
DEPTH TOP: 10·80 (m)
DATE: 14/11/2018
BOX REF: (6)
DEPTH BASE: 12·30 (m)
BASE
10·80m
CR06
12·30m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR07
DEPTH TOP: 12·30 (m)
DATE: 14/11/2018
BOX REF: (7)
DEPTH BASE: 13·80 (m)
BASE
12·30m
CR 07
13·80m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR08
DEPTH TOP: 13.80 (m)
DATE: 15/11/2018
BOX REF: (8)
DEPTH BASE: 15.30 (m)
BASE
13.80m
CR 08
15.30m
13.80
15.30

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR09
DEPTH TOP: 15.30 (m)
DATE: 15/11/2018
BOX REF: (9)
DEPTH BASE: 16.80 (m)
BASE
15.30m
CR09
16.80m

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR10
DEPTH TOP: 16.80 (m)
DATE: 15/11/2018
BOX REF: (10)
DEPTH BASE: 18.30 (m)
BASE
16.80m
CR 10
18.30m
16.80
18.30

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR11
DEPTH TOP: 18.30 (m)
DATE: 15/11/2018
BOX REF: (11)
DEPTH BASE: 19.80 (m)
BASE
18.30m
CR 11
19.50m
18.30
19.80

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PHOTOGRAPHY BOARD
PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR12
DEPTH TOP: 19.80 (m)
DATE: 15/11/2018
BOX REF: (12)
DEPTH BASE: 21.30 (m)
BASE
19.80m
CR 12
21.30m
19.80
21.30

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PROJECT NAME: ST. OLA PIER REFURBISHMENT - SITE INVESTIGATION (MARINE)
EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR13
DEPTH TOP: 21·30 (m)
DATE: 15th Nov 2018
BOX REF: (13)
DEPTH BASE: 22·80 (m)
BASE
BH23:CR13

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR14
DEPTH TOP: 22.80 (m)
DATE: 15th Nov 2018
BOX REF: (14)
DEPTH BASE: 24.30 (m)
BASE
BH23:CR14

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CONTRACT REF: G180030U
TOP
POSITION REF: BH23
SAMPLE REF: CR15
DEPTH TOP: 24.30 (m)
DATE: 15th Nov 2018
BOX REF: (15)
DEPTH BASE: 25.30 (m)
BASE

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
DATE: 11th Nov 2018
SAMPLE REF: CRO1
BOX REF: (1)
DEPTH TOP: 3·00 (m)
DEPTH BASE: 4·20 (m)
BASE

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CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
SAMPLE REF: CR 02
DEPTH TOP: 4.20 (m)
DATE: 11/11/2018
BOX REF: (2)
DEPTH BASE: 5.70 (m)
BASE
AZCL 4.29m - 4.45m
CR 2
5.70m

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SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
SAMPLE REF: CR 03
DEPTH TOP: 5.70 (m)
DATE: 11/11/2018
BOX REF: (3)
DEPTH BASE: 7.20 (m)
BASE
AZCL 5.70-5.80m 5.80m
CR 3
7.20m
5.70
7.20

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SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
SAMPLE REF: CR 04
DEPTH TOP: 7.20 (m)
DATE: 11/11/2018
BOX REF: (4)
DEPTH BASE: 8.70 (m)
BASE
ACL 7.20-7.35m
CR 4
8.70m
7.20
8.70

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
SAMPLE REF: CR 05
DEPTH TOP: 8.70 (m)
DATE: 11/11/2018
BOX REF: (5)
DEPTH BASE: 10.20 (m)
BASE
8.70m
CR 5
10.20m

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CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
DATE: 11/11/2018
SAMPLE REF: CR 06
BOX REF: (6)
DEPTH TOP: 10.20 (m)
DEPTH BASE: 11.70 (m)
BASE
10.20 m
CR 6
11.70m

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SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
SAMPLE REF: CR 07
DEPTH TOP: 11.70 (m)
DATE: 11/11/2018
BOX REF: (7)
DEPTH BASE: 13.20 (m)
BASE
11.70m
CR 7

(NB: Box 9 (CR09) is missing).

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SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
SAMPLE REF: CR 10
DEPTH TOP: 16.20 (m)
DATE: 12/11/2018
BOX REF: (10)
DEPTH BASE: 17.70 (m)
BASE
16.20m
CR 10
17.70m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
SAMPLE REF: CR 11
DEPTH TOP: 17.70 (m)
DATE: 12/11/2018
BOX REF: (11)
DEPTH BASE: 19.20 (m)
BASE
17.70m
CR 11
19.24

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
SAMPLE REF: CR 12
DEPTH TOP: 19.20 (m)
DATE: 12/11/2018
BOX REF: (12)
DEPTH BASE: 20.70 (m)
BASE
AZCL 19.20-19.30m
19.30m
19.20
20.70

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
DATE: 12/11/2018
SAMPLE REF: CR 13
BOX REF: (13)
DEPTH TOP: 20.70 (m)
DEPTH BASE: 22.20 (m)
BASE
AZCL 2070-2100
CR 13
2220

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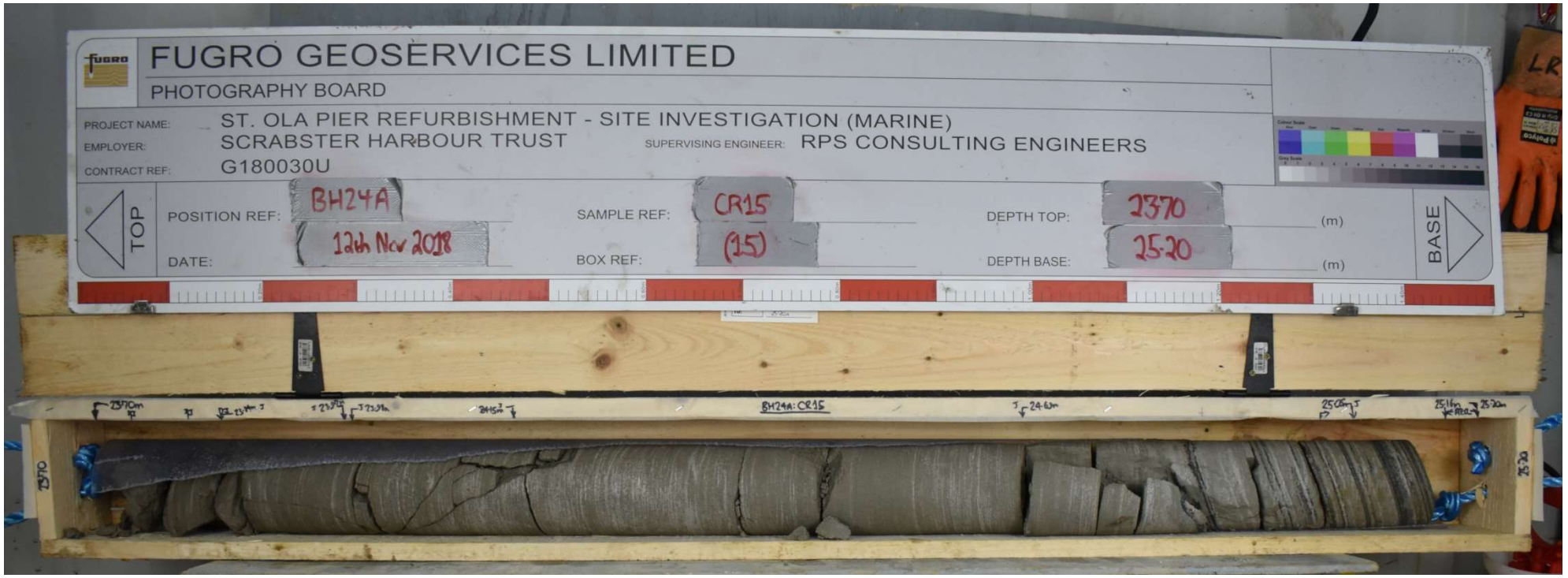
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
SAMPLE REF: 14
DEPTH TOP: 22·20 (m)
DATE: 12th Nov 2018
BOX REF: (14)
DEPTH BASE: 23·70 (m)
BASE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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH24A
SAMPLE REF: CR15
DEPTH TOP: 23.70 (m)
DATE: 12th Nov 2018
BOX REF: (15)
DEPTH BASE: 25.20 (m)
BASE

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH30
SAMPLE REF: CR01
DEPTH TOP: 0.50 (m)
DATE: 16/11/2018
BOX REF: (1)
DEPTH BASE: 1.50 (m)
BASE
AZCL 0.50-0.60m
CR01
1.50m
0.50
1.50

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH30
SAMPLE REF: CR02
DEPTH TOP: 1.50 (m)
DATE: 16/11/2018
BOX REF: (2)
DEPTH BASE: 2.60 (m)
BASE
1.50m
CR02
2.60m
1.50
2.60

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH30
SAMPLE REF: CR 03
DEPTH TOP: 2.60 (m)
DATE: 16/11/2018
BOX REF: (3)
DEPTH BASE: 4.10 (m)
BASE
2.60 m
— CR 03 —
4.10m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH30
SAMPLE REF: CR 04
DEPTH TOP: 4.10 (m)
DATE: 16/11/2018
BOX REF: (4)
DEPTH BASE: 5.60 (m)
BASE
4.10m
CR 04
5.60m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH30
SAMPLE REF: CR05
DEPTH TOP: 5·60 (m)
DATE: 16/11/2018
BOX REF: (5)
DEPTH BASE: 7·10 (m)
BASE
5·60m
CR05
7·10m

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EMPLOYER: SCRABSTER HARBOUR TRUST
SUPERVISING ENGINEER: RPS CONSULTING ENGINEERS
CONTRACT REF: G180030U
TOP
POSITION REF: BH30
SAMPLE REF: CR06
DEPTH TOP: 7.10 (m)
DATE: 16/11/2018
BOX REF: (6)
DEPTH BASE: 7.65 (m)
BASE
7.10m
CR06
7.65m

E. IN SITU FIELD TEST RESULTS

E.1 STANDARD PENETRATION TESTS

Standard Penetration Test Summaries	Figures E.1.1 to E.1.16
Standard Penetration Test Equipment Calibration Report	SPT08

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH01**
	Fugro Reference	G180030U			
	Coordinates (m)	E310365.10 N970393.09	Ground Elevation (m Datum)	-2.95	Sheet 1 of 1
	Hole Type	Cable Percussion and Rotary Coring			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=13 (2,2/2,3,4,4)	450	SPT08	51	0.50	
1.50	S	0	N=23 (3,4/3,5,7,8)	450	SPT08	51	1.50	
2.50	S	0	N=50 (4,7/7,16,16,11)	450	SPT08	51	2.50	
3.50	S	0	N=42 (4,6/7,11,11,13)	450	SPT08	51	3.50	
4.50	S	0	N=35 (3,4/6,7,11,11)	450	SPT08	51	4.50	
5.50	S	0	N=50 (3,8/9,10,14,17)	450	SPT08	51	5.50	
6.50	C	0	N=50 (25 for 25mm/50 for 35mm)	60	SPT08	51	6.50	
9.00	S	0	N=50 (8,10/50 for 270mm)	420	SPT08	51	6.50	
12.00	S	0	N=50 (4,7/50 for 150mm)	300	SPT08	51	6.50	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Template: FGSL/HBSI/FGSL SPT Summary.hbt/Config Fugro Rev5/18/02/2019/TS | Print Date 11/03/2019

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH02**
	Fugro Reference	G180030U			
	Coordinates (m)	E310383.17 N970350.71	Ground Elevation (m Datum)	-4.25	Sheet 1 of 1
	Hole Type	Cable Percussion and Rotary Coring			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=10 (2,1/2,2,2,4)	450	SPT08	51	0.50	
1.50	S	0	N=23 (4,3/4,4,7,8)	450	SPT08	51	1.50	
2.50	S	0	N=37 (6,6/8,8,10,11)	450	SPT08	51	2.50	
3.50	S	0	N=49 (1,3/7,10,16,16)	450	SPT08	51	3.50	
4.50	S	0	N=50 (5,6/50 for 280mm)	430	SPT08	51	4.50	
5.50	S	0	N=50 (3,3/50 for 280mm)	430	SPT08	51	5.50	
7.00	S	0	N=50 (25 for 90mm/50 for 60mm)	150	SPT08	51	7.00	
9.80	S	0	N=50 (4,16/50 for 90mm)	240	SPT08	51	7.00	
11.30	S	0	N=50 (25 for 100mm/50 for 85mm)	185	SPT08	51	7.00	
17.30	S	0	N=85 (4,6/85 for 275mm)	425	SPT08	51	7.00	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Template: FGSL/HBSI/FGSL SPT Summary.hbt/Config Fugro Rev5/18/02/2019/TS | Print Date 11/03/2019

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH03**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310420.91 N970276.83	Ground Elevation (m Datum)	-5.95	Sheet 1 of 1
	Hole Type	Cable Percussion and Rotary Coring			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	150	N=7 (0,0/1,2,2,2)	450	SPT08	51	0.50	
1.50	S	0	N=46 (3,5/9,9,11,17)	450	SPT08	51	1.50	
2.50	S	0	N=50 (1,2/50 for 275mm)	425	SPT08	51	2.50	
3.50	S	0	N=50 (1,5/50 for 200mm)	350	SPT08	51	3.50	
4.50	S	0	N=50 (5,11/13,13,12,12)	450	SPT08	51	4.50	
9.50	S	0	N=50 (7,10/50 for 110mm)	260	SPT08	51	5.00	
12.50	S	0	N=50 (4,7/50 for 250mm)	400	SPT08	51	5.00	
15.50	S	0	N=50 (4,11/50 for 235mm)	385	SPT08	51	5.00	
18.50	S	0	N=50 (2,6/50 for 285mm)	435	SPT08	51	5.00	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH04**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310443.63 N970212.48	Ground Elevation (m Datum)	-7.05	Sheet 1 of 1
	Hole Type	Cable Percussion and Rotary Coring			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=19 (0,1/1,4,6,8)	450	SPT08	51	0.50	
1.50	S	0	N=50 (5,12/50 for 185mm)	335	SPT08	51	1.50	
2.50	S	0	N=50 (3,8/14,12,11,13)	450	SPT08	51	2.50	
3.50	S	0	N=50 (1,2/50 for 285mm)	435	SPT08	51	3.50	
4.50	S	0	N=50 (3,6/50 for 245mm)	395	SPT08	51	4.40	
6.00	S	0	N=50 (7,12/50 for 195mm)	345	SPT08	51	4.95	
7.50	S	0	N=50 (15,9/50 for 195mm)	345	SPT08	51	4.95	
9.00	S	0	N=50 (6,9/50 for 250mm)	400	SPT08	51	4.95	
10.50	S	0	N=50 (4,10/50 for 215mm)	365	SPT08	51	4.95	
12.00	S	0	N=50 (10,14/50 for 155mm)	305	SPT08	51	4.95	
13.50	S	0	N=50 (3,12/50 for 175mm)	325	SPT08	51	4.95	
18.00	S	0	N=50 (25 for 80mm/50 for 80mm)	160	SPT08	51	4.95	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

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Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
Client	Scrabster Harbour Trust			**BH05**
Fugro Reference	G180030U			
Coordinates (m)	E310495.51 N970132.70	Ground Elevation (m Datum)	-6.65	Sheet 1 of 1
Hole Type	Cable Percussion			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=16 (1,2/3,3,5,5)	450	SPT08	51	0.50	
1.50	S	0	N=17 (1,1/2,3,5,7)	450	SPT08	51	1.50	
2.50	S	0	N=50 (10,15/50 for 180mm)	330	SPT08	51	2.50	
3.50	S	0	N=50 (2,7/50 for 290mm)	440	SPT08	51	3.50	
4.50	C	0	N=50 (8,17/50 for 135mm)	285	SPT08	51	4.50	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Template: FGSL/HBSI/FGSL SPT Summary.hbt/Config Fugro Rev5/18/02/2019/TS | Print Date 11/03/2019

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH06**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310507.86 N970210.07	Ground Elevation (m Datum)	-6.95	Sheet 1 of 1
Hole Type	Cable Percussion			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=5 (0,0/0,1,2,2)	450	SPT08	51	0.50	
1.50	S	0	N=47 (2,4/6,10,12,19)	450	SPT08	51	1.50	
2.50	S	0	N=50 (3,8/50 for 225mm)	375	SPT08	51	2.50	
3.50	S	0	N=50 (4,9/50 for 155mm)	305	SPT08	51	3.50	
4.50	S	0	N=50 (0,1/50 for 200mm)	350	SPT08	51	4.50	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Template: FGSL/HBSI/FGSL SPT Summary.hbt/Config Fugro Rev5/18/02/2019/TS | Print Date 11/03/2019

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Location ID **BH07**
	Client	Scrabster Harbour Trust		
	Fugro Reference	G180030U		
	Coordinates (m)	E310494.34 N970299.25	Ground Elevation (m Datum) -6.65	Sheet 1 of 1
	Hole Type	Cable Percussion		Status Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=14 (1,2/2,2,4,6)	450	SPT08	51	0.50	
1.50	S	0	N=20 (3,3/4,5,6,5)	450	SPT08	51	1.50	
2.50	S	0	N=20 (2,2/2,4,5,9)	450	SPT08	51	2.50	
3.50	S	0	N=26 (2,2/3,6,7,10)	450	SPT08	51	3.50	
4.50	S	0	N=26 (1,2/3,5,7,11)	450	SPT08	51	4.50	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH08**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310455.80 N970384.31	Ground Elevation (m Datum)	-4.65	Sheet 1 of 1
Hole Type	Cable Percussion			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	150	N=4 (0,0/1,1,1,1)	450	SPT08	51	0.50	
1.50	S	0	N=19 (3,4/4,5,4,6)	450	SPT08	51	1.50	
2.50	S	0	N=28 (2,6/6,8,7,7)	450	SPT08	51	2.50	
3.50	S	0	N=46 (2,7/10,10,12,14)	450	SPT08	51	3.50	
4.50	S	0	N=50 (3,6/50 for 250mm)	400	SPT08	51	4.50	
5.50	S	0	N=50 (0,2/50 for 265mm)	415	SPT08	51	5.50	
6.50	S	0	N=50 (1,3/50 for 275mm)	425	SPT08	51	6.50	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Template: FGSL/HBSI/FGSL SPT Summary.hbt/Config Fugro Rev5/18/02/2019/TS | Print Date 11/03/2019

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH09**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310429.31 N970461.23	Ground Elevation (m Datum)	-2.65	Sheet 1 of 1
	Hole Type	Cable Percussion and Rotary Coring			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=7 (0,1/1,2,2,2)	450	SPT08	51	0.50	
1.50	S	0	N=12 (3,3/2,2,4,4)	450	SPT08	51	1.50	
2.50	S	0	N=9 (1,3/3,2,2,2)	450	SPT08	51	2.50	
3.50	S	0	N=28 (1,3/5,6,8,9)	450	SPT08	51	3.50	
4.50	S	0	N=39 (4,5/7,9,10,13)	450	SPT08	51	4.50	
5.50	S	0	N=19 (1,3/3,4,6,6)	450	SPT08	51	5.50	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Template: FGSL/HBSI/FGSL SPT Summary.hbt/Config Fugro Rev5/18/02/2019/TS	Print Date	11/03/2019

Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH11**
Client	Scrabster Harbour Trust			
Fugro Reference	G180030U			
Coordinates (m)	E310544.88 N970373.93	Ground Elevation (m Datum)	-7.35	Sheet 1 of 1
Hole Type	Cable Percussion			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=11 (1,1/1,2,4,4)	450	SPT08	51	0.95	
1.50	S	0	N=13 (1,3/2,4,4,3)	450	SPT08	51	1.50	
2.50	S	0	N=42 (3,6/8,8,12,14)	450	SPT08	51	2.50	
3.50	S	0	N=34 (1,2/6,7,10,11)	450	SPT08	51	3.50	
4.50	S	0	N=44 (2,5/7,9,12,16)	450	SPT08	51	4.50	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Template: FGSL/HBSI/FGSL SPT Summary.hbt/Config Fugro Rev5/18/02/2019/TS | Print Date 11/03/2019

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH20**
	Fugro Reference	G180030U			
	Coordinates (m)	E310292.33 N970351.44	Ground Elevation (m Datum)	-4.75	Sheet 1 of 1
	Hole Type	Cable Percussion and Rotary Coring			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=15 (1,1/2,3,4,6)	450	SPT08	51	0.50	
1.50	S	0	N=50 (1,3/50 for 225mm)	375	SPT08	51	1.50	
2.50	S	0	N=50 (25 for 135mm/50 for 220mm)	355	SPT08	51	2.50	
5.50	S	0	N=50 (25 for 130mm/50 for 120mm)	250	SPT08	51	2.50	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Template: FGSL/HBSI/FGSL SPT Summary.hbt/Config Fugro Rev5/18/02/2019/TS	Print Date	11/03/2019

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH21**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310333.45 N970373.51	Ground Elevation (m Datum)	-3.55	Sheet 1 of 1
	Hole Type	Cable Percussion and Rotary Coring			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=1 (0,0/0,0,1,0)	450	SPT08	51	0.50	
1.50	S	0	N=1 (0,0/0,0,1,0)	450	SPT08	51	1.50	
2.50	S	0	N=2 (0,0/0,0,1,1)	450	SPT08	51	2.50	
3.50	S	0	N=24 (4,5/6,6,7,5)	450	SPT08	51	3.50	
4.50	S	0	N=50 (25 for 80mm/50 for 5mm)	85	SPT08	51	4.50	
5.50	S	0	N=50 (25 for 125mm/50 for 105mm)	230	SPT08	51	4.70	
10.00	S	0	N=50 (5,11/50 for 225mm)	375	SPT08	51	4.70	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH22**
	Fugro Reference	G180030U			
	Coordinates (m)	E310357.33 N970311.54	Ground Elevation (m Datum)	-5.85	Sheet 1 of 1
	Hole Type	Cable Percussion and Rotary Coring			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=14 (2,2/2,2,5,5)	450	SPT08	51	0.50	
1.50	S	0	N=33 (1,3/6,6,9,12)	450	SPT08	51	1.50	
2.50	S	0	N=50 (3,5/50 for 250mm)	400	SPT08	51	2.50	
3.50	S	0	N=50 (3,5/50 for 235mm)	385	SPT08	51	3.50	
4.50	S	0	N=50 (4,12/50 for 225mm)	375	SPT08	51	4.50	
7.40	S	0	N=50 (5,13/50 for 225mm)	375	SPT08	51	4.50	
11.90	S	0	N=41 (4,6/7,8,10,16)	450	SPT08	51	4.50	
16.40	S	0	N=50 (6,12/50 for 225mm)	375	SPT08	51	4.50	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH23**
	Fugro Reference	G180030U			
	Coordinates (m)	E310388.03 N970250.84	Ground Elevation (m Datum)	-6.15	Sheet 1 of 1
	Hole Type	Cable Percussion and Rotary Coring			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=10 (0,1/1,2,3,4)	450	SPT08	51	0.50	
1.50	S	0	N=26 (1,1/2,5,8,11)	450	SPT08	51	1.50	
2.50	S	0	N=33 (1,1/4,6,9,14)	450	SPT08	51	2.50	
3.50	S	0	N=50 (4,7/50 for 200mm)	350	SPT08	51	3.50	
4.80	S	0	N=45 (2,5/6,11,14,14)	450	SPT08	51	4.00	
7.80	S	0	N=50 (9,11/50 for 200mm)	350	SPT08	51	4.00	
9.30	S	0	N=50 (5,10/50 for 250mm)	400	SPT08	51	4.00	
12.30	S	0	N=50 (5,8/50 for 230mm)	380	SPT08	51	4.00	
16.80	S	0	N=50 (3,5/50 for 220mm)	370	SPT08	51	4.00	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID
	Client	Scrabster Harbour Trust			**BH24a**
	Fugro Reference	G180030U			
	Coordinates (m)	E310417.36 N970174.76	Ground Elevation (m Datum)	-7.75	Sheet 1 of 1
	Hole Type	Cable Percussion and Rotary Coring			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=20 (2,2/4,7,4,5)	450	SPT08	51	0.50	
1.50	S	0	N=41 (4,7/9,11,11,10)	450	SPT08	51	1.50	
2.50	S	0	N=50 (4,9/50 for 235mm)	385	SPT08	51	2.50	
5.70	S	0	N=50 (4,11/50 for 285mm)	435	SPT08	51	2.50	
8.70	S	0	N=35 (3,3/6,9,10,10)	450	SPT08	51	2.50	
11.70	S	0	N=50 (4,8/50 for 175mm)	325	SPT08	51	2.50	
14.70	S	0	N=50 (3,4/50 for 275mm)	425	SPT08	51	2.50	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

	Contract Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Location ID **BH30**
	Client	Scrabster Harbour Trust			
	Fugro Reference	G180030U			
	Coordinates (m)	E310219.11 N970318.93	Ground Elevation (m Datum)	-3.95	Sheet 1 of 1
	Hole Type	Cable Percussion and Rotary Coring			Status: Preliminary

Standard Penetration Test Results

Test Depth (m)	Test Type	Self Weight Penetration (mm)	Test Result	Total Penetration (mm)	Hammer Serial Number	Energy Ratio (%)	Casing Depth (m)	Water Depth (m)
0.50	S	0	N=50 (7,12/50 for 205mm)	355	SPT08	51	0.50	
1.50	S	0	N=50 (5,7/50 for 210mm)	360	SPT08	51	0.50	
2.60	S	0	N=50 (8,12/50 for 115mm)	265	SPT08	51	0.50	
4.10	S	0	N=47 (5,10/47 for 170mm)	320	SPT08	51	0.50	
7.10	S	0	N=50 (25 for 105mm/50 for 85mm)	190	SPT08	51	0.50	

In Situ Vane Test Results

Test Depth (m)	Test Type	Undisturbed Undrained Shear Strength (kPa)	Residual Undrained Shear Strength (kPa)

In Situ Hand Penetrometer Results

Test Depth (m)	Undisturbed Undrained Shear Strength (kPa)

Volatile Headspace Testing by Photoionisation Detector

Test Depth (m)	PID Result (ppm)

Notes

- Abbreviations and results data defined on 'Notes on Exploratory Position Records'

Template: FGSL/HBSI/FGSL SPT Summary.hbt/Config Fugro Rev5/18/02/2019/TS | Print Date 11/03/2019

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref:	SPT08
Test Date:	19/09/2018
Report Date:	19/09/2018
File Name:	SPT08.spt
Test Operator:	SH

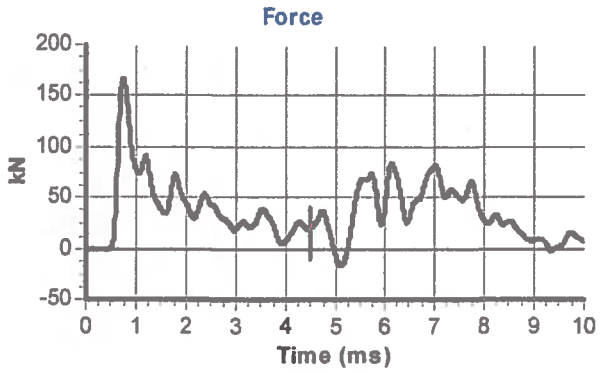
Instrumented Rod Data

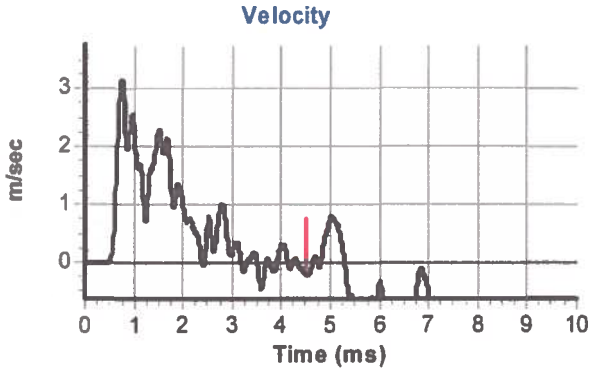
Diameter d_r (mm):	54
Wall Thickness t_r (mm):	6.3
Assumed Modulus E_a (GPa):	200
Accelerometer No.1:	7080
Accelerometer No.2:	11609

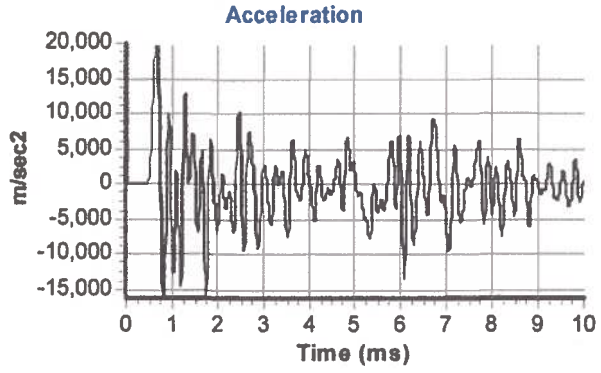
SPT Hammer Information

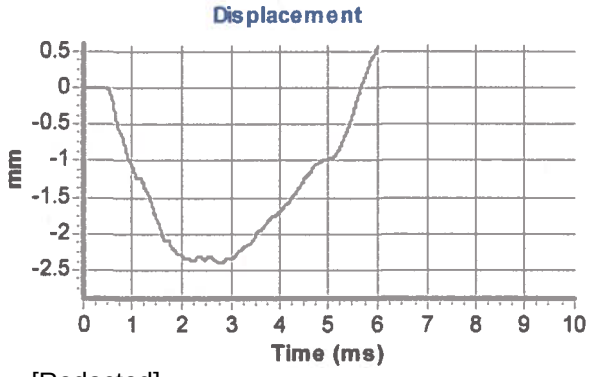
Hammer Mass m (kg):	63.5
Falling Height h (mm):	760
SPT String Length L (m):	10.0

Comments / Location









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Calculations

Area of Rod A (mm2):	944
Theoretical Energy E_{theor} (J):	473
Measured Energy E_{meas} (J):	242

Energy Ratio E_r (%): **51**

Signed: S.HOWARTH
Title: FITTER

The recommended calibration interval is 12 months

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F. GEOTECHNICAL LABORATORY TEST RESULTS

F.1 GUIDANCE NOTES

General Notes on Laboratory Test Results — Figure F.1 (1 page)

F.2 UKAS SCHEDULES

Geotechnical Testing Schedules of UKAS Accreditation — 4 pages

F.3 RESULTS

Summary of Soil Classification Tests — Figure F.3.1 (4 pages)

Particle Size Distribution — Figure F.3.2 (40 pages)

Incremental Loading Oedometer Test — Figure F.3.3 (11 pages)

Unconsolidated Undrained Triaxial Compression Tests – Single Stage — Figure F.3.4.1 (1 page)

Results of Undrained Shear Strength Tests in Triaxial Compression – Multistage — Figure F.3.4.2 (1 page)

Summary of Isotropically Consolidated Drained Triaxial Compression Tests — Figure F.3.5.1 (12 pages)

Summary of Isotropically Consolidated Undrained Triaxial Compression Tests — Figure F.3.5.2 (40 pages)

Determination of the Shear Strength by Direct Shear — Figure F.3.6 (8 pages)

Point Load Strength Index Tests — Figure F.3.7 (2 pages)

Uniaxial Compression Test on Rock — Figure F.3.8 (1 page)

Direct Shear Strength of Rock Discontinuities — Figure F.3.9 (12 pages)

GENERAL NOTES ON LABORATORY TEST RESULTS

1. TEST METHODS

The tests reported on the following sheets have been carried out in accordance with the methods given in BS 1377:1990 'Methods of test for soils for civil engineering purposes', subject to a small number of variances as described below under the respective headings. These notes also serve as keysheets to any notation used in reporting the laboratory tests.

2. KEY TO NOTATION OF SAMPLE TYPE

D Small disturbed sample

B Bulk disturbed sample

U/UT General purpose open drive tube sample

P Piston sample

TW Thin wall sample

C Rotary core sample

3. CLASSIFICATION TESTS

% passing 425µm	this figure is only correctly reported when 'WS' is shown in the 'Method of preparation' column. For 'HP' and 'AR', the reported figure is an estimate only.
WS	sample prepared by Wet Sieving
HP	sample prepared by Hand Picking (removal) of gravel sized fragments
AR	sample tested "As Received"
NP	non-plastic

4. COMPACTION RELATED TESTS

Sample preparation: **Individual** indicates test carried out on individual sub-samples

Single indicates test carried out on a single sample

Assumed values of particle density are reported in brackets e.g. (2.67)

5. SAMPLE DESCRIPTIONS

The sample descriptions shown on the test report sheets are the technician's visual descriptions of the test samples, in accordance with Clause 9.1 of Part 1 of BS 1377:1990 and do not necessarily comply with the requirements of BS 5930:1999 or BS EN ISO 14688-1:2002. For a more comprehensive description of the soil samples to these standards, reference should be made to the exploratory hole records, or an engineering description can be provided on request.

6. INTERPRETATION OF TEST RESULTS

Laboratory test results in this report give the soil properties of individual specimens tested under specified conditions. Individual results or groups of results may not be appropriate for use as design parameters for some geotechnical analyses. The samples may be non-representative, disturbed internally, or prepared and tested under conditions suited for different geotechnical applications. Unless the selection of design parameters is discussed in this report, it is recommended that the advice of an appropriately qualified and experienced specialist is sought.

7. U100 DRIVEN OPEN TUBE SAMPLES

It should be noted that the sampling method using standard U100 (thick walled or liner OS-TK/W) samplers may give Class 2 samples, i.e. for use for laboratory classification, moisture content and density testing, but more generally Class 3. The sampling procedure using thin wall samples (OS-T/W) can achieve Class 1 samples (strength, deformation and consolidation testing as well as Class 2 type testing) in non-sensitive fine cohesive soils of stiff or lower consistency. In brittle or closely fissured materials such as hard clays, the lower sampling class is more frequently achieved, i.e. for use for laboratory classification and moisture content testing. UT samples are thin wall (OS-T/W) samples and so may provide Class 1 samples.

United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE

UKAS
UNITED KINGDOM ACCREDITATION SERVICE

TESTING LABORATORY
No. 1483

Fugro Engineering Services
A trading name of Fugro Seacore Limited

is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005
General Requirements for the competence of testing and calibration laboratories.

This accreditation demonstrates technical competence for a defined scope as detailed in and at the locations specified in the schedule to this certificate, and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated 18 June 2005).

The schedule to this certificate is an essential accreditation document and from time to time may be revised and reissued by the United Kingdom Accreditation Service. The most recent issue of the schedule of accreditation, which bears the same accreditation number as this certificate, is available from the UKAS website www.ukas.com.

This accreditation is subject to continuing conformity
with United Kingdom Accreditation Service requirements. The absence of a schedule on the UKAS website indicates that the accreditation is no longer in force.

[Redacted]

Initial Accreditation date
30 March 1994

This certificate issued on
05 April 2012

UKAS is appointed as the sole national accreditation body for the UK by The Accreditation Regulations 2009 (SI No 3155/2009) and operates under a Memorandum of Understanding (MoU) with the Department for Business, Innovation and Skills (BIS).

Schedule of Accreditation

issued by

United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

1483

Accredited to ISO/IEC 17025:2005

Fugro GeoServices Limited

Issue No: 025 **Issue date:** 16 February 2018

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Website: www.fugro.com

Testing performed at the above address only

DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
ROCK	Point load strength and anisotropy indices	The Complete ISRM Suggested Methods for Rock Characterisation, Testing and Monitoring:1974-2006. Editors: R Ulusay & J A Hudson
	Water content	
	Porosity and density - by saturation and calliper techniques	
	Porosity and density - by saturation and buoyancy techniques	
	Slake-durability index	
SOILS for civil engineering purposes	California Bearing Ratio (CBR)	BS 1377- 4:1990
	Shear strength by direct shear (small shear box apparatus)	BS 1377- 7:1990
	Shear strength by direct shear (large shear box apparatus	BS 1377- 7:1990
	Unconfined compressive strength - load frame method	BS 1377- 7:1990
	Undrained shear strength - triaxial compression without measurement of pore pressure	BS 1377- 7:1990
	Undrained shear strength - triaxial compression with multistage loading and without measurement of pore pressure	BS 1377- 7:1990

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
SOILS for civil engineering purposes (cont'd)	Moisture content - oven drying method	BS 1377- 2:1990
	Saturation moisture content of chalk	BS 1377- 2:1990
	Liquid limit - cone penetrometer - one point	BS 1377- 2:1990
	Plastic limit	BS 1377- 2:1990
	Plasticity index and liquidity index	BS 1377- 2:1990
	Density - linear measurement	BS 1377- 2:1990
	Density - immersion in water	BS 1377- 2:1990
	Density - water displacement	BS 1377- 2:1990
	Particle density - gas jar	BS 1377- 2:1990
	Particle density - small pyknometer	BS 1377- 2:1990
	Particle size distribution - wet sieving	BS 1377- 2:1990
	Particle size distribution - dry sieving	BS 1377- 2:1990
	Particle size distribution - sedimentation - pipette method	BS 1377- 2:1990
	Dry density/moisture content relationship (2.5 kg rammer)	BS 1377- 4:1990
	Dry density/moisture content relationship (4.5 kg rammer)	BS 1377- 4:1990
	Dry density/moisture content relationship (vibrating hammer)	BS 1377- 4:1990
	Moisture condition value (MCV)	BS 1377- 4:1990
	Chalk crushing value	BS 1377- 4:1990

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
SOILS for civil engineering purposes (cont'd)	One-dimensional consolidation properties	BS 1377- 5:1990
	Constant head permeability in a triaxial cell	BS 1377- 6:1990
	Consolidated undrained triaxial compression test with the measurement of pore water pressure	BS 1377- 8:1990
	Consolidated undrained triaxial compression test with the measurement of pore water pressure using multistage loading	Documented In-House Method LTPMS 41
	Consolidated drained triaxial compression test with measurement of volume change	BS 1377- 8:1990
	Consolidated drained triaxial compression test with measurement of volume change using multistage loading	Documented In-House Method LTPMS 42
GEOTECHNICAL INVESTIGATION and TESTING - Laboratory testing of soil	Water content	BS EN ISO 17892-1:2014
	Bulk density - linear measurement method - immersion in fluid method - fluid displacement method	BS EN ISO 17892-2:2014
	Determination of particle density - fluid pyknometer method	BS EN ISO 17892-3:2015
	Determination of particle size distribution - sieving method - pipette method - hydrometer method	BS EN ISO 17892-4:2016
END		

Summary of Classification Test Results

Project Name: St. Ola Pier Refurbishment - Site Investigation (Marine)

Project No.: G180030U

Hole	Sample Ref	Sample Top (m)	Sample Type	Description	Density bulk (Mg/m3)	Density dry (Mg/m3)	w (%)	Passing 425µm (%)	LL (%)	PL (%)	PI (%)	Particle density (Mg/m3)	Remarks
BH01	5	1.00	D	Brown silty SAND			30.1						
BH01	19	6.20	B	Brown gravelly silty SAND			9.0						
BH01	21	9.00	D	Brown slightly gravelly sandy CLAY			10.0	64	22 (1pt)	13	9		
BH02	2	0.50	D	Grey silty SAND			16.7						
BH02	8	2.50	B	Brown clayey SAND	1.98 (wi)	1.61	23.5						
BH02	15	6.50	D	Brown slightly gravelly slightly sandy CLAY			19.5	95	39	20	19		
BH02	22	17.30	D	Brown slightly gravelly slightly sandy CLAY			13.2	70	25	12	13		
BH03	3	0.50	D	Grey silty SAND			26.2						
BH03	5	0.50	B	Brown clayey SAND	1.99 (wi)	1.59	24.9						
BH03	10	2.50	D	Brown silty SAND			23.0						
BH03	16	4.50	D	Brown slightly gravelly silty SAND			18.7						
BH03	18	4.50	B	Brown slightly gravelly sandy CLAY	2.20 (wi)	1.92	14.6						
BH03	21	9.50	D	Brown gravelly silty SAND			18.8	94		NP			
BH03	23	12.50	D	Brown slightly gravelly slightly sandy CLAY			11.7	71	23	12	11		
BH03	24	15.50	D	Brown slightly sandy CLAY			11.0						
BH03	25	18.50	D	Brown slightly gravelly slightly sandy CLAY			9.8	65	24 (1pt)	12	12		

Methods:
Water Content - BS EN IS 17892-1 Bulk Density - BS EN ISO 17892-2 Particle Density (Pycnometer) - BS EN ISO 17892-3
Particle Density (Gas Jar) - BS 1377 : Part 2 Atterberg Limits - BS 1377 : Part 2

Key

Density Tests
Linear measurement (lm) unless :
wd - fluid displacement
wi - immersion in fluid

Atterberg Limits (al)
Liquid limit 4pt cone unless :
1pt - single point test
NP - Non plastic

Particle Density
sp - small pycnometer
gj - gas jar

Date Printed: 28/02/2019

Figure Number: F.3.1

Summary of Classification Test Results

Project Name: St. Ola Pier Refurbishment - Site Investigation (Marine)

Project No.: G180030U

Hole	Sample Ref	Sample Top (m)	Sample Type	Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Remarks
BH04	2	0.00	B	Brown clayey SAND	1.97 (wi)	1.57	25.3						
BH04	3	0.50	D	Grey silty SAND			26.2						
BH04	9	2.50	D	Grey slightly gravelly silty SAND			14.0						
BH04	17	4.40	B	Brown slightly gravelly slightly sandy CLAY			24.1		28	14	14		
BH04	20	6.00	D	Brown slightly gravelly slightly sandy CLAY			19.1	98	24	15	9		
BH04	21	7.50	D	Brown slightly sandy CLAY			12.1						
BH04	22	9.00	D	Brown slightly gravelly slightly sandy CLAY			20.4	99	32	18	14		
BH04	24	12.00	D	Brown slightly gravely slightly sandy CLAY			9.0	64	24 (1pt)	12	12		
BH04	25	13.50	D	Brown slightly gravelly slightly sandy CLAY			11.0						
BH05	3	0.50	D	Grey silty SAND			28.4						
BH05	12	3.50	D	Grey slightly gravelly silty SAND			17.4						
BH06	6	2.50	D	Brown slightly sandy CLAY			24.7						
BH07	7	2.50	D	Brown slightly sandy CLAY			25.6						
BH07	11	3.50	B	Brown clayey SAND	2.02 (wi)	1.63	23.9						
BH08	3	0.50	D	Brown slightly sandy CLAY			39.3						
BH08	13	4.50	D	Brown slightly sandy CLAY			24.7						

Methods:
Water Content - BS EN IS 17892-1 Bulk Density - BS EN ISO 17892-2 Particle Density (Pycnometer) - BS EN ISO 17892-3
Particle Density (Gas Jar) - BS 1377 : Part 2 Atterberg Limits - BS 1377 : Part 2

Key

Density Tests
Linear measurement (lm) unless :
wd - fluid displacement
wi - immersion in fluid

Atterberg Limits (al)
Liquid limit 4pt cone unless :
1pt - single point test
NP - Non plastic

Particle Density
sp - small pycnometer
gj - gas jar

Date Printed: 28/02/2019

Figure Number: F.3.1

Summary of Classification Test Results

Project Name: St. Ola Pier Refurbishment - Site Investigation (Marine)

Project No.: G180030U

Hole	Sample Ref	Sample Top (m)	Sample Type	Description	Density bulk Mg/m3	Density dry Mg/m3	w %	Passing 425µm %	LL %	PL %	PI %	Particle density Mg/m3	Remarks
BH09	5	1.00	B	Brown clayey SAND	1.95 (wi)	1.54	26.8						
BH09	6	1.50	D	Brown slightly sandy CLAY			26.4						
BH09	14	4.50	D	Brown slightly sandy CLAY			25.1						
BH11	7	2.50	D	Brown silty SAND			23.2						
BH20	13	5.19	C	Brown slightly sandy gravelly CLAY	2.41 (wi)	2.25	6.9						
BH20	14	5.50	D	Brown slightly sandy slightly gravelly CLAY			8.4	63	24 (1pt)	12	12		
BH21	22	10.00	D	Brown slightly sandy gravelly CLAY			9.5	50	22 (1pt)	12	10		
BH22	4	1.50	D	Grey silty SAND			26.0						
BH22	9	3.50	D	Grey silty SAND			24.8						
BH22	13	4.70	D	Brown slightly gravelly slightly sandy CLAY			9.1	68	23	13	10		
BH22	16	7.40	D	Brown slightly sandy CLAY			10.1						
BH22	20	11.90	D	Brown slightly gravelly slightly sandy CLAY			10.8	74	23	11	12		
BH23	3	0.50	D	Black slightly gravelly silty SAND			30.8	95		NP			
BH23	13	3.50	D	Grey silty SAND			20.9						
BH23	15	3.90	D	Brown slightly gravelly sandy silty CLAY			11.6	41	21 (1pt)	13	8		
BH23	20	7.80	D	Brown slightly gravelly sandy silty CLAY			17.8	85	25	17	8		

Methods:
Water Content - BS EN IS 17892-1 Bulk Density - BS EN ISO 17892-2 Particle Density (Pycnometer) - BS EN ISO 17892-3
Particle Density (Gas Jar) - BS 1377 : Part 2 Atterberg Limits - BS 1377 : Part 2

Key

Density Tests
Linear measurement (lm) unless :
wd - fluid displacement
wi - immersion in fluid

Atterberg Limits (al)
Liquid limit 4pt cone unless :
1pt - single point test
NP - Non plastic

Particle Density
sp - small pycnometer
gj - gas jar

Date Printed: 28/02/2019

Figure Number: F.3.1

Summary of Classification Test Results

Project Name: St. Ola Pier Refurbishment - Site Investigation (Marine)

Project No.: G180030U

Hole	Sample Ref	Sample Top (m)	Sample Type	Description	Density bulk (Mg/m3)	Density dry (Mg/m3)	w (%)	Passing 425µm (%)	LL (%)	PL (%)	PI (%)	Particle density (Mg/m3)	Remarks
BH23	25	12.30	D	Brown slightly sandy gravelly CLAY			9.1	52	24 (1pt)	12	12		
BH24a	3	0.50	D	Grey slightly gravelly silty SAND			15.5						
BH24a	12	2.50	B	Brown slightly gravelly sandy CLAY	2.17 (wi)	1.88	15.5						
BH24a	14	5.70	D	Brown slightly gravelly sandy CLAY			20.3	99	27	18	9		
BH24a	23	14.70	D	Brown slightly sandy gravelly CLAY			12.1	57	24 (1pt)	12	12		
BH30	3	0.50	D	Brown slightly sandy gravelly CLAY			9.9	50	22 (1pt)	12	10		
BH30	8	2.60	D	Brown slightly sandy slightly gravelly CLAY			9.0	66	24 (1pt)	13	11		
BH30	15	7.10	D	Brown slightly sandy slightly gravelly CLAY			8.1	73	22 (1pt)	12	10		

Methods:

Water Content - BS EN IS 17892-1 Bulk Density - BS EN ISO 17892-2 Particle Density (Pycnometer) - BS EN ISO 17892-3

Particle Density (Gas Jar) - BS 1377 : Part 2 Atterberg Limits - BS 1377 : Part 2

Key

Density Tests
Linear measurement (lm) unless :
wd - fluid displacement
wi - immersion in fluid

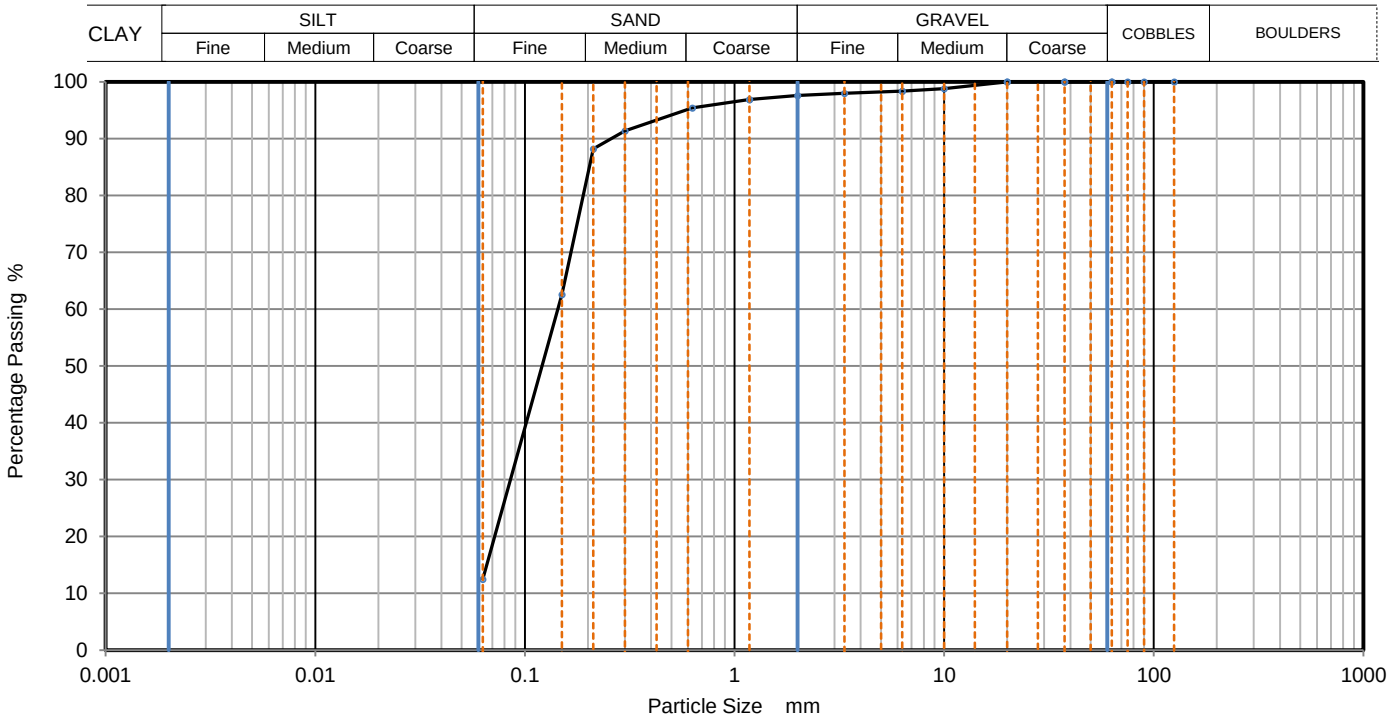
Atterberg Limits (al)
Liquid limit 4pt cone unless :
1pt - single point test
NP - Non plastic

Particle Density
sp - small pycnometer
gj - gas jar

Date Printed: 28/02/2019

Figure Number: F.3.1

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH01
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	3
Description	Grey slightly gravelly silty SAND			Depth, m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	D
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0120181108003



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	100		
10	99		
6.3	98		
3.35	98		
2	98		
1.18	97		
0.63	95		
0.3	91		
0.212	88		
0.15	63		
0.063	13		

Dry Mass of sample, g: 361

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	2.4
Sand	85.1
Fines <0.063mm	12.5

Grading Analysis		
D100	mm	20
D60	mm	0.143
D30	mm	0.0852
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

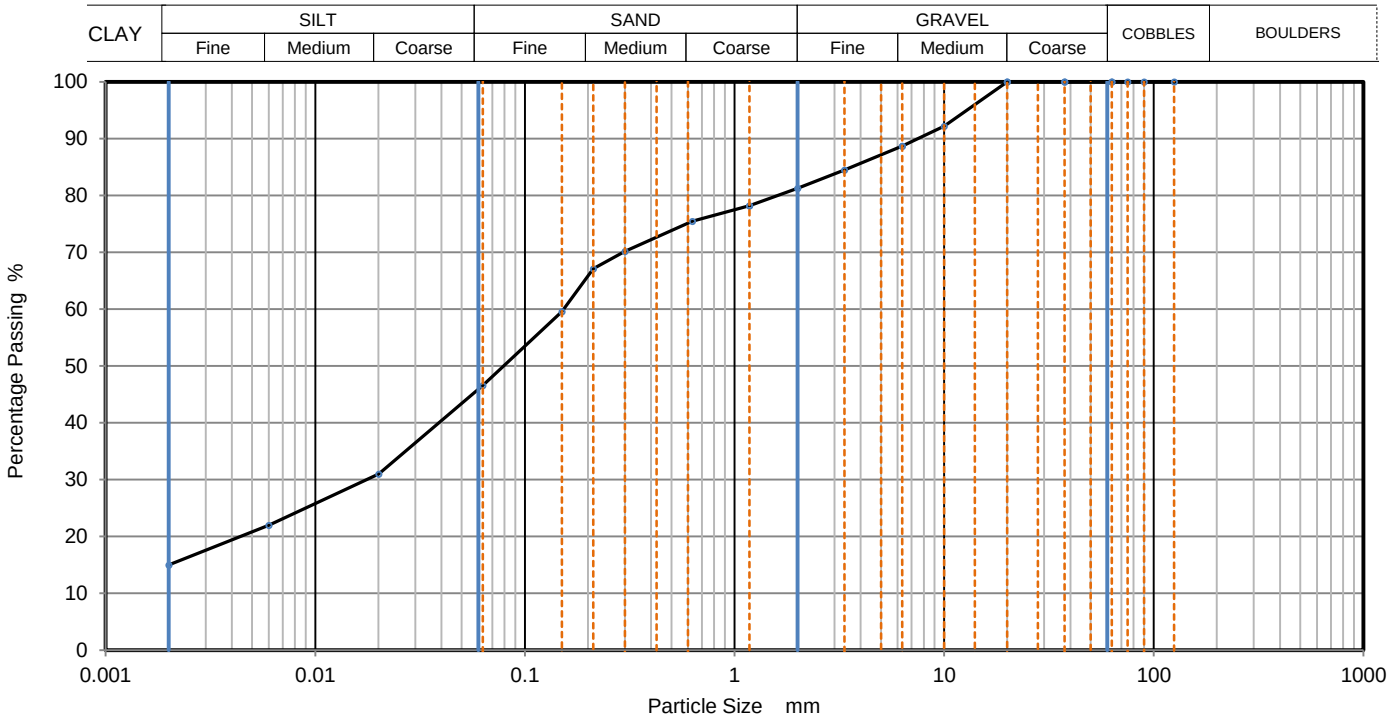
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	1

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH03
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	30
Description	Grey slightly gravelly slightly sandy CLAY			Depth, m	14.00
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clauses 5.2 and 5.4			KeyLAB ID	BH0320181110030



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	31
90	100	0.0060	22
75	100	0.0020	15
63	100		
37.5	100		
20	100		
10	92		
6.3	89		
3.35	85		
2	81		
1.18	78		
		Particle density	(assumed)
0.63	76	2.70	Mg/m3
0.3	70		
0.212	67		
0.15	60		
0.063	47		

Dry Mass of sample, g	828

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	18.7
Sand	34.6
Silt	31.3
Clay	15.4

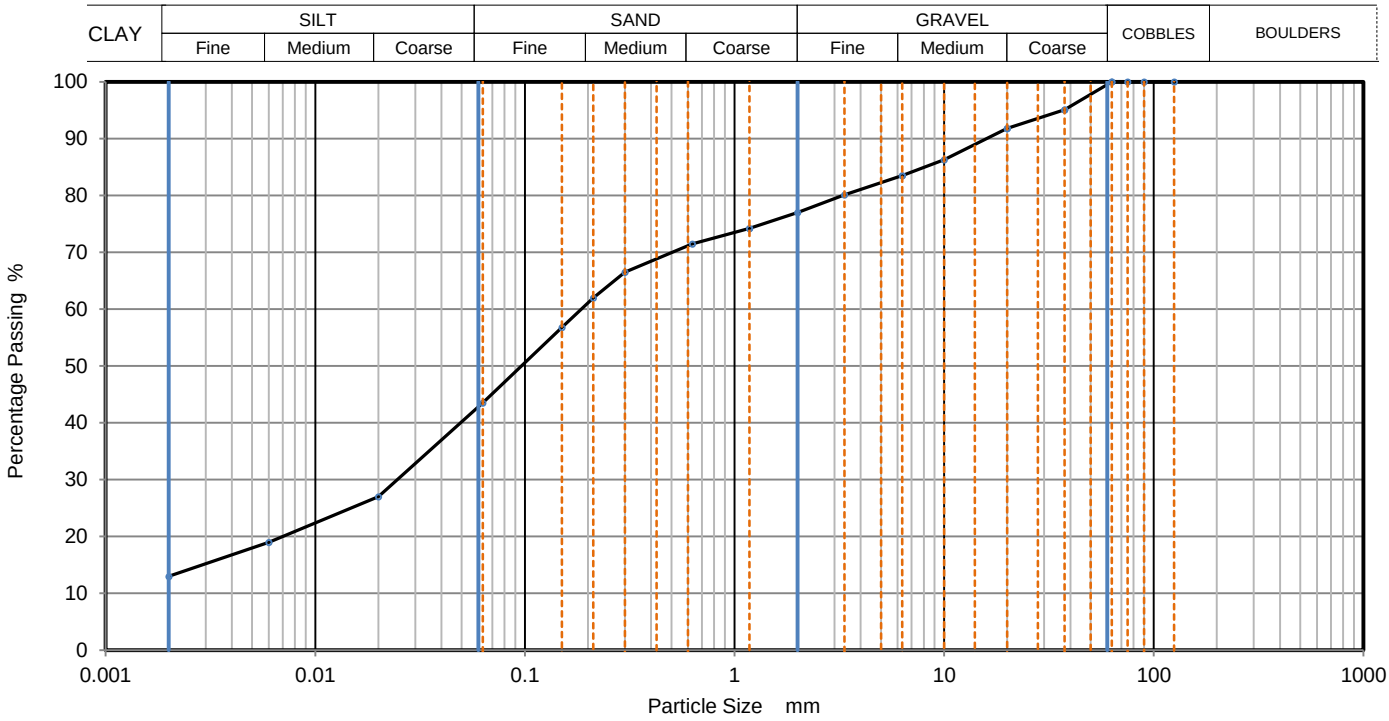
Grading Analysis		
D100	mm	20
D60	mm	0.153
D30	mm	0.0185
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	2

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH03
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	31
Description	Brown slightly gravelly slightly sandy CLAY			Depth, m	16.40
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clauses 5.2 and 5.4			KeyLAB ID	BH0320181110031



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	27
90	100	0.0060	19
75	100	0.0020	13
63	100		
37.5	95		
20	92		
10	86		
6.3	84		
3.35	80		
2	77		
1.18	74		
		Particle density	(assumed)
0.63	72	2.70	Mg/m3
0.3	67		
0.212	62		
0.15	57		
0.063	44		

Dry Mass of sample, g	2638

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	23.0
Sand	33.4
Silt	30.2
Clay	13.4

Grading Analysis		
D100	mm	63
D60	mm	0.186
D30	mm	0.0245
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

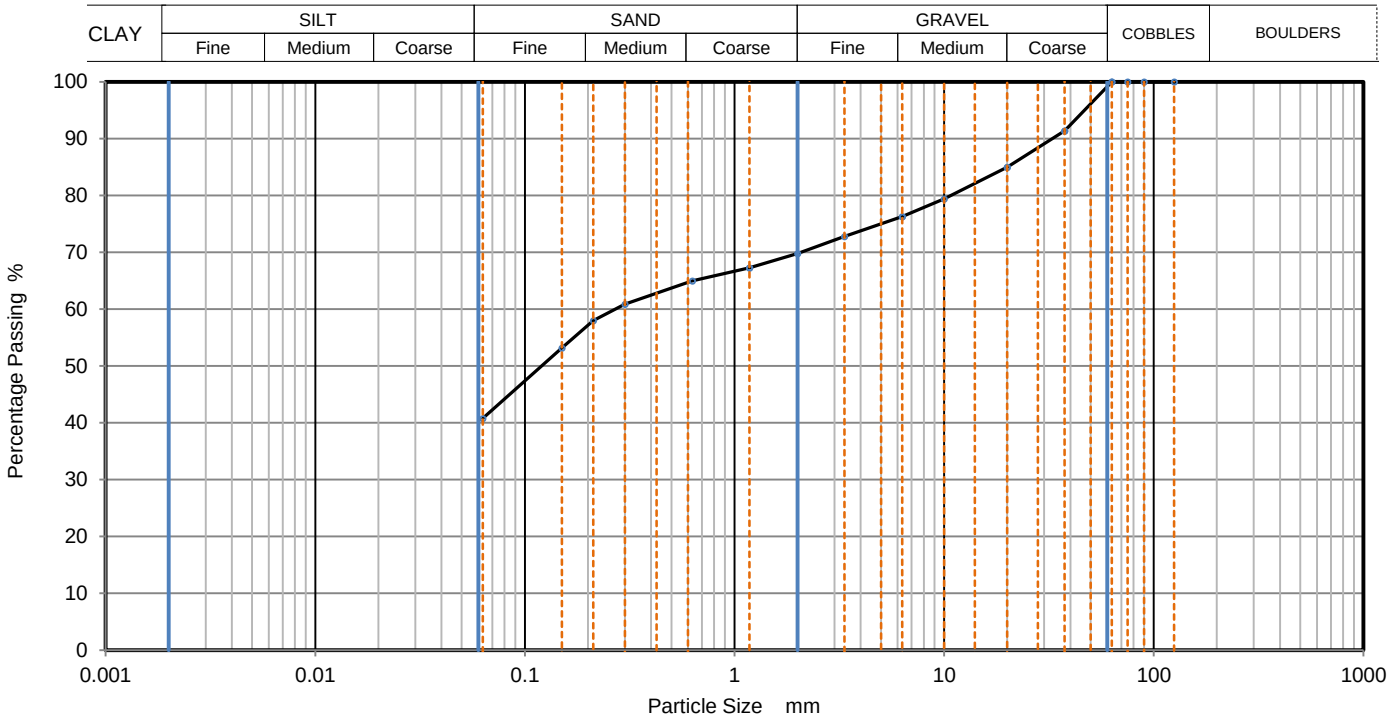
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	3

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH03
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	33
Description	Brown slightly sandy slightly gravelly CLAY			Depth, m	19.75
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0320181110033



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	91		
20	85		
10	79		
6.3	76		
3.35	73		
2	70		
1.18	67		
0.63	65		
0.3	61		
0.212	58		
0.15	53		
0.063	41		

Dry Mass of sample, g: 3241

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	30.2
Sand	29.1
Fines <0.063mm	40.8

Grading Analysis		
D100	mm	63
D60	mm	0.269
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

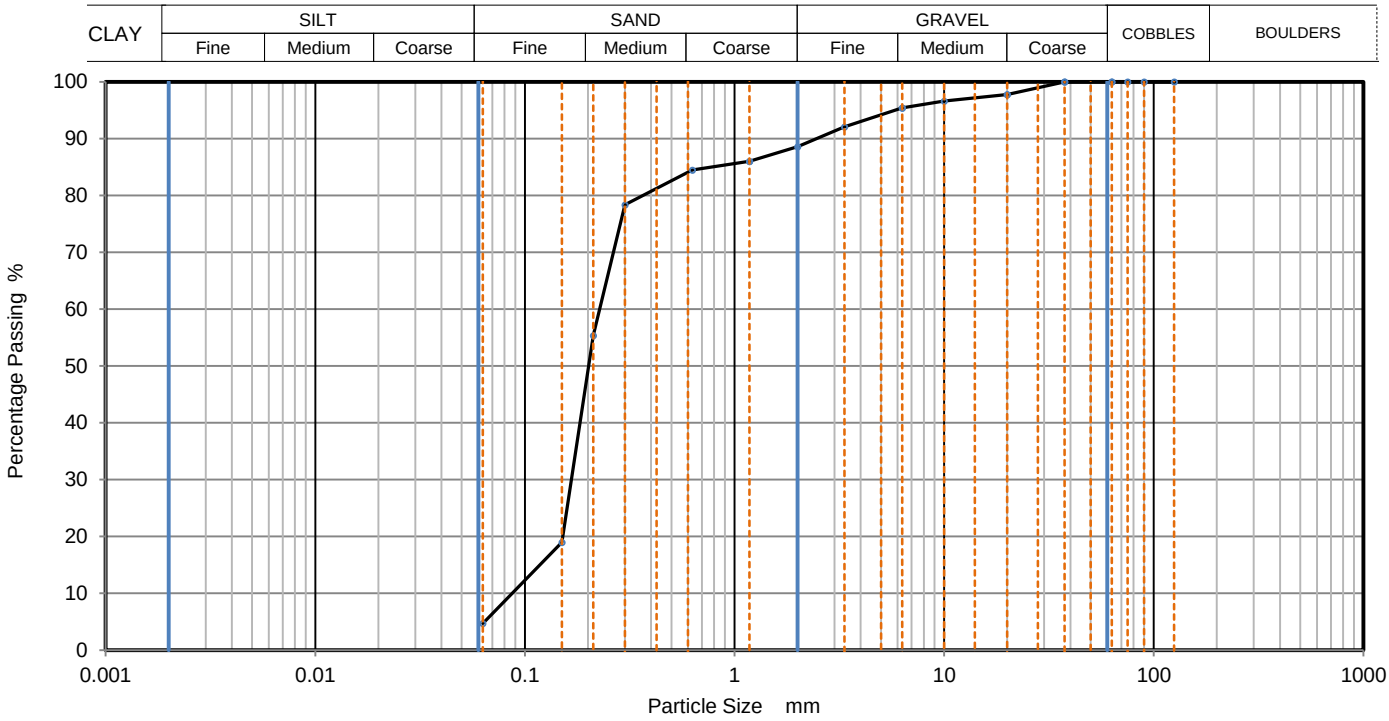
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	4

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH04
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	14
Description	Grey slightly silty gravelly SAND			Depth, m	3.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0420181104014



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	98		
10	97		
6.3	95		
3.35	92		
2	89		
1.18	86		
0.63	85		
0.3	78		
0.212	55		
0.15	19		
0.063	5		

Dry Mass of sample, g	2200

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	11.4
Sand	83.9
Fines <0.063mm	4.7

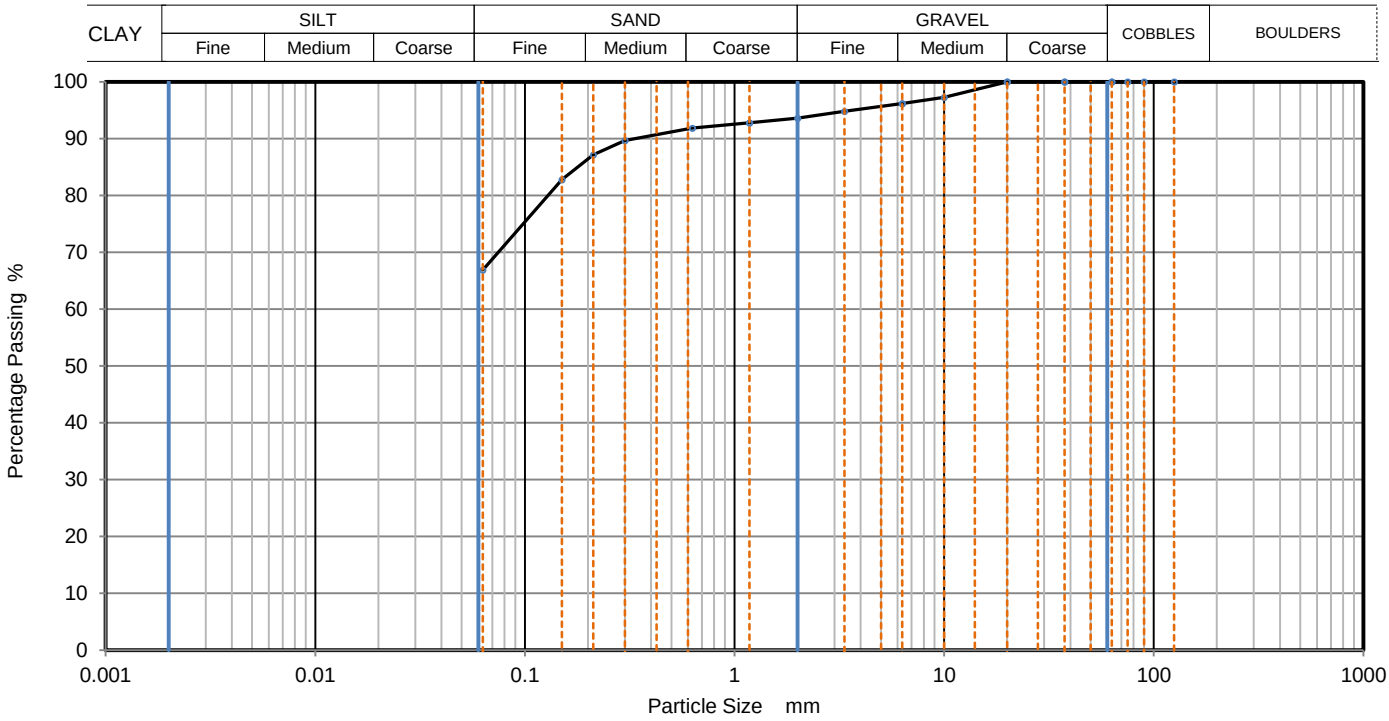
Grading Analysis		
D100	mm	37.5
D60	mm	0.227
D30	mm	0.167
D10	mm	0.087
Uniformity Coefficient		2.6
Curvature Coefficient		1.4

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	5

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH04
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	27
Description	Brown gravelly very sandy SILT			Depth, m	7.30
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0420181104027



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	100		
10	97		
6.3	96		
3.35	95		
2	94		
1.18	93		
0.63	92		
0.3	90		
0.212	87		
0.15	83		
0.063	67		

Dry Mass of sample, g	718

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	6.4
Sand	26.7
Fines <0.063mm	66.9

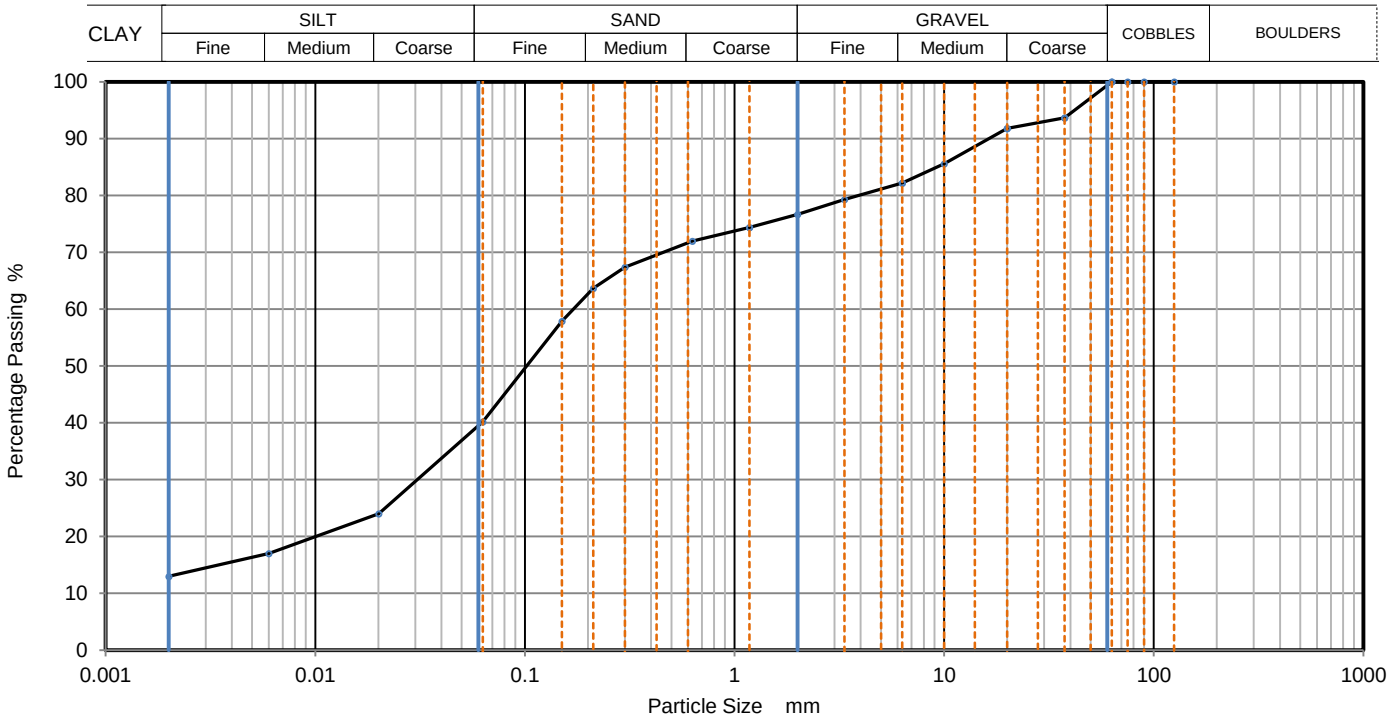
Grading Analysis		
D100	mm	20
D60	mm	
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	6

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH04
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	29
Description	Brown slightly gravelly sandy CLAY			Depth, m	11.35
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clauses 5.2 and 5.4			KeyLAB ID	BH0420181104029



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	24
90	100	0.0060	17
75	100	0.0020	13
63	100		
37.5	94		
20	92		
10	86		
6.3	82		
3.35	79		
2	77		
1.18	74		
		Particle density	(assumed)
0.63	72	2.70	Mg/m3
0.3	67		
0.212	64		
0.15	58		
0.063	40		

Dry Mass of sample, g: 2298

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	23.3
Sand	36.5
Silt	27.5
Clay	12.7

Grading Analysis		
D100	mm	63
D60	mm	0.17
D30	mm	0.0307
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

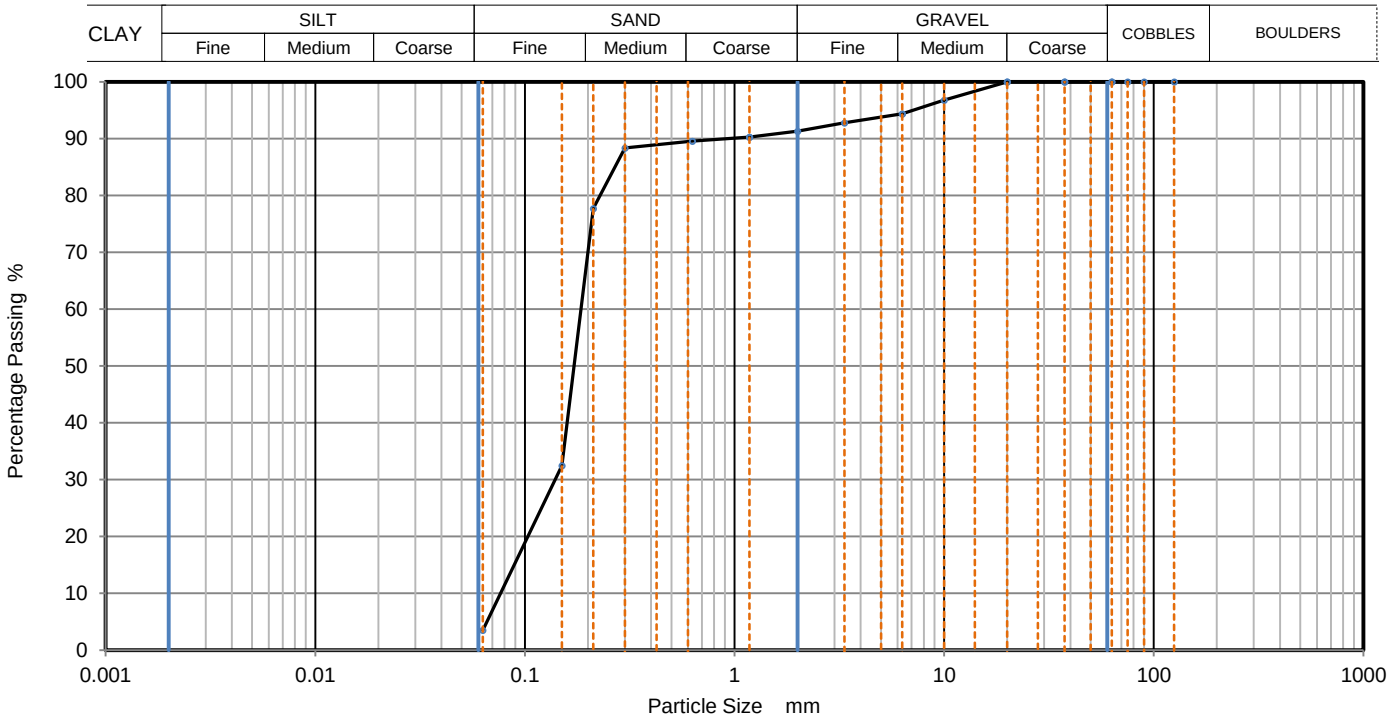
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	7

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH05
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	4
Description	Greyish brown slightly clayey gravelly SAND			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0520181111004



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	100		
10	97		
6.3	94		
3.35	93		
2	91		
1.18	90		
0.63	90		
0.3	88		
0.212	78		
0.15	33		
0.063	4		

Dry Mass of sample, g	971

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	8.7
Sand	87.8
Fines <0.063mm	3.5

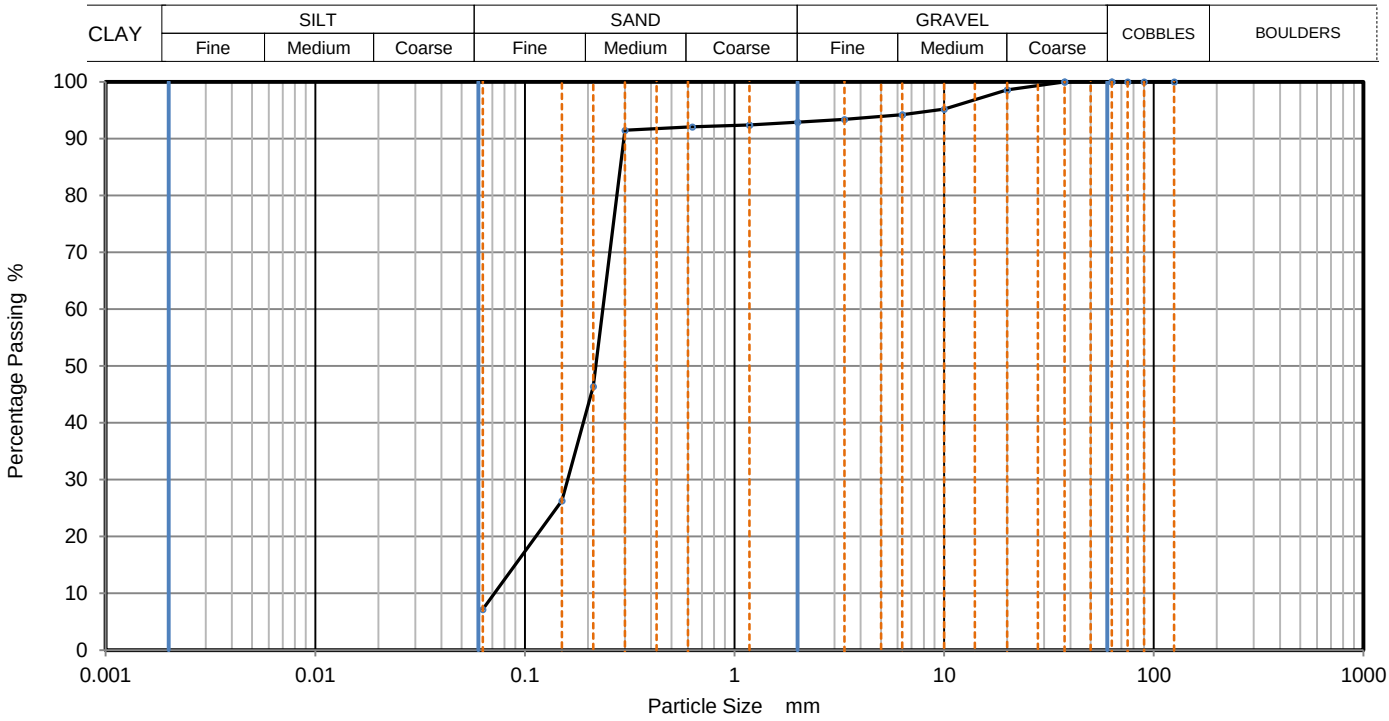
Grading Analysis		
D100	mm	20
D60	mm	0.185
D30	mm	0.139
D10	mm	0.0764
Uniformity Coefficient		2.4
Curvature Coefficient		1.4

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	8

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH05
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	10
Description	Grey brown gravelly silty SAND			Depth, m	2.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0520181111010



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	99		
10	95		
6.3	94		
3.35	93		
2	93		
1.18	92		
0.63	92		
0.3	92		
0.212	46		
0.15	26		
0.063	7		

Dry Mass of sample, g: 1913

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	7.1
Sand	85.6
Fines <0.063mm	7.2

Grading Analysis		
D100	mm	37.5
D60	mm	0.235
D30	mm	0.16
D10	mm	0.0714
Uniformity Coefficient		3.3
Curvature Coefficient		1.5

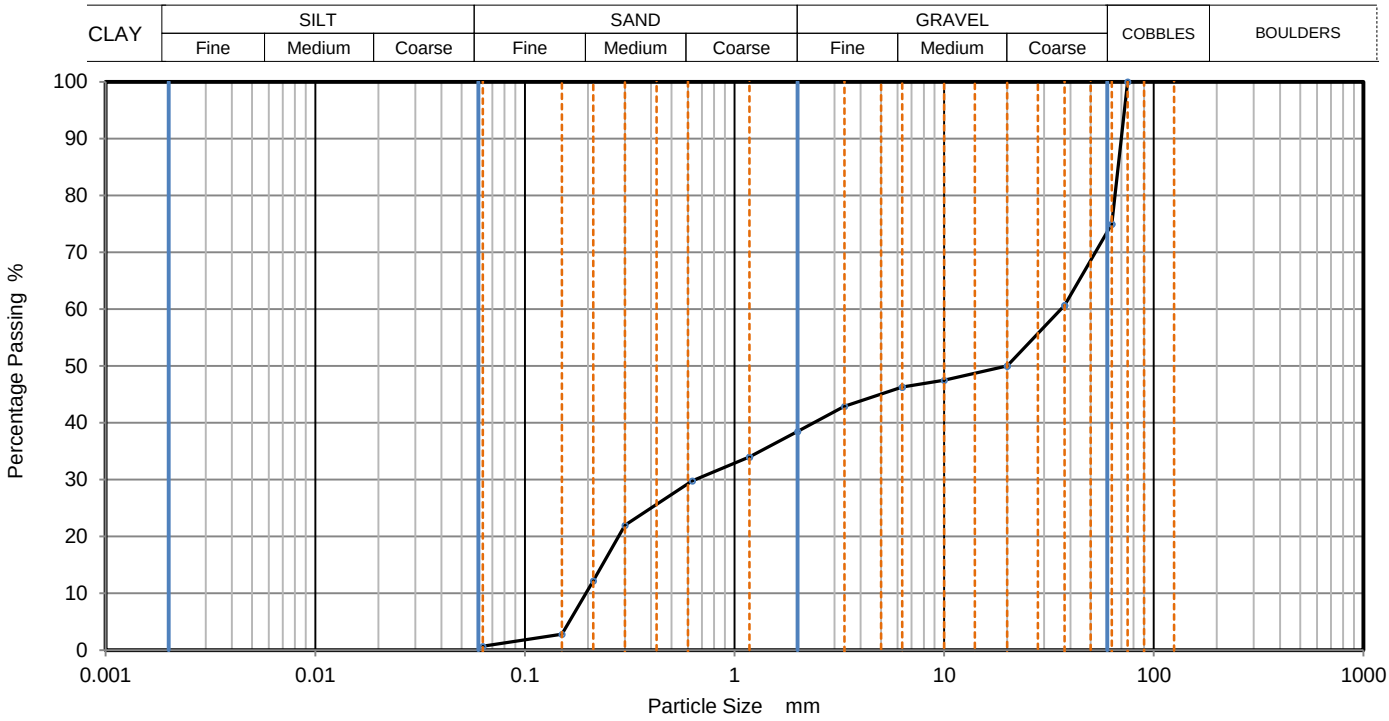
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	9

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH05
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	15
Description	Grey slightly silty very cobbly very gravelly SAND			Depth, m	4.40
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0520181111015



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	75		
37.5	61		
20	50		
10	48		
6.3	46		
3.35	43		
2	39		
1.18	34		
0.63	30		
0.3	22		
0.212	12		
0.15	3		
0.063	1		

Dry Mass of sample, g: 2985

Sample Proportions	% dry mass
Very coarse	25.0
Gravel	36.5
Sand	37.8
Fines <0.063mm	0.7

Grading Analysis		
D100	mm	75
D60	mm	36
D30	mm	0.654
D10	mm	0.195
Uniformity Coefficient		180
Curvature Coefficient		0.061

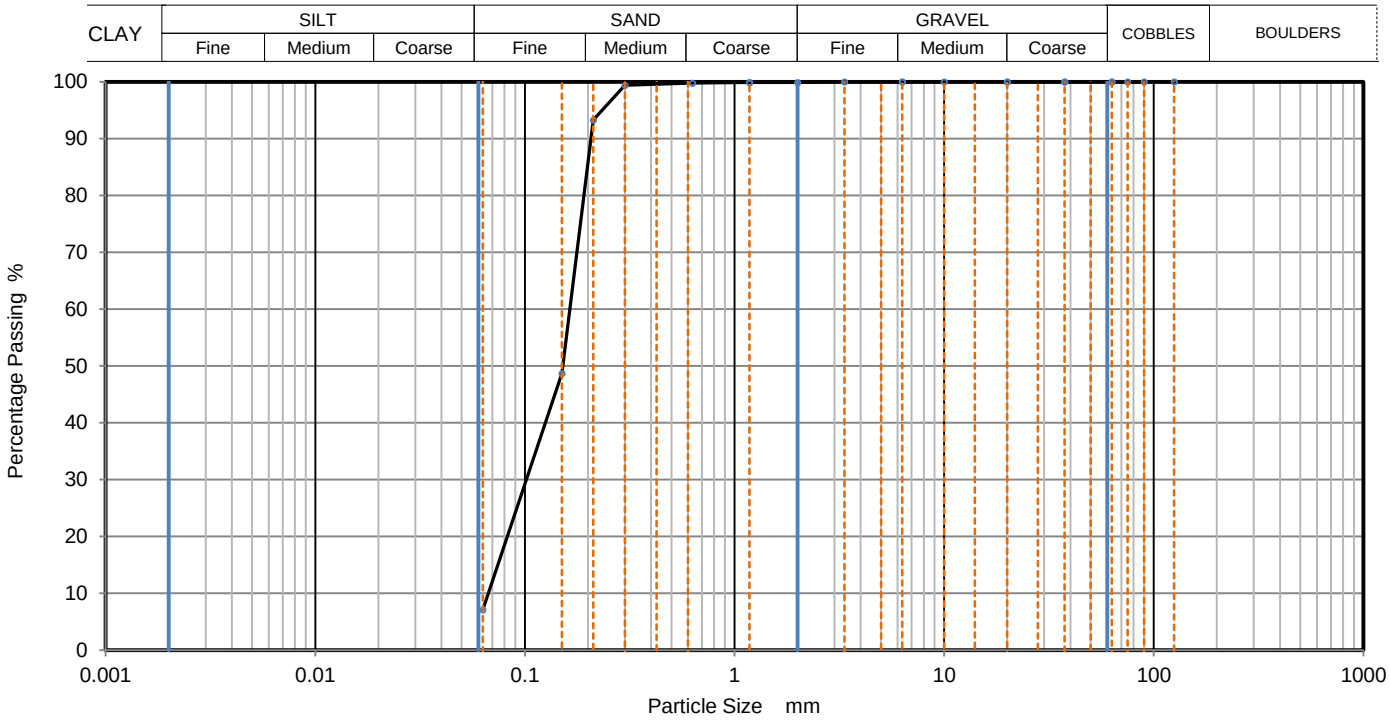
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	10

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH06
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	5
Description	Grey brown slightly gravelly sitly SAND			Depth, m	1.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH062018110505



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	100		
10	100		
6.3	100		
3.35	100		
2	100		
1.18	100		
0.63	100		
0.3	99		
0.212	93		
0.15	49		
0.063	7		

Dry Mass of sample, g	907

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.1
Sand	92.8
Fines <0.063mm	7.1

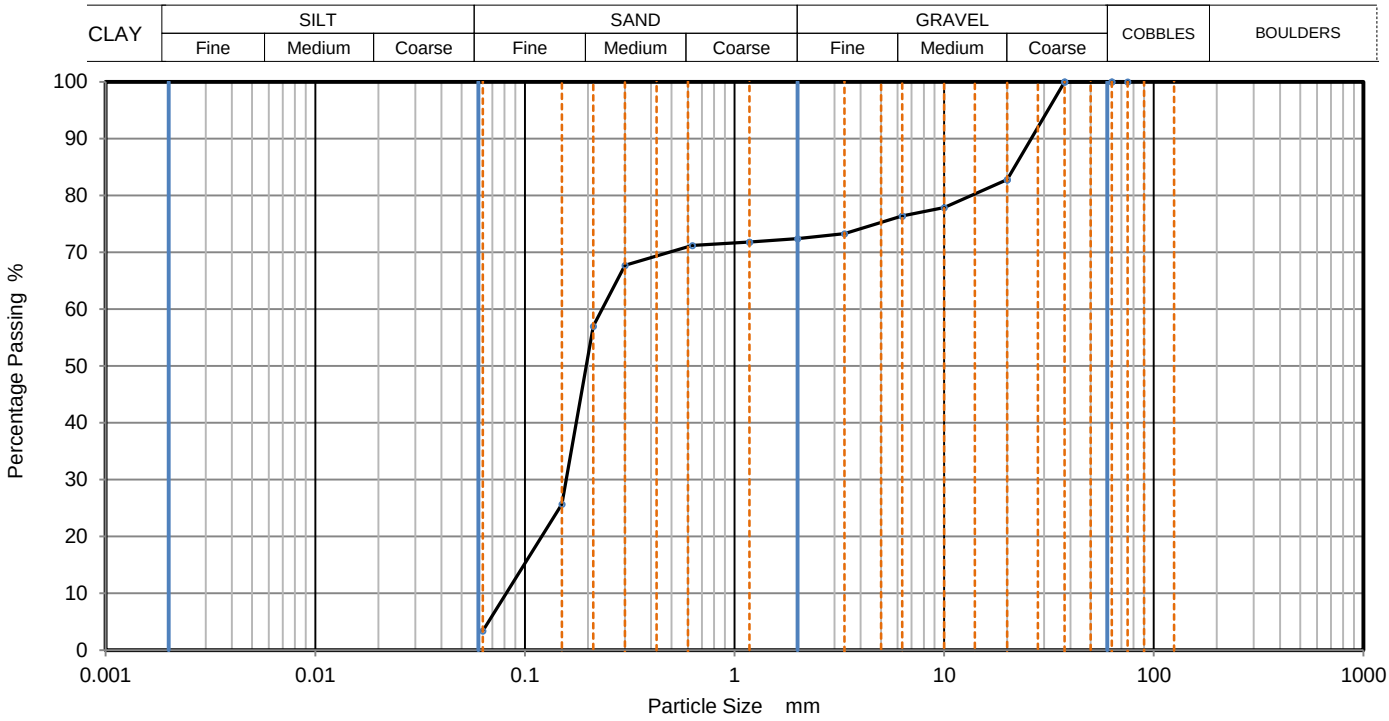
Grading Analysis		
D100	mm	3.35
D60	mm	0.164
D30	mm	0.102
D10	mm	0.067
Uniformity Coefficient		2.4
Curvature Coefficient		0.94

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	11

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH06
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	11
Description	Grey slightly silty very gravelly SAND			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH062018110511



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
37.5	100		
20	83		
10	78		
6.3	76		
3.35	73		
2	72		
1.18	72		
0.63	71		
0.3	68		
0.212	57		
0.15	26		
0.063	3		

Dry Mass of sample, g	2360

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	27.6
Sand	69.0
Fines <0.063mm	3.4

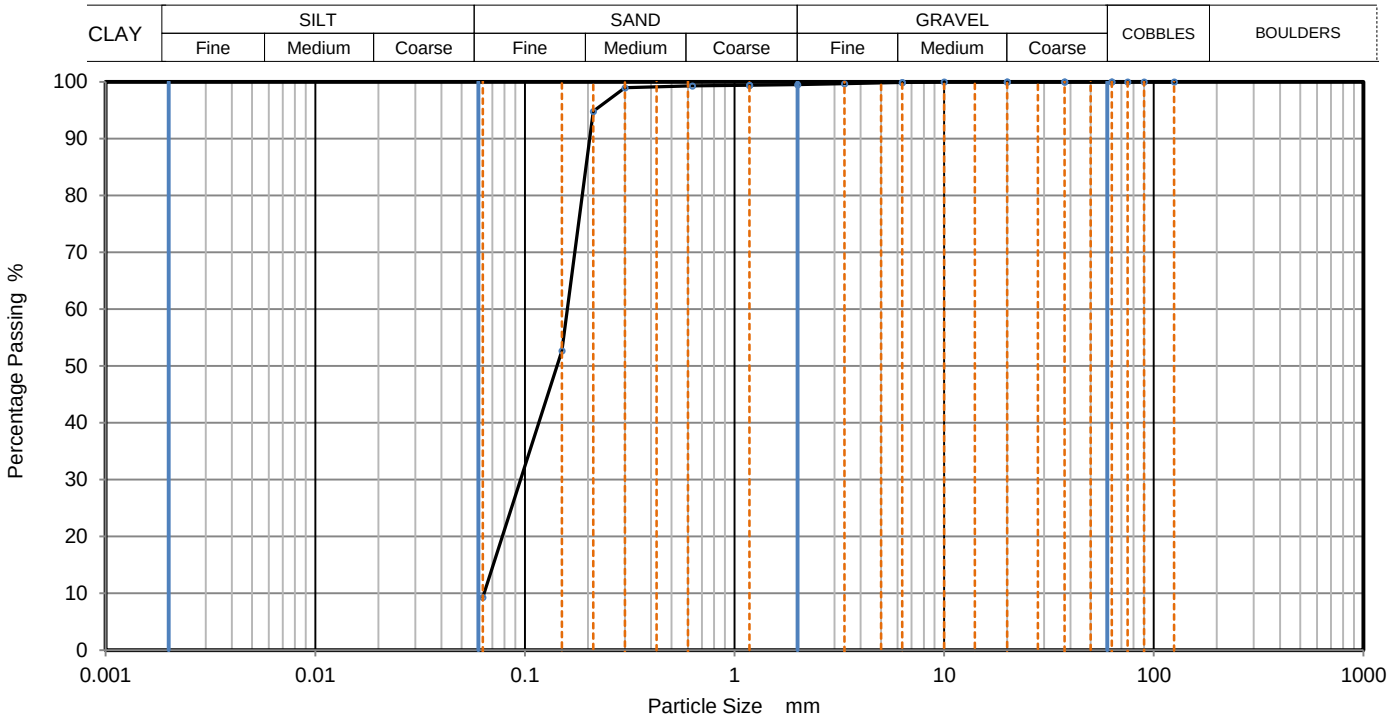
Grading Analysis		
D100	mm	37.5
D60	mm	0.234
D30	mm	0.157
D10	mm	0.0815
Uniformity Coefficient		2.9
Curvature Coefficient		1.3

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	12

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH07
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	11
Description	Grey brown slightly gravelly silty SAND			Depth, m	3.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0720181106011



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	100		
10	100		
6.3	100		
3.35	100		
2	100		
1.18	99		
0.63	99		
0.3	99		
0.212	95		
0.15	53		
0.063	9		

Dry Mass of sample, g	946

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.5
Sand	90.2
Fines <0.063mm	9.3

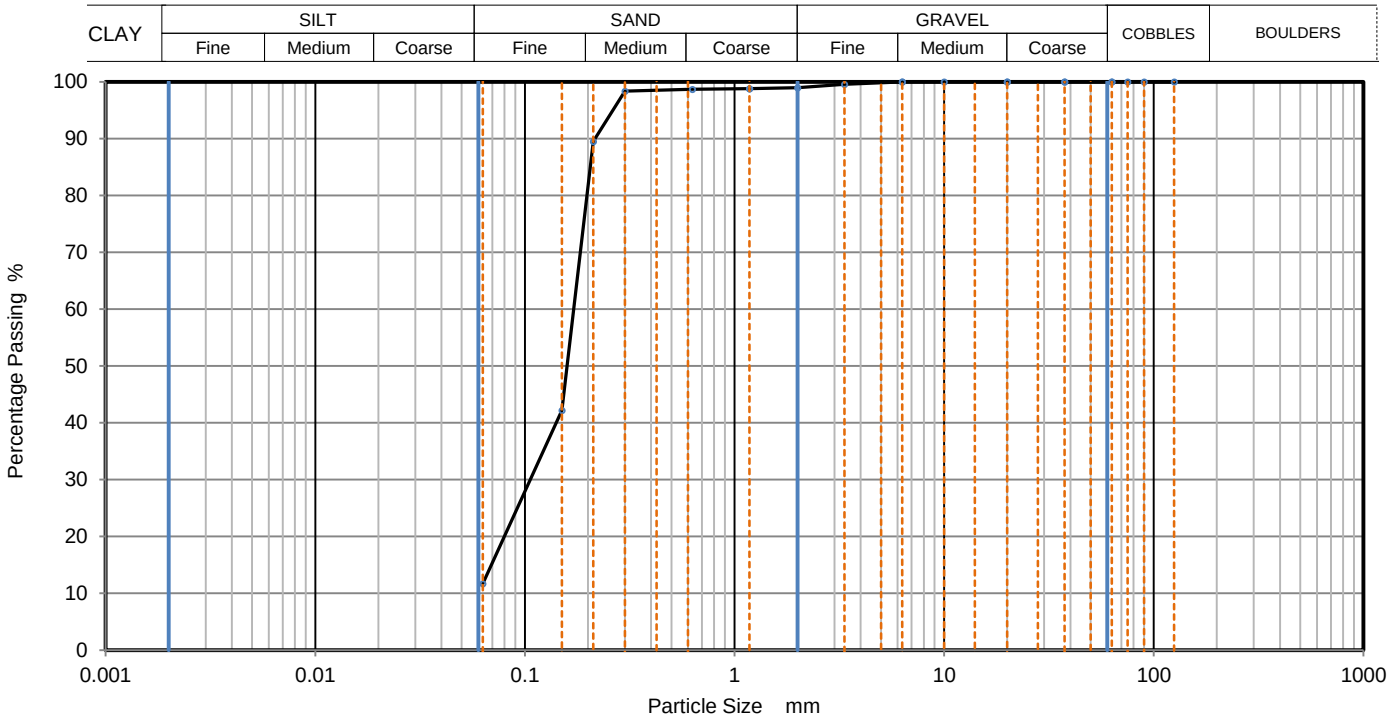
Grading Analysis		
D100	mm	10
D60	mm	0.159
D30	mm	0.0953
D10	mm	0.0639
Uniformity Coefficient		2.5
Curvature Coefficient		0.89

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	13

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH07
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	12
Description	Brown grey slightly gravelly silty SAND			Depth, m	4.50
Specimen Reference		Specimen Depth	m	Sample Type	D
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0720181106012



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	100		
10	100		
6.3	100		
3.35	100		
2	99		
1.18	99		
0.63	99		
0.3	98		
0.212	90		
0.15	42		
0.063	12		

Dry Mass of sample, g	412

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	1.0
Sand	87.3
Fines <0.063mm	11.7

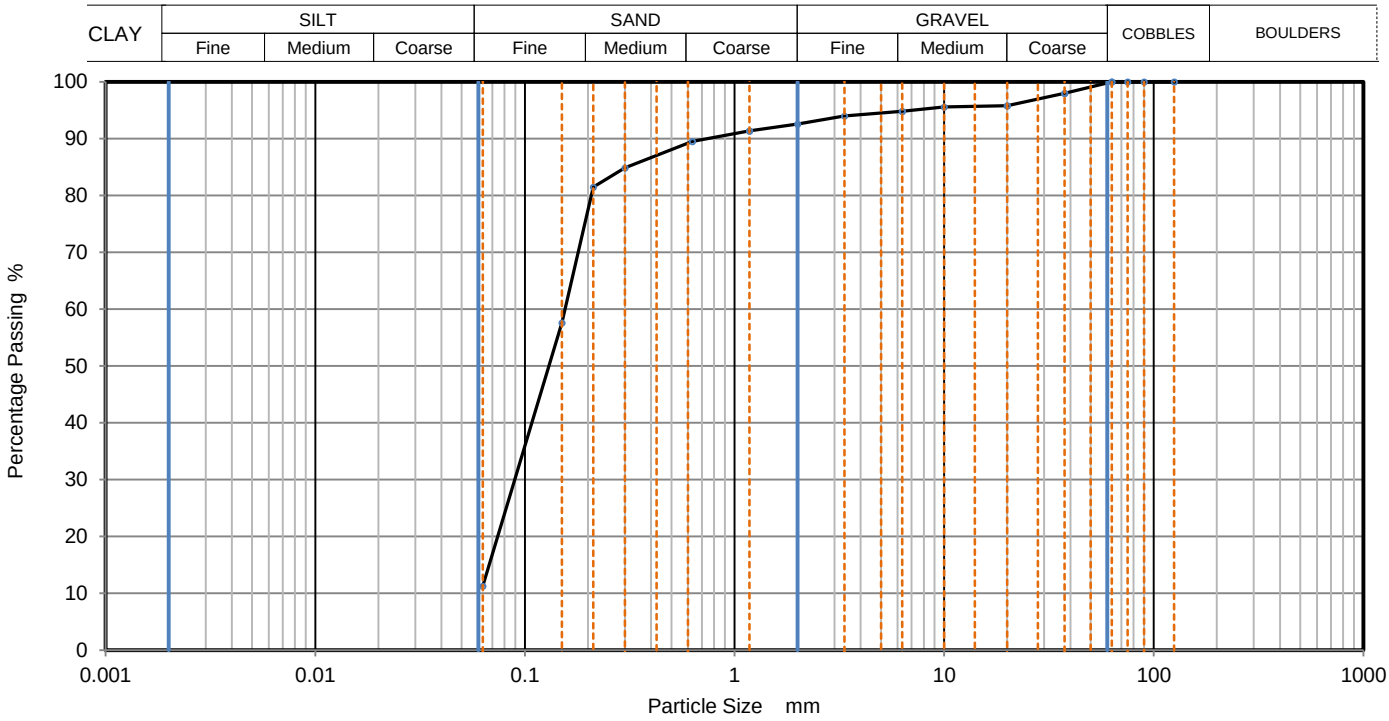
Grading Analysis		
D100	mm	6.3
D60	mm	0.171
D30	mm	0.106
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	14

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH08
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	4
Description	Grey gravelly silty SAND			Depth, m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0820181106004



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	98		
20	96		
10	96		
6.3	95		
3.35	94		
2	93		
1.18	91		
0.63	90		
0.3	85		
0.212	82		
0.15	58		
0.063	11		

Insufficient material to comply with the recommended minimum mass.

Dry Mass of sample, g	9003

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	7.4
Sand	81.3
Fines <0.063mm	11.3

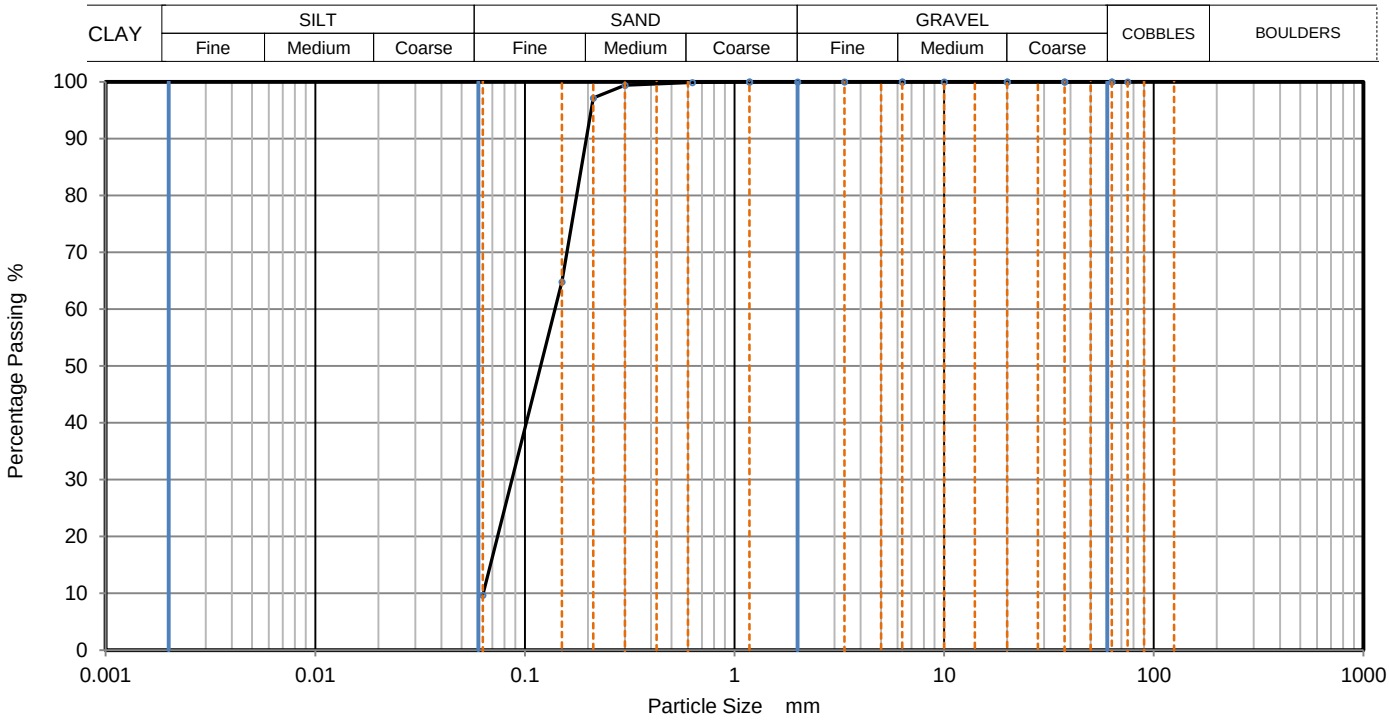
Grading Analysis		
D100	mm	63
D60	mm	0.155
D30	mm	0.0895
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	15

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH08
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	17
Description	Grey brown silty SAND			Depth, m	5.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0820181106017



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
37.5	100		
20	100		
10	100		
6.3	100		
3.35	100		
2	100		
1.18	100		
0.63	100		
0.3	99		
0.212	97		
0.15	65		
0.063	10		

Dry Mass of sample, g	853

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.0
Sand	90.3
Fines <0.063mm	9.7

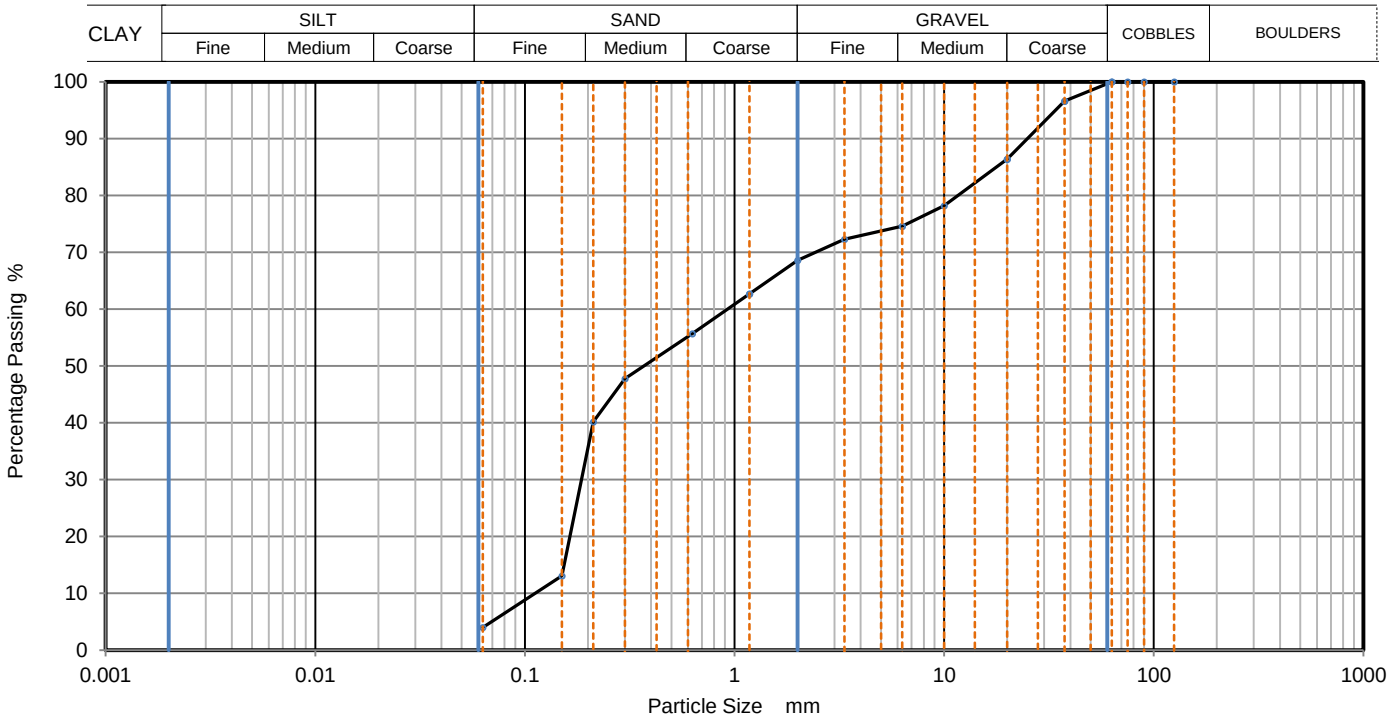
Grading Analysis		
D100	mm	2
D60	mm	0.139
D30	mm	0.0867
D10	mm	0.0633
Uniformity Coefficient		2.2
Curvature Coefficient		0.85

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	16

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH09
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	4
Description	Grey slightly silty very gravelly SAND			Depth, m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0920181115004



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	97		
20	86		
10	78		
6.3	75		
3.35	72		
2	69		
1.18	63		
0.63	56		
0.3	48		
0.212	40		
0.15	13		
0.063	4		

Dry Mass of sample, g: 2264

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	31.4
Sand	64.6
Fines <0.063mm	4.0

Grading Analysis		
D100	mm	63
D60	mm	0.924
D30	mm	0.186
D10	mm	0.112
Uniformity Coefficient		8.3
Curvature Coefficient		0.33

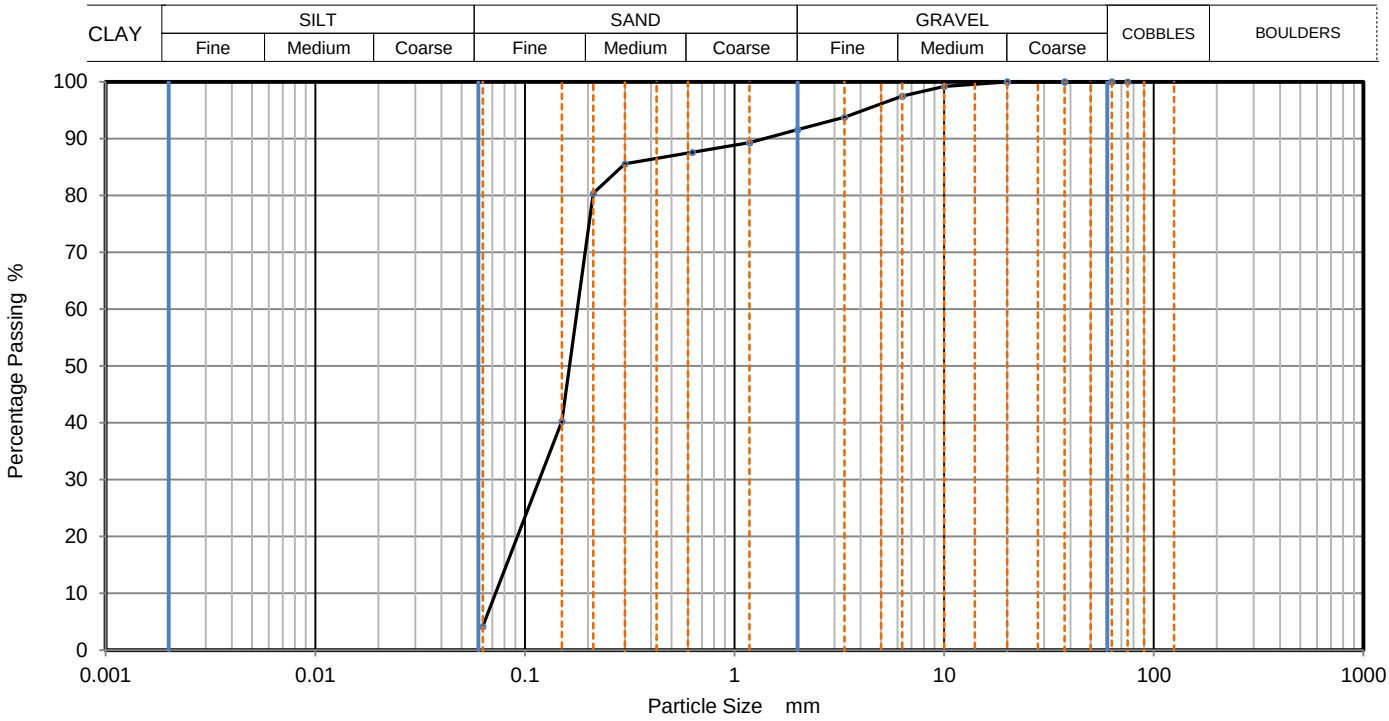
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	17

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH09
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	20
Description	Grey slightly silty gravelly SAND			Depth, m	6.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH0920181115020



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
37.5	100		
20	100		
10	99		
6.3	98		
3.35	94		
2	92		
1.18	89		
0.63	88		
0.3	86		
0.212	80		
0.15	40		
0.063	4		

Dry Mass of sample, g	930

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	8.4
Sand	87.4
Fines <0.063mm	4.2

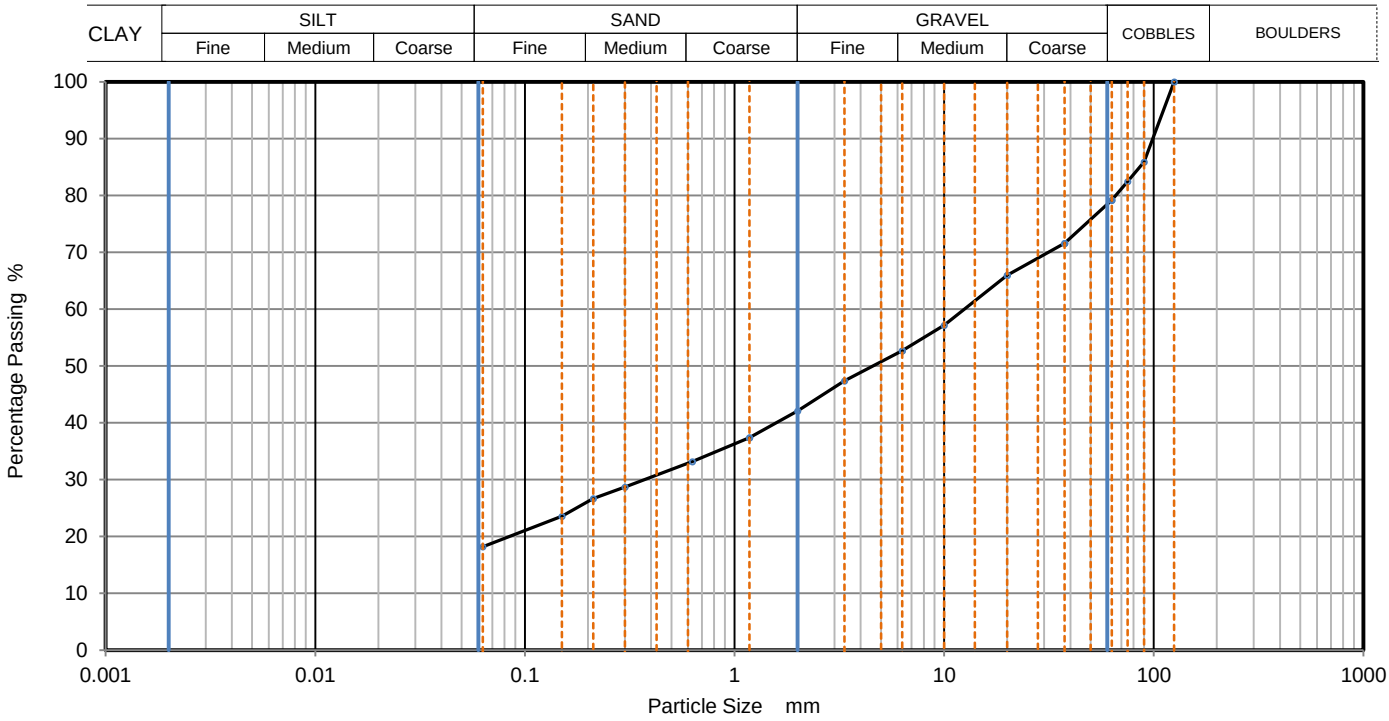
Grading Analysis		
D100	mm	20
D60	mm	0.178
D30	mm	0.117
D10	mm	0.0724
Uniformity Coefficient		2.5
Curvature Coefficient		1.1

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	18

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH20
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	11
Description	Brown clayey cobbley very sandy GRAVEL			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH2020181112011



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	86		
75	83		
63	79		
37.5	72		
20	66		
10	57		
6.3	53		
3.35	47		
2	42		
1.18	37		
0.63	33		
0.3	29		
0.212	27		
0.15	24		
0.063	18		

Dry Mass of sample, g: 20904

Sample Proportions	% dry mass
Very coarse	20.8
Gravel	37.1
Sand	23.9
Fines <0.063mm	18.2

Grading Analysis		
D100	mm	125
D60	mm	12.5
D30	mm	0.371
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

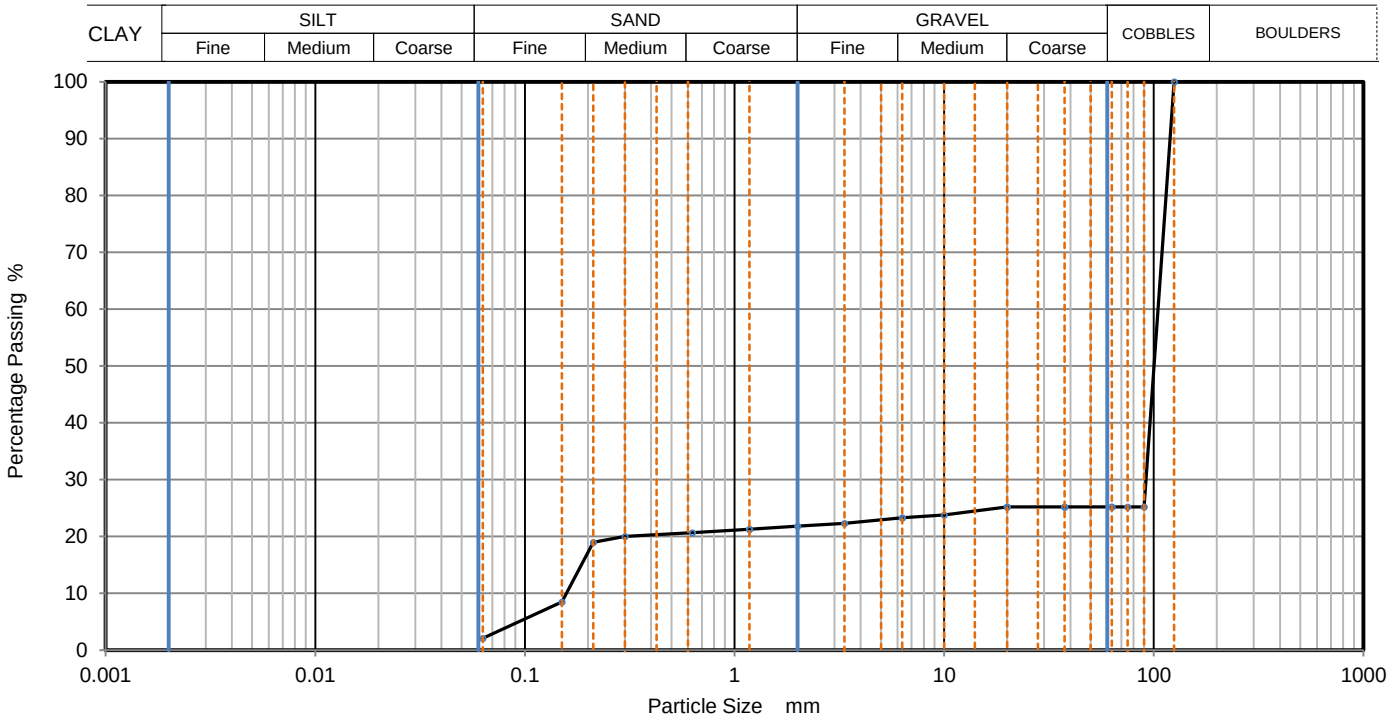
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	19

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH21
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	7
Description	Brown grey slightly silty slightly gravelly sandy COBBLES			Depth, m	1.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH2120181113007



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	25		
75	25		
63	25		
37.5	25		
20	25		
10	24		
6.3	23		
3.35	22		
2	22		
1.18	21		
0.63	21		
0.3	20		
0.212	19		
0.15	9		
0.063	2		

Dry Mass of sample, g: 1431

Sample Proportions	% dry mass
Very coarse	74.8
Gravel	3.5
Sand	19.7
Fines <0.063mm	2.1

Grading Analysis		
D100	mm	125
D60	mm	105
D30	mm	91.9
D10	mm	0.157
Uniformity Coefficient		670
Curvature Coefficient		510

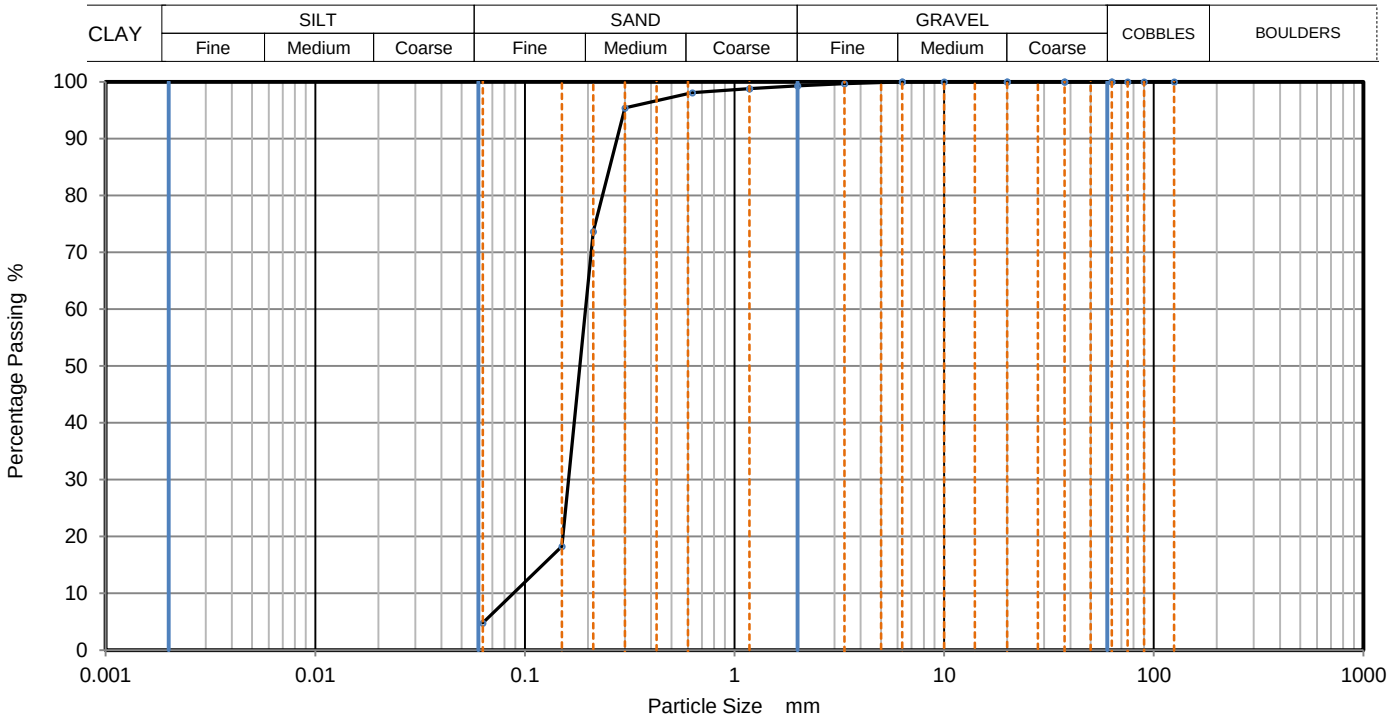
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	20

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH21
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	12
Description	Brown slightly gravelly slightly silty SAND			Depth, m	3.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH2120181113012



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	100		
10	100		
6.3	100		
3.35	100		
2	99		
1.18	99		
0.63	98		
0.3	95		
0.212	74		
0.15	18		
0.063	5		

Dry Mass of sample, g	949

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.7
Sand	94.5
Fines <0.063mm	4.8

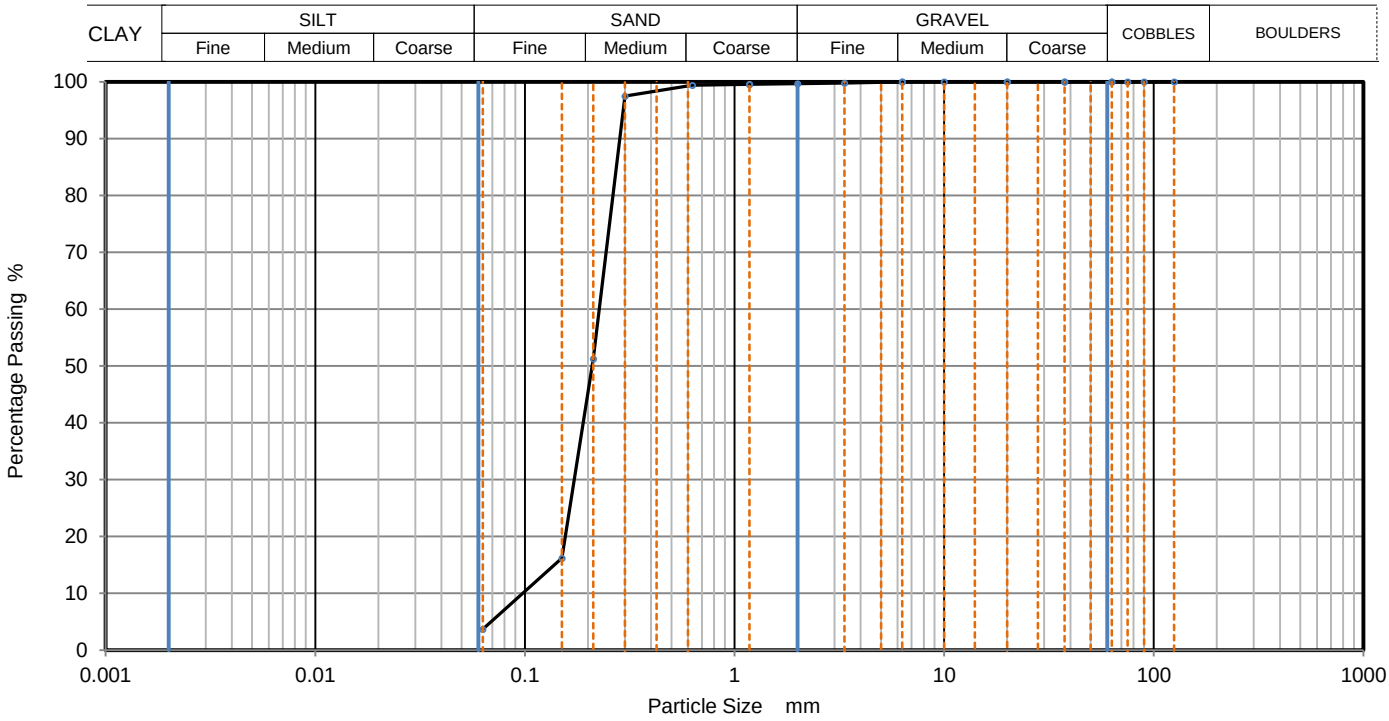
Grading Analysis		
D100	mm	10
D60	mm	0.195
D30	mm	0.161
D10	mm	0.0879
Uniformity Coefficient		2.2
Curvature Coefficient		1.5

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	21

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH21
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	15
Description	Brown slightly gravelly slightly silty SAND			Depth, m	4.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH2120181113015



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	100		
10	100		
6.3	100		
3.35	100		
2	100		
1.18	100		
0.63	99		
0.3	98		
0.212	51		
0.15	16		
0.063	4		

Dry Mass of sample, g	928

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.3
Sand	96.0
Fines <0.063mm	3.7

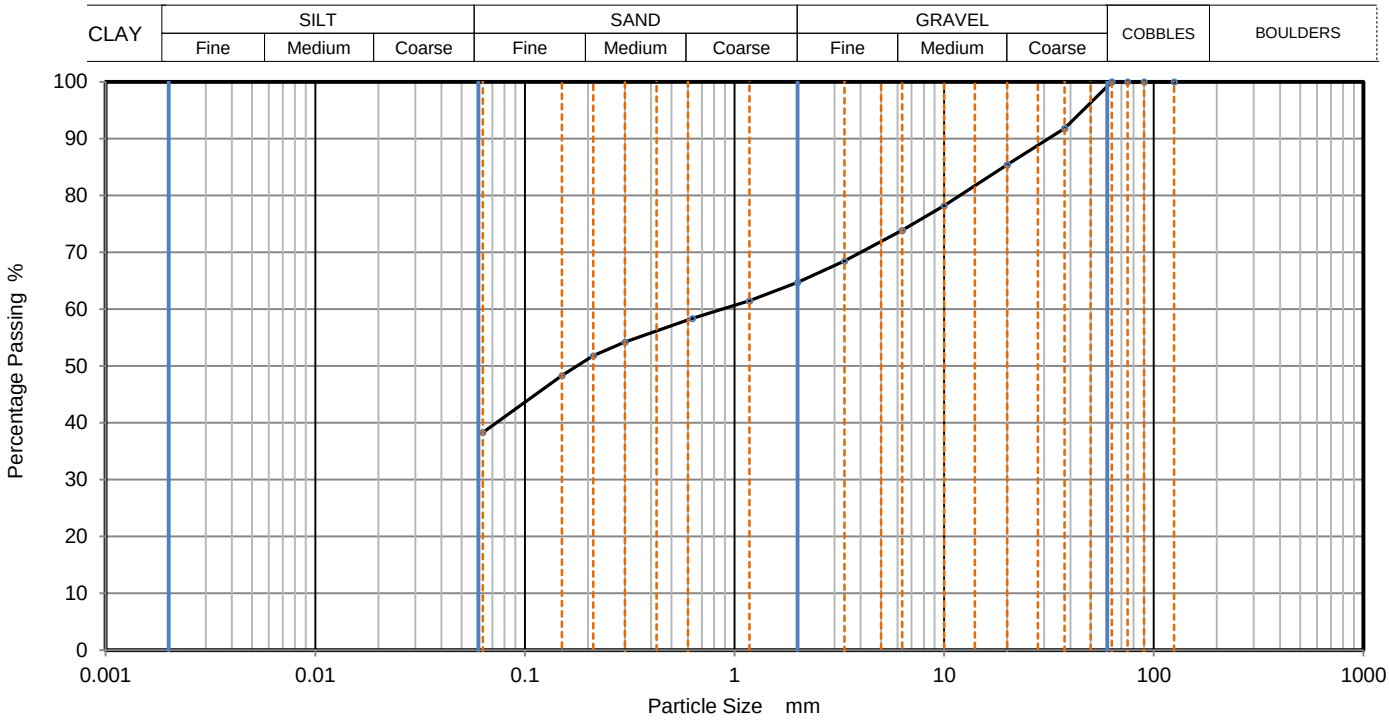
Grading Analysis		
D100	mm	6.3
D60	mm	0.226
D30	mm	0.172
D10	mm	0.0976
Uniformity Coefficient		2.3
Curvature Coefficient		1.3

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	22

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH21
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	19
Description	Grey slightly sandy gravelly CLAY			Depth, m	6.05
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH2120181113019



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	92		
20	85		
10	78		
6.3	74		
3.35	69		
2	65		
1.18	62		
0.63	58		
0.3	54		
0.212	52		
0.15	48		
0.063	38		

Dry Mass of sample, g: 5358

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	35.3
Sand	26.4
Fines <0.063mm	38.3

Grading Analysis		
D100	mm	63
D60	mm	0.871
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

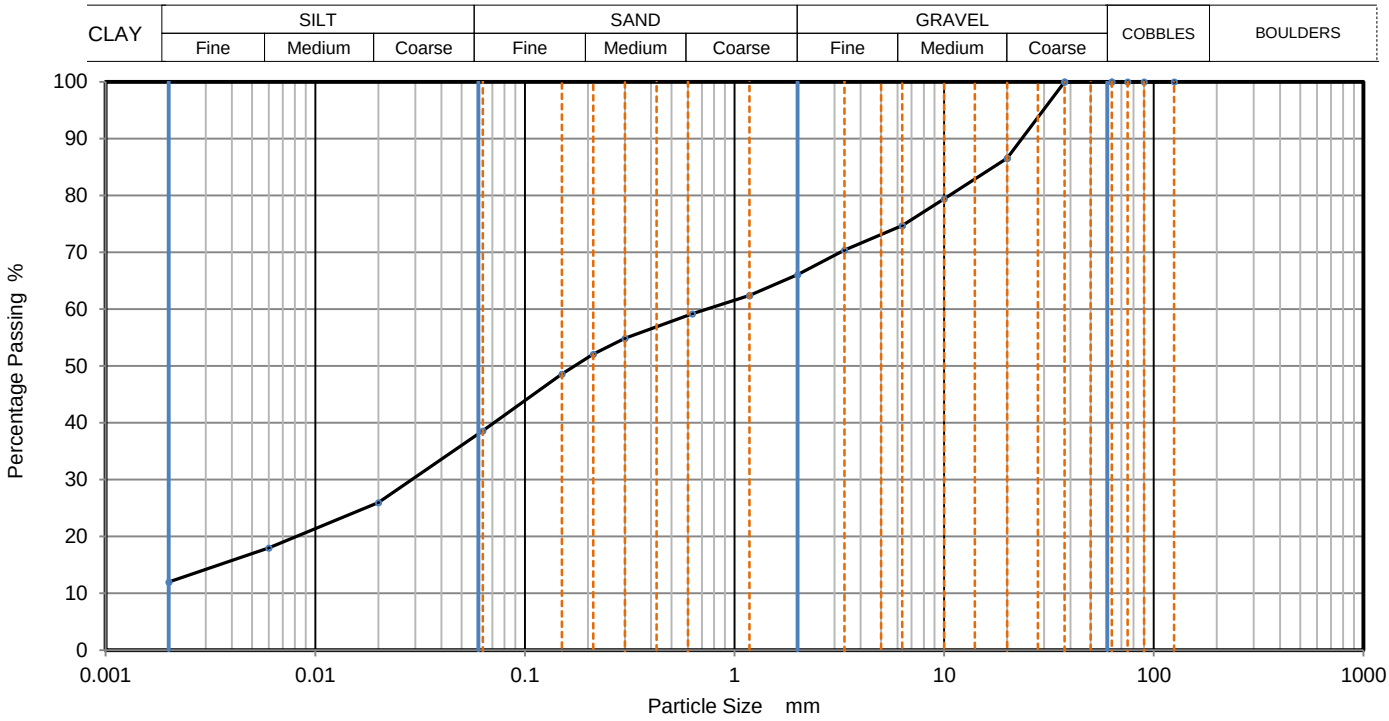
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	23

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH21
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	21
Description	Brown slightly sandy slightly gravelly CLAY			Depth, m	9.25
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clauses 5.2 and 5.4			KeyLAB ID	BH2120181114021



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	26
90	100	0.0060	18
75	100	0.0020	12
63	100		
37.5	100		
20	87		
10	79		
6.3	75		
3.35	70		
2	66		
1.18	62		
		Particle density	(assumed)
0.63	59	2.70	Mg/m3
0.3	55		
0.212	52		
0.15	49		
0.063	39		

Dry Mass of sample, g	2252

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	33.9
Sand	27.5
Silt	26.7
Clay	11.9

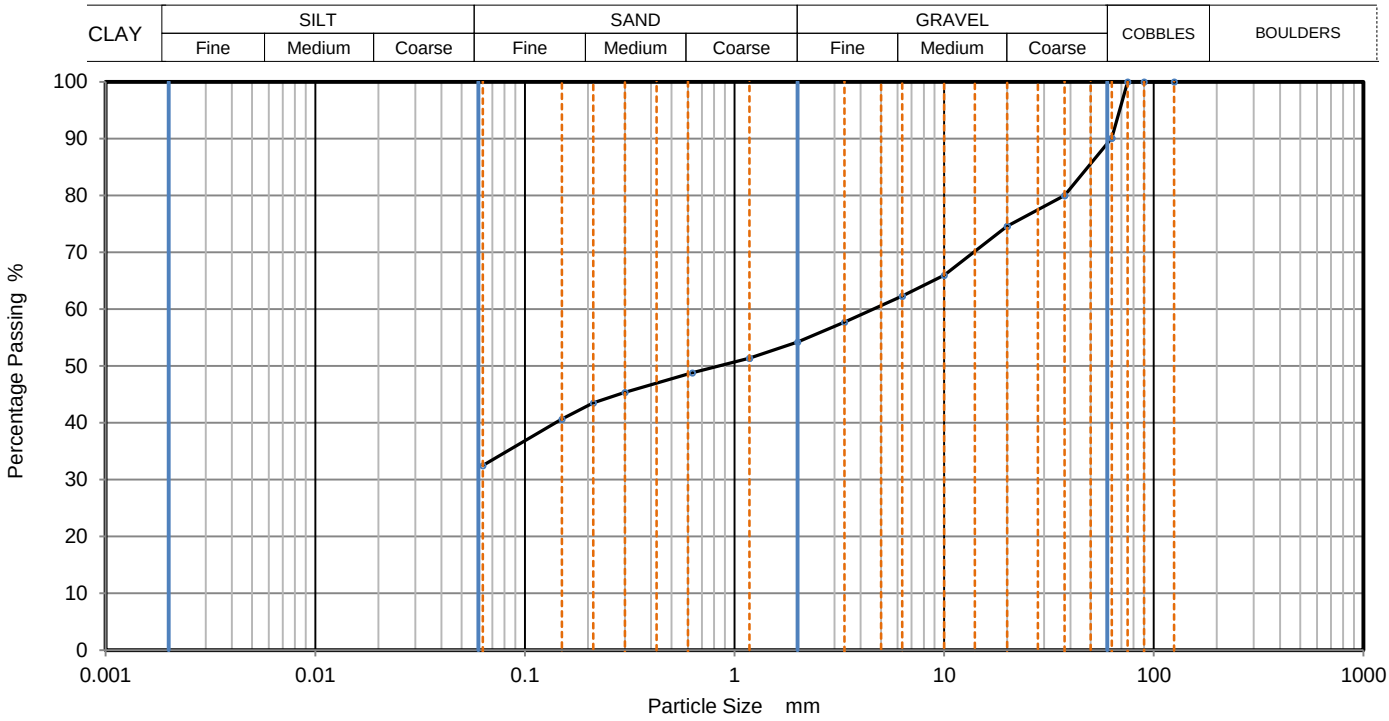
Grading Analysis		
D100	mm	37.5
D60	mm	0.736
D30	mm	0.0288
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	24

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH21
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	23
Description	Grey cobbley very sandy very silty GRAVEL			Depth, m	10.70
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH2120181114023



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	90		
37.5	80		
20	75		
10	66		
6.3	62		
3.35	58		
2	54		
1.18	51		
0.63	49		
0.3	45		
0.212	44		
0.15	41		
0.063	33		

Dry Mass of sample, g: 5588

Sample Proportions	% dry mass
Very coarse	9.9
Gravel	35.9
Sand	21.7
Fines <0.063mm	32.5

Grading Analysis		
D100	mm	75
D60	mm	4.61
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

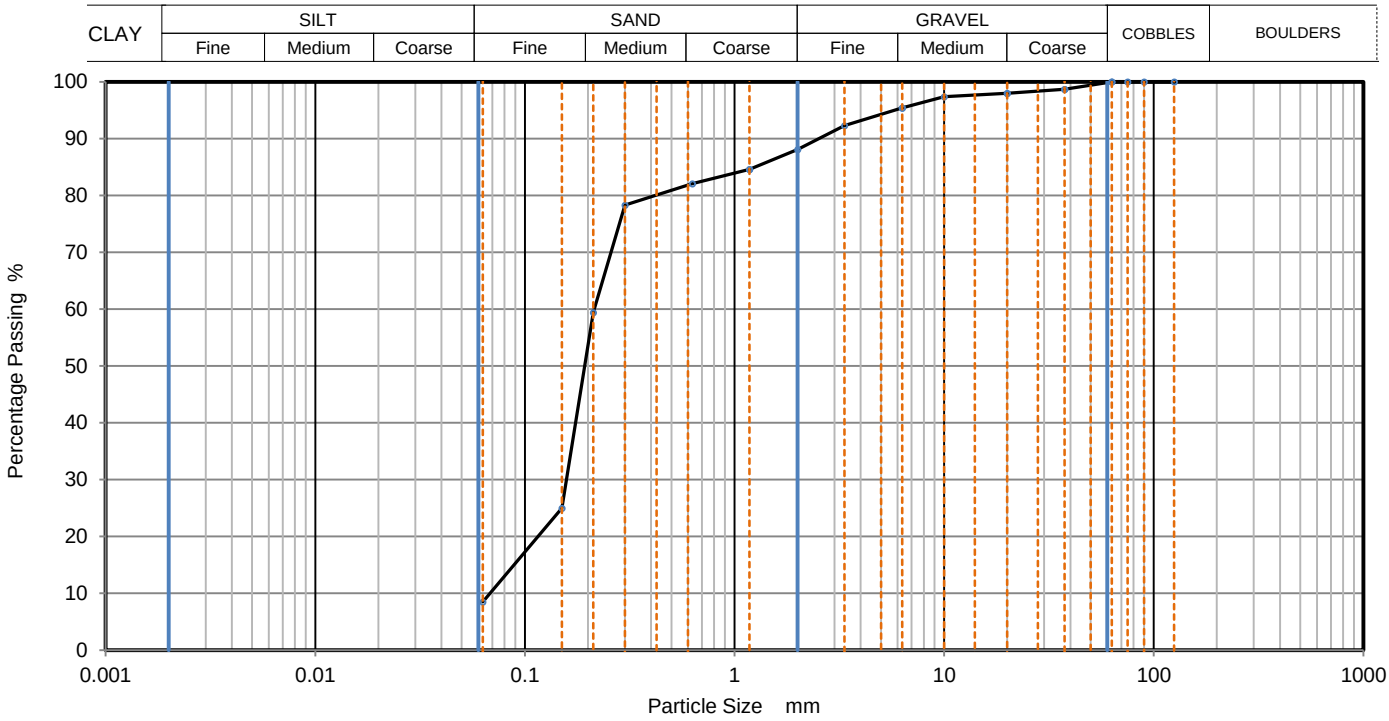
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	25

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH22
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	10
Description	Brown silty gravelly SAND			Depth, m	3.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH2220181113010



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	99		
20	98		
10	97		
6.3	95		
3.35	92		
2	88		
1.18	85		
0.63	82		
0.3	78		
0.212	59		
0.15	25		
0.063	9		

Dry Mass of sample, g	15915

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	11.9
Sand	79.6
Fines <0.063mm	8.5

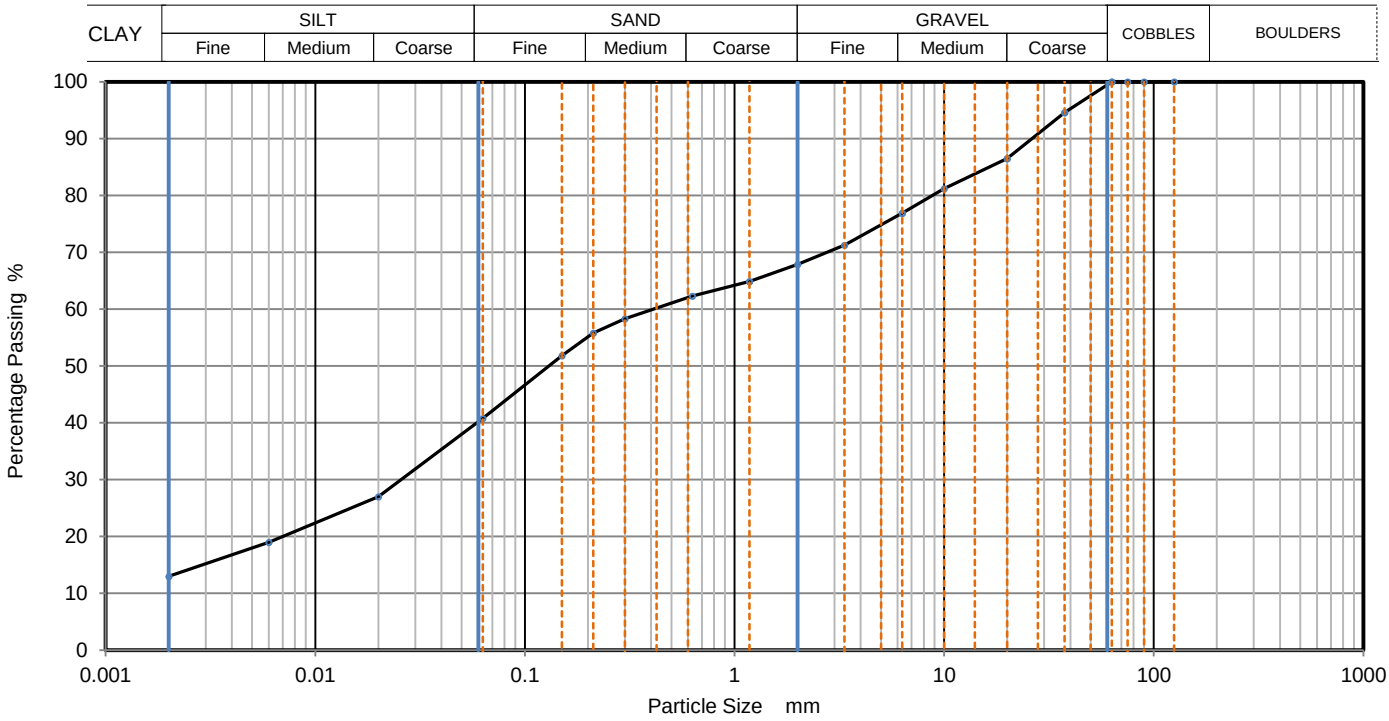
Grading Analysis		
D100	mm	63
D60	mm	0.214
D30	mm	0.158
D10	mm	0.068
Uniformity Coefficient		3.2
Curvature Coefficient		1.7

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	26

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH22
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	14
Description	Brown slightly sandy slightly gravelly CLAY			Depth, m	5.20
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clauses 5.2 and 5.4			KeyLAB ID	BH2220181113014



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	27
90	100	0.0060	19
75	100	0.0020	13
63	100		
37.5	95		
20	87		
10	81		
6.3	77		
3.35	71		
2	68		
1.18	65		
		Particle density	(assumed)
0.63	62	2.70	Mg/m3
0.3	58		
0.212	56		
0.15	52		
0.063	41		

Dry Mass of sample, g: 1559

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	32.1
Sand	27.0
Silt	28.2
Clay	12.7

Grading Analysis		
D100	mm	63
D60	mm	0.411
D30	mm	0.025
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

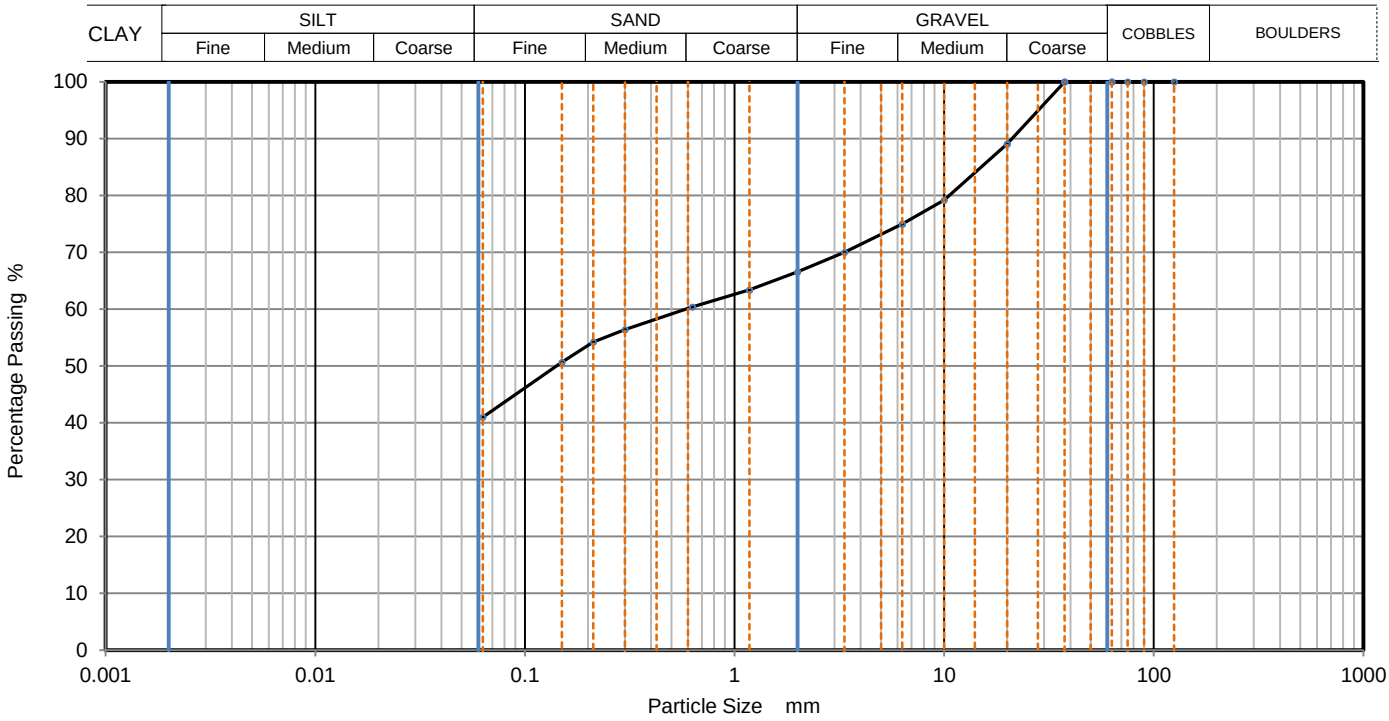
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	27

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH22
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	17
Description	Brown slightly sandy slightly gravelly CLAY			Depth, m	8.05
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH2220181113017



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	89		
10	79		
6.3	75		
3.35	70		
2	67		
1.18	63		
0.63	60		
0.3	56		
0.212	54		
0.15	51		
0.063	41		

Dry Mass of sample, g	2627

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	33.4
Sand	25.6
Fines <0.063mm	41.0

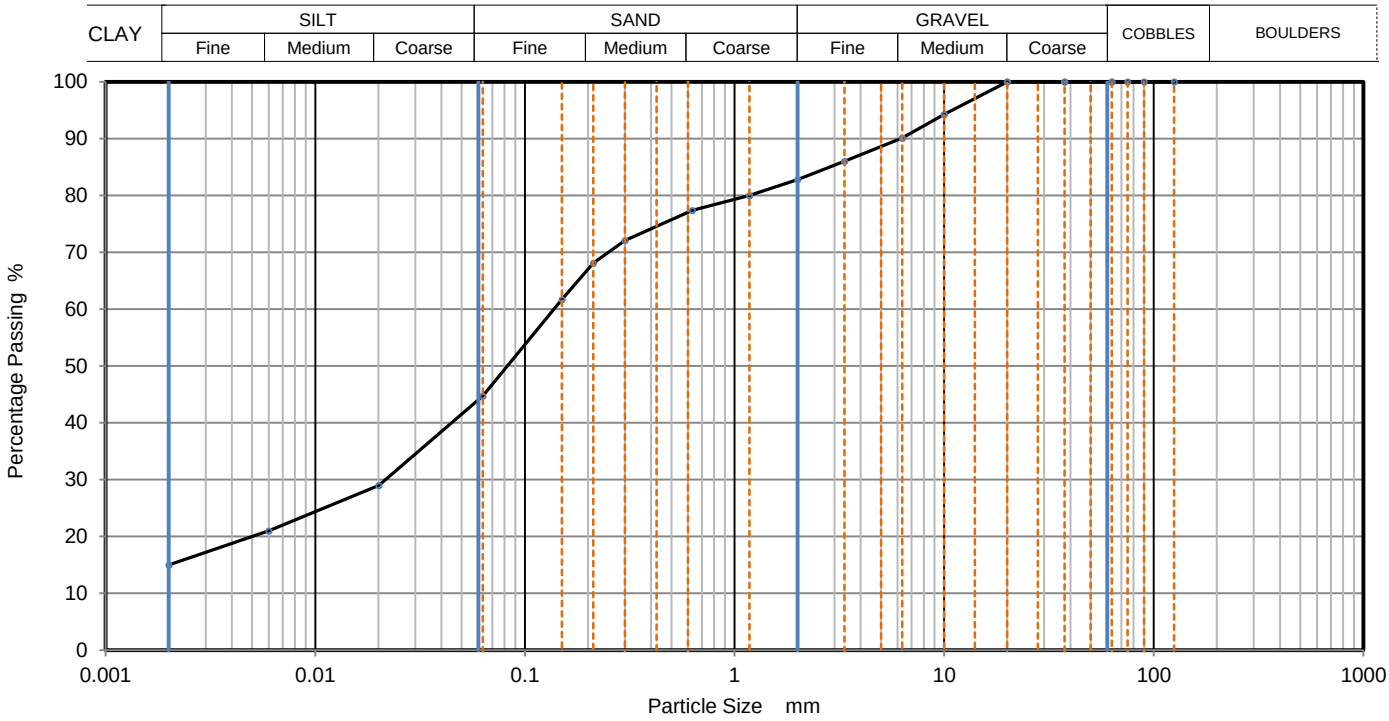
Grading Analysis		
D100	mm	37.5
D60	mm	0.587
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	28

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH22
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	21
Description	Grey slightly gravelly sandy CLAY			Depth, m	13.00
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clauses 5.2 and 5.4			KeyLAB ID	BH2220181113021



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	29
90	100	0.0060	21
75	100	0.0020	15
63	100		
37.5	100		
20	100		
10	94		
6.3	90		
3.35	86		
2	83		
1.18	80		
		Particle density	(assumed)
0.63	77	2.70	Mg/m3
0.3	72		
0.212	68		
0.15	62		
0.063	45		

Dry Mass of sample, g	956

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	17.2
Sand	38.1
Silt	29.5
Clay	15.2

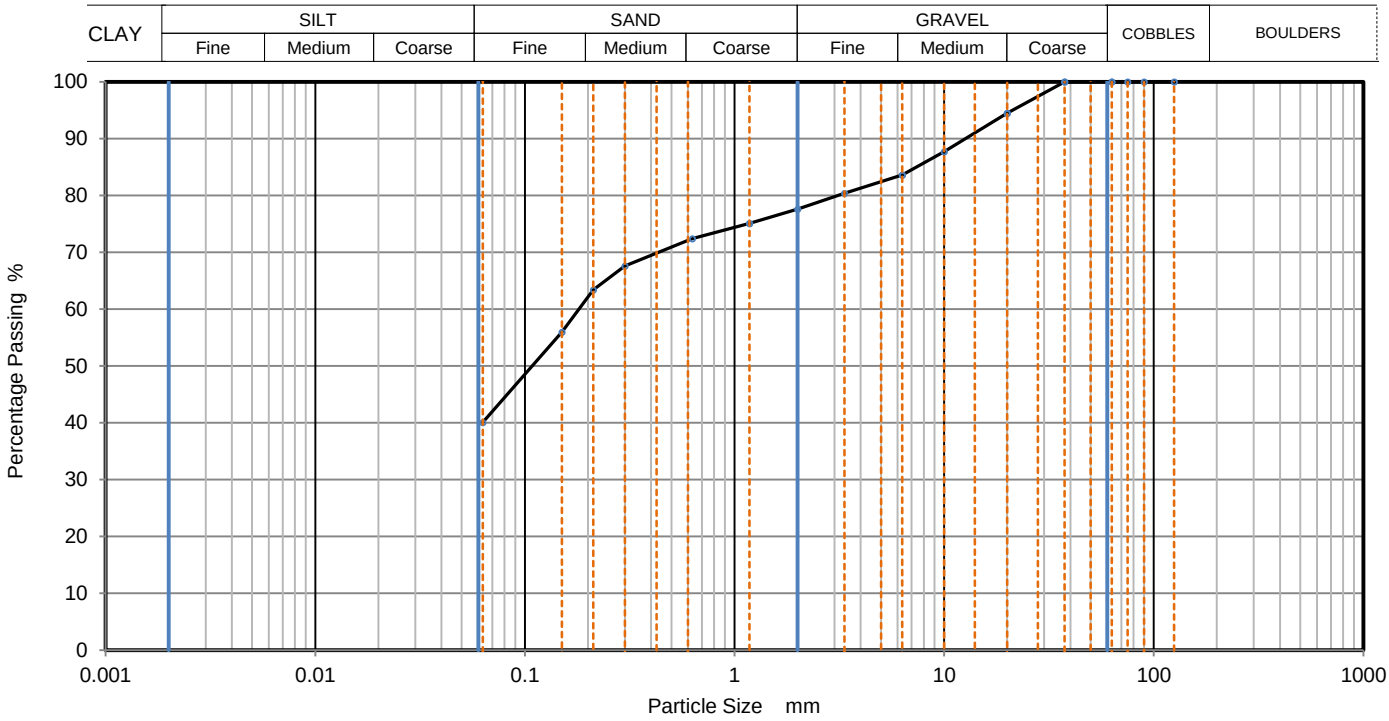
Grading Analysis		
D100	mm	20
D60	mm	0.137
D30	mm	0.0223
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	29

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH22
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	26
Description	Grey slightly gravelly sandy CLAY			Depth, m	18.53
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH2220181113026



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	95		
10	88		
6.3	84		
3.35	80		
2	78		
1.18	75		
0.63	72		
0.3	68		
0.212	63		
0.15	56		
0.063	40		

Dry Mass of sample, g	2525

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	22.4
Sand	37.5
Fines <0.063mm	40.1

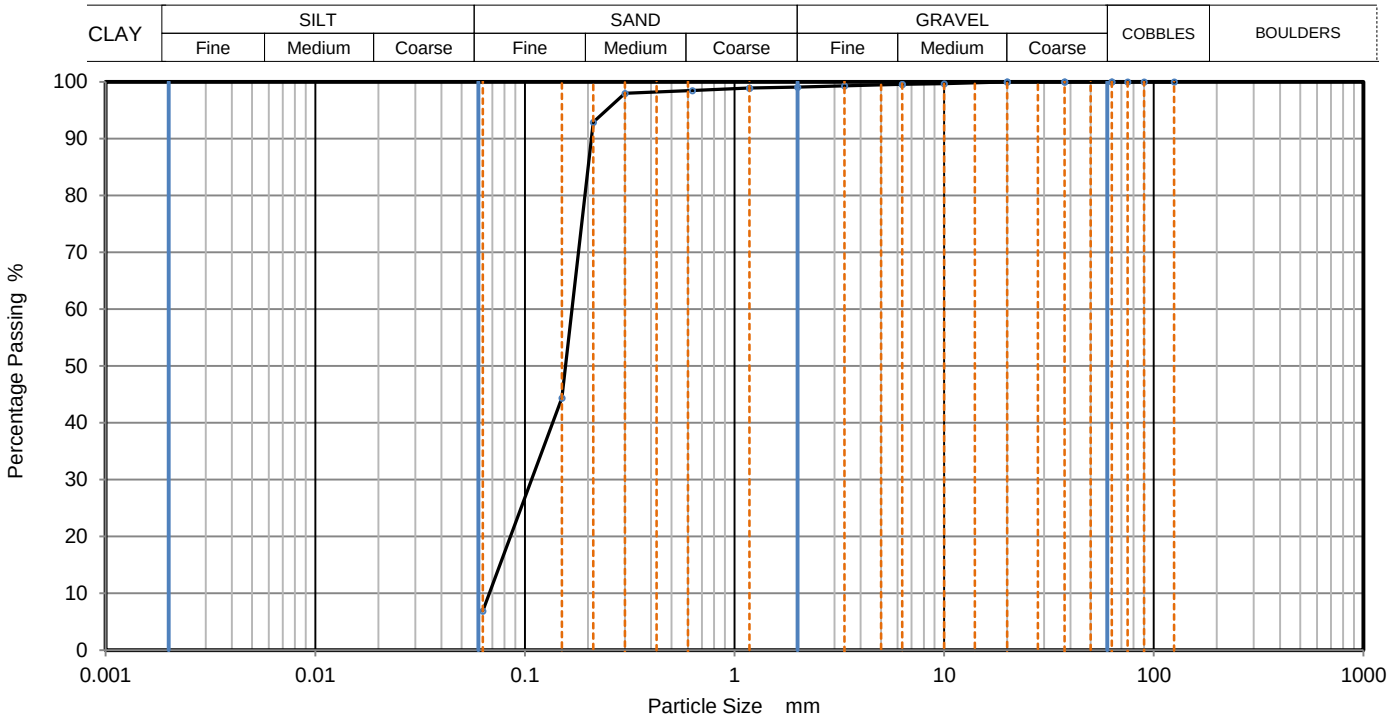
Grading Analysis		
D100	mm	37.5
D60	mm	0.181
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	30

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH23
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	5
Description	Brown slightly gravelly silty SAND			Depth, m	0.50
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH2314112018005



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	100		
10	100		
6.3	100		
3.35	99		
2	99		
1.18	99		
0.63	99		
0.3	98		
0.212	93		
0.15	44		
0.063	7		

Dry Mass of sample, g	869

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	0.9
Sand	92.2
Fines <0.063mm	6.9

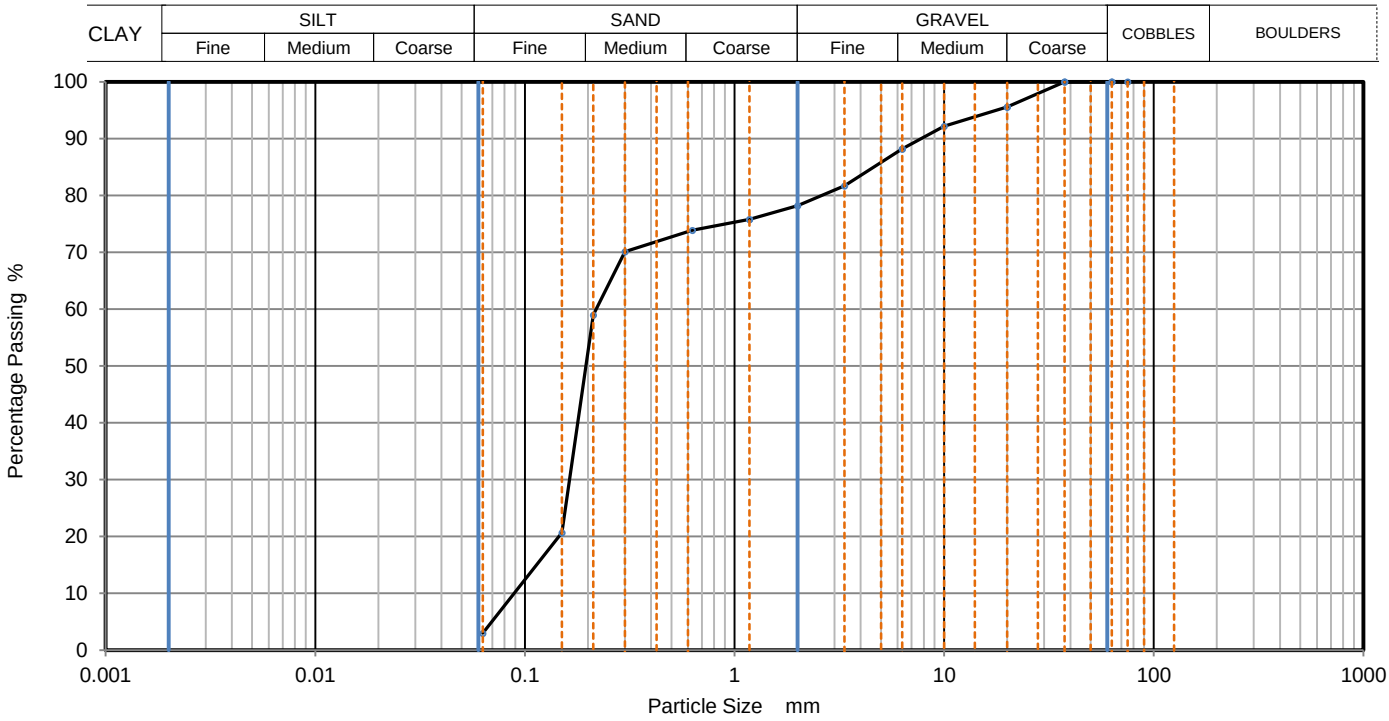
Grading Analysis		
D100	mm	20
D60	mm	0.168
D30	mm	0.107
D10	mm	0.0677
Uniformity Coefficient		2.5
Curvature Coefficient		1

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	31

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH23
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	9
Description	Brown slightly silty very gravelly SAND			Depth, m	2.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH2314112018009



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
37.5	100		
20	96		
10	92		
6.3	88		
3.35	82		
2	78		
1.18	76		
0.63	74		
0.3	70		
0.212	59		
0.15	21		
0.063	3		

Dry Mass of sample, g	2088

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	21.8
Sand	75.2
Fines <0.063mm	3.0

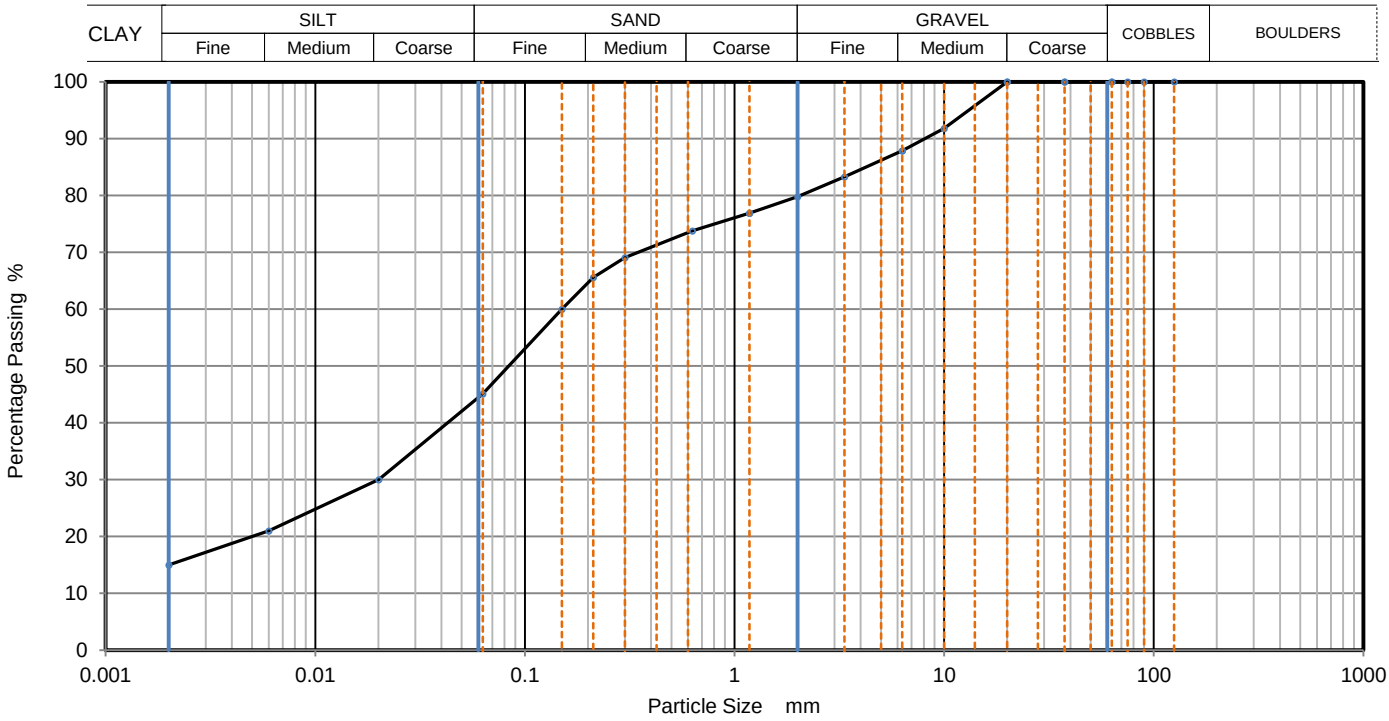
Grading Analysis		
D100	mm	37.5
D60	mm	0.219
D30	mm	0.163
D10	mm	0.0888
Uniformity Coefficient		2.5
Curvature Coefficient		1.4

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	32

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH23
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	30
Description	Brown slightly gravelly slightly sandy CLAY			Depth, m	17.70
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clauses 5.2 and 5.4			KeyLAB ID	BH2314112018030



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	30
90	100	0.0060	21
75	100	0.0020	15
63	100		
37.5	100		
20	100		
10	92		
6.3	88		
3.35	83		
2	80		
1.18	77		
		Particle density	(assumed)
0.63	74	2.70	Mg/m3
0.3	69		
0.212	66		
0.15	60		
0.063	45		

Dry Mass of sample, g	1072

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	20.2
Sand	34.7
Silt	29.9
Clay	15.2

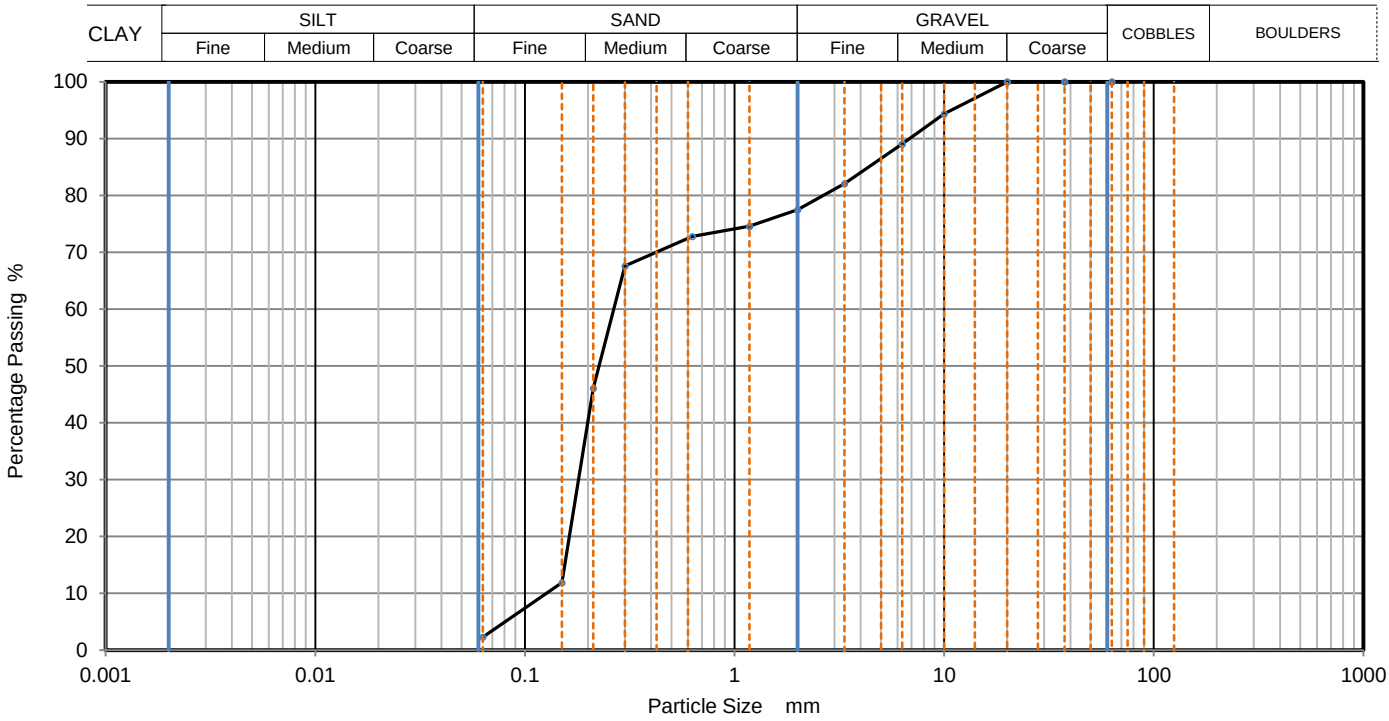
Grading Analysis		
D100	mm	20
D60	mm	0.15
D30	mm	0.0201
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	33

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH24a
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	6
Description	Brown slightly silty very gravelly SAND			Depth, m	1.00
Specimen Reference		Specimen Depth	m	Sample Type	B
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	6



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
63	100		
37.5	100		
20	100		
10	94		
6.3	89		
3.35	82		
2	78		
1.18	75		
0.63	73		
0.3	68		
0.212	46		
0.15	12		
0.063	2		

Dry Mass of sample, g	1110

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	22.5
Sand	75.2
Fines <0.063mm	2.3

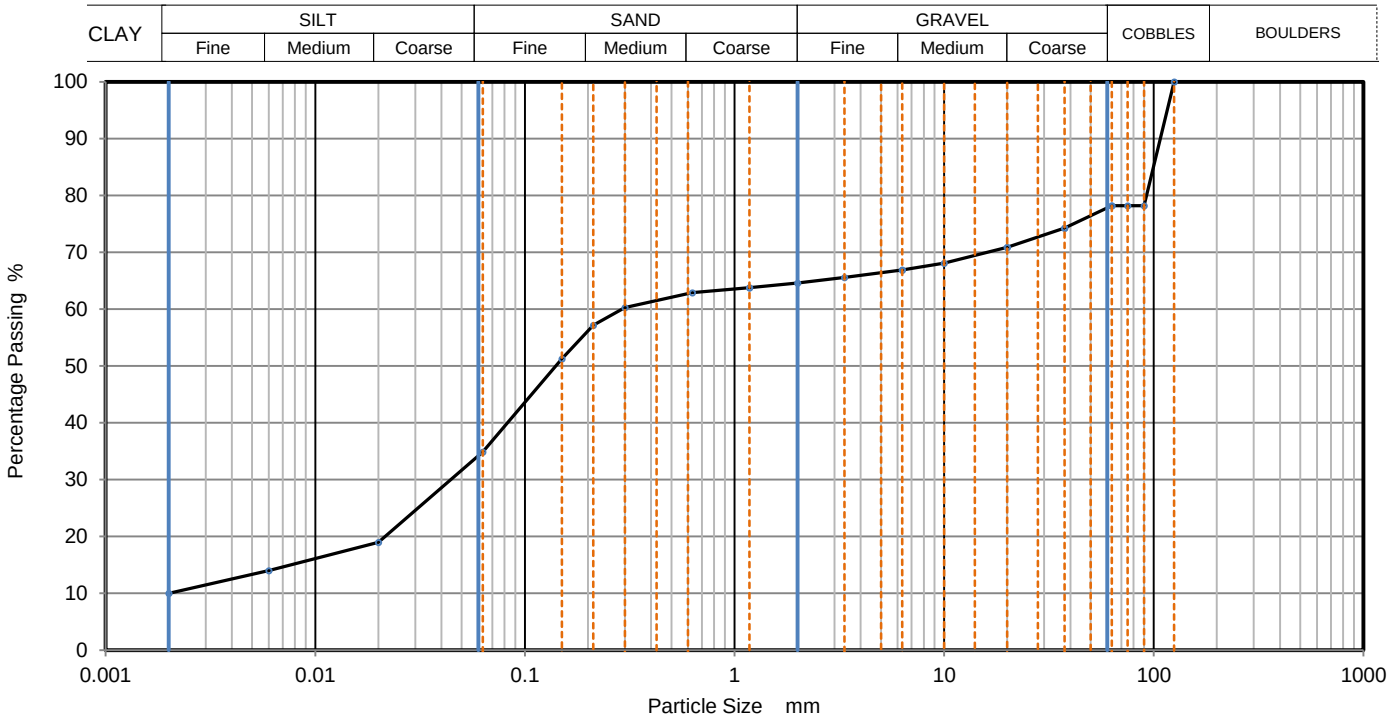
Grading Analysis		
D100	mm	20
D60	mm	0.265
D30	mm	0.18
D10	mm	0.127
Uniformity Coefficient		2.1
Curvature Coefficient		0.97

Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Date printed	Figure number	Sheet
14/03/2019	F.3.2	34

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH24a
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	13
Description	Brown slightly gravelly slightly cobbley slightly sandy CLAY			Depth, m	3.75
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clauses 5.2 and 5.4			KeyLAB ID	13



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	19
90	78	0.0060	14
75	78	0.0020	10
63	78		
37.5	74		
20	71		
10	68		
6.3	67		
3.35	66		
2	65		
1.18	64		
		Particle density	(assumed)
0.63	63	2.70	Mg/m3
0.3	60		
0.212	57		
0.15	51		
0.063	35		

Dry Mass of sample, g: 5681

Sample Proportions	% dry mass
Very coarse	21.8
Gravel	13.6
Sand	29.7
Silt	24.6
Clay	10.3

Grading Analysis		
D100	mm	125
D60	mm	0.289
D30	mm	0.0438
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

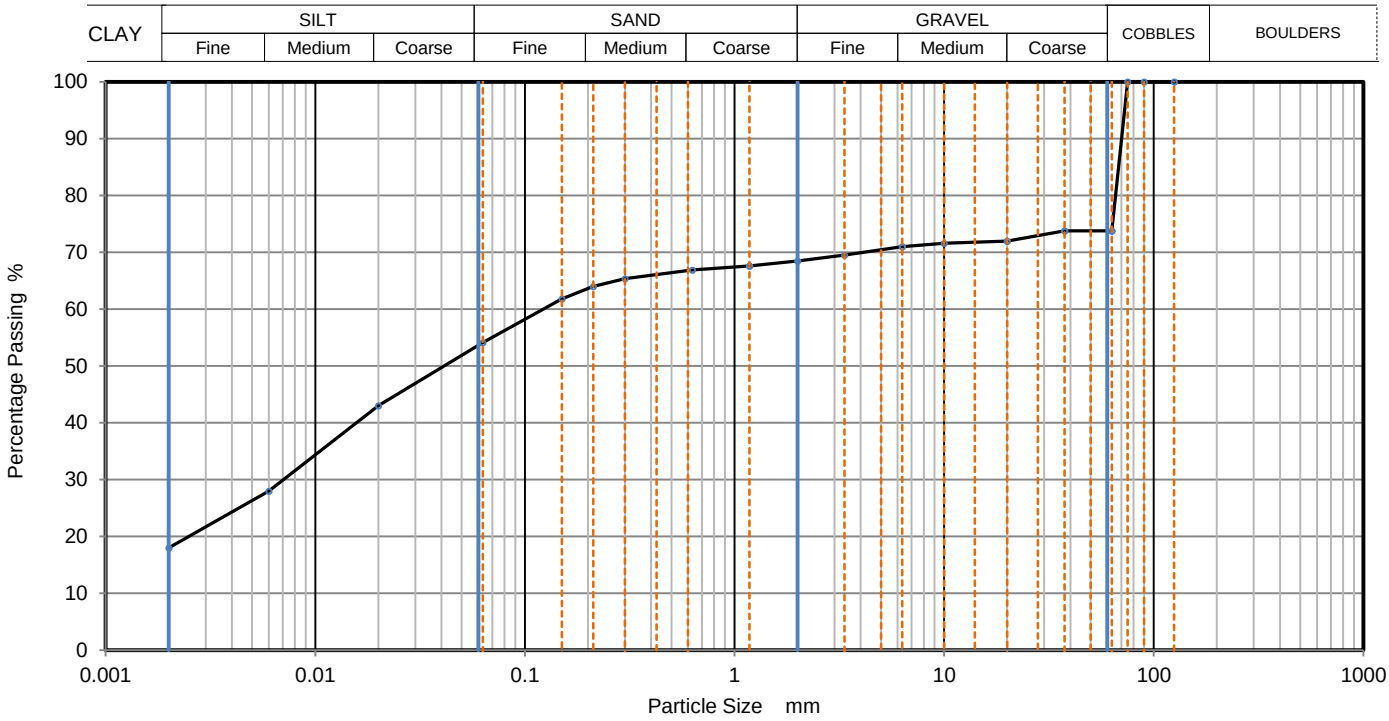
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	35

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH24a
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	17
Description	Brown slightly gravelly slightly sandy slightly cobbley CLAY			Depth, m	8.00
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clauses 5.2 and 5.4			KeyLAB ID	17



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	43
90	100	0.0060	28
75	100	0.0020	18
63	74		
37.5	74		
20	72		
10	72		
6.3	71		
3.35	70		
2	69		
1.18	68		
		Particle density	(assumed)
0.63	67	2.70	Mg/m3
0.3	65		
0.212	64		
0.15	62		
0.063	54		

Dry Mass of sample, g: 2019

Sample Proportions	% dry mass
Very coarse	26.2
Gravel	5.3
Sand	14.4
Silt	36.3
Clay	17.8

Grading Analysis		
D100	mm	75
D60	mm	0.123
D30	mm	0.00697
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

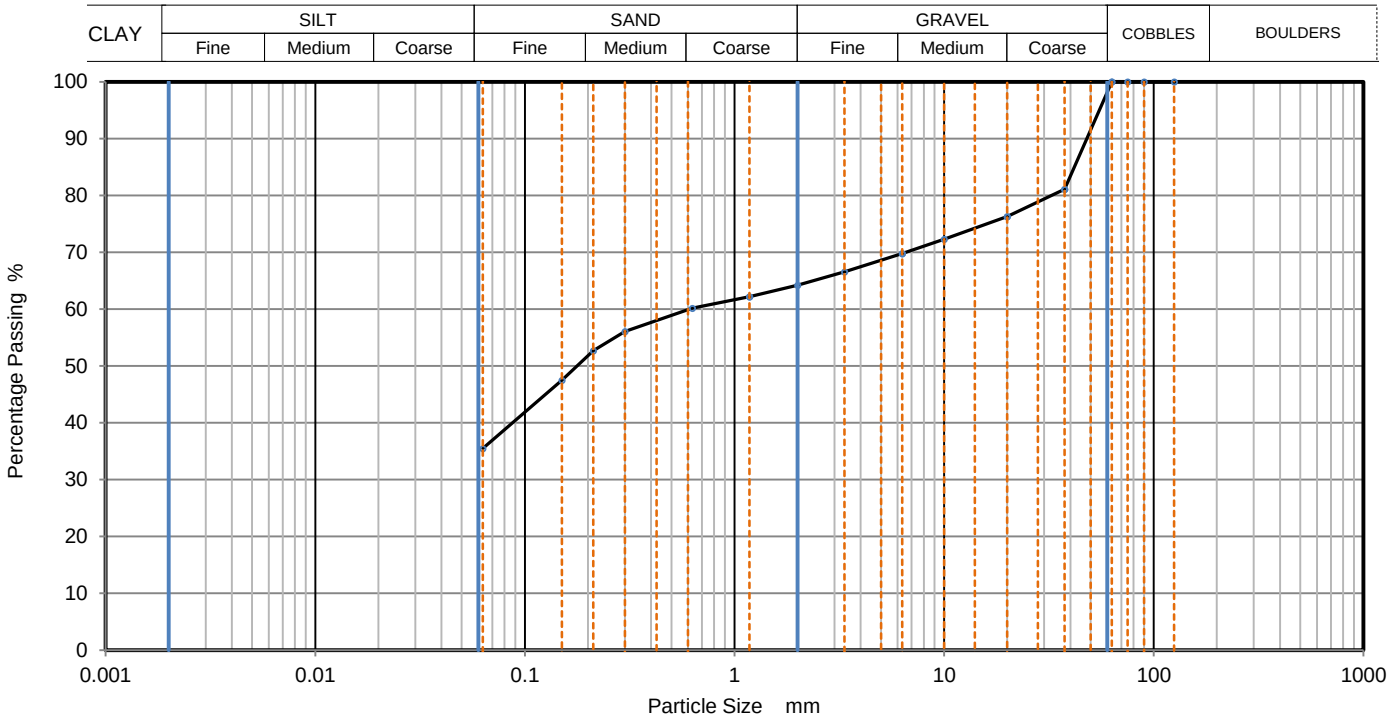
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	36

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH24a
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	19
Description	Brown slightly sandy gravelly CLAY			Depth, m	10.85
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	19



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	81		
20	76		
10	72		
6.3	70		
3.35	67		
2	64		
1.18	62		
0.63	60		
0.3	56		
0.212	53		
0.15	48		
0.063	36		

Dry Mass of sample, g: 1638

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	35.8
Sand	28.7
Fines <0.063mm	35.5

Grading Analysis		
D100	mm	63
D60	mm	0.606
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

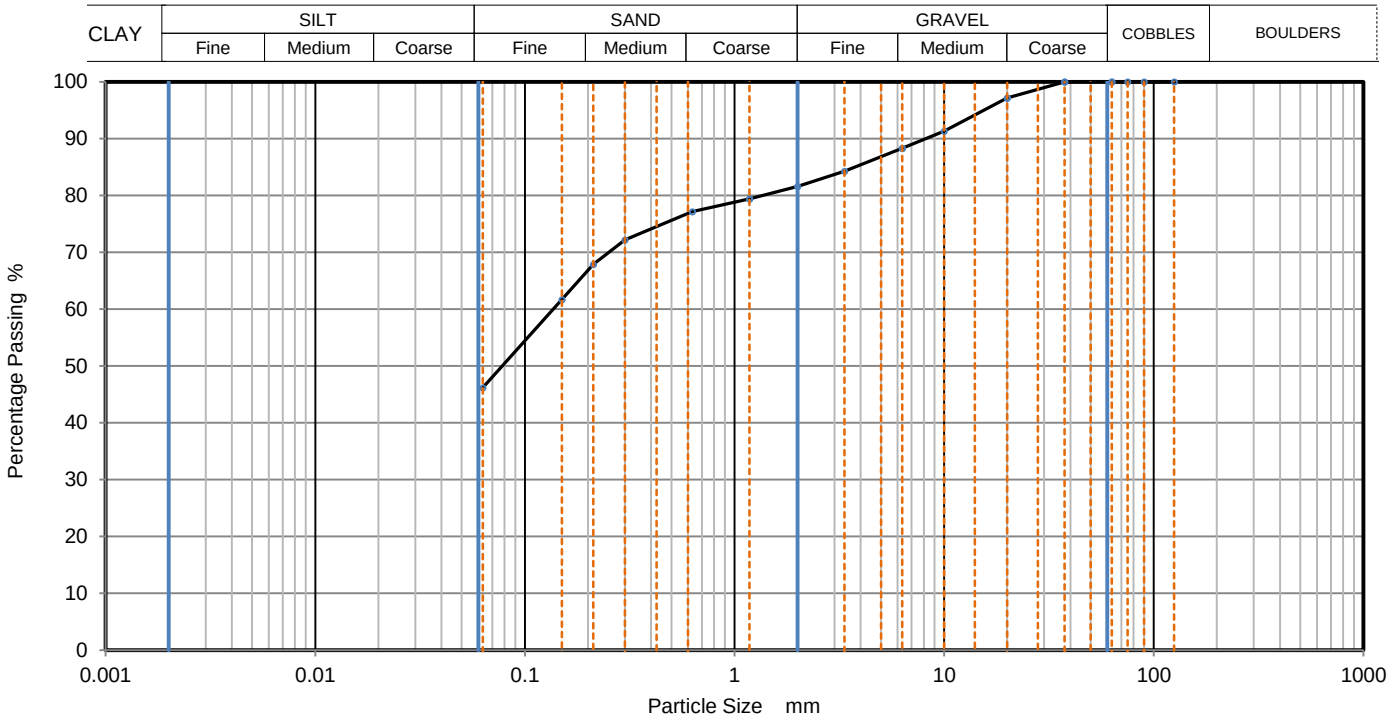
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	37

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH24a
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	21
Description	Brown slightly gravelly sandy CLAY			Depth, m	12.88
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	21



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	97		
10	91		
6.3	88		
3.35	84		
2	82		
1.18	79		
0.63	77		
0.3	72		
0.212	68		
0.15	62		
0.063	46		

Dry Mass of sample, g: 1905

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	18.4
Sand	35.5
Fines <0.063mm	46.2

Grading Analysis		
D100	mm	37.5
D60	mm	0.136
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

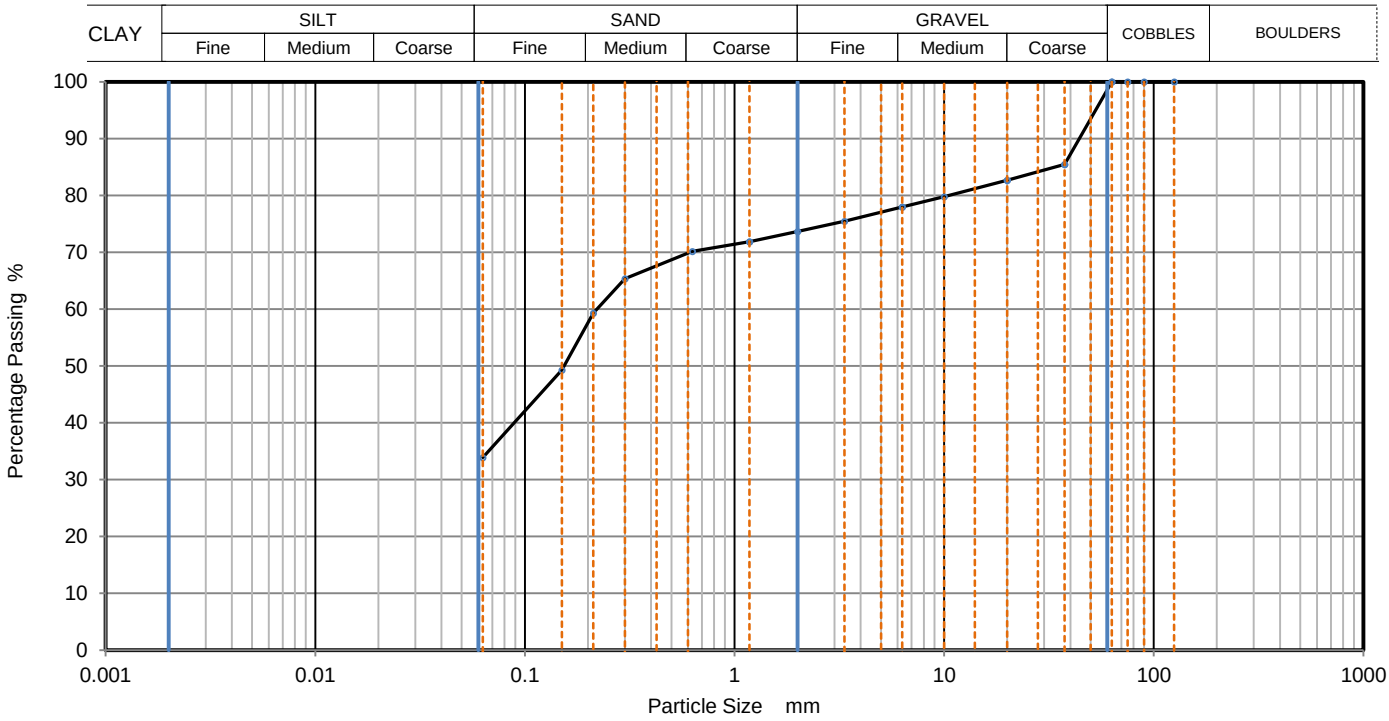
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	38

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH24a
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	24
Description	Brown very gravelly very clayey SAND			Depth, m	15.17
Specimen Reference		Specimen Depth	m	Sample Type	C
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	24



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	86		
20	83		
10	80		
6.3	78		
3.35	76		
2	74		
1.18	72		
0.63	70		
0.3	65		
0.212	59		
0.15	49		
0.063	34		

Dry Mass of sample, g: 4608

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	26.3
Sand	39.8
Fines <0.063mm	33.9

Grading Analysis		
D100	mm	63
D60	mm	0.221
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

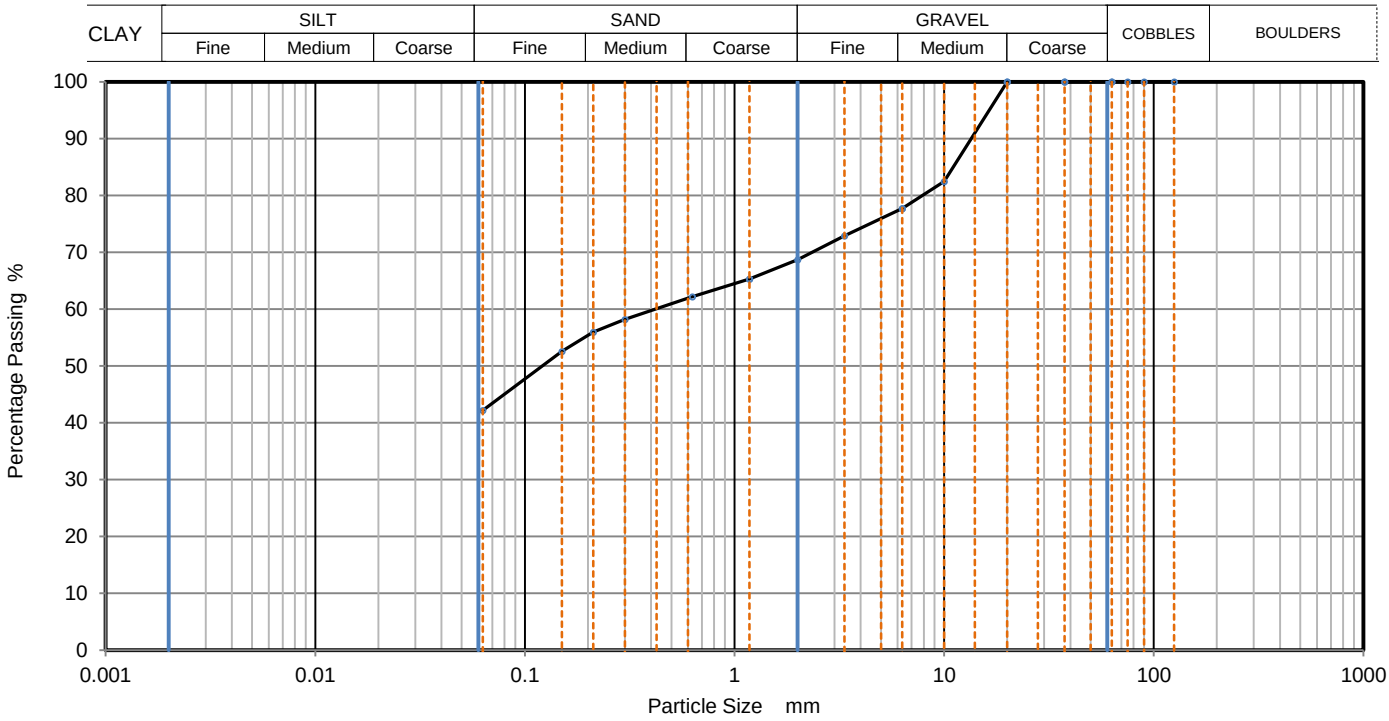
Remarks

Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	39

FUGRO	**Particle Size Distribution**			Project No.	G180030U
				Hole	BH30
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Sample No.	6
Description	Grey slightly sandy slightly gravelly CLAY			Depth, m	1.50
Specimen Reference		Specimen Depth	m	Sample Type	D
Test Method	BS EN ISO 17892-4:2016 Clause 5.2			KeyLAB ID	BH3020181116006



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
37.5	100		
20	100		
10	83		
6.3	78		
3.35	73		
2	69		
1.18	65		
0.63	62		
0.3	58		
0.212	56		
0.15	53		
0.063	42		

Dry Mass of sample, g: 292

Sample Proportions	% dry mass
Very coarse	0.0
Gravel	31.3
Sand	26.5
Fines <0.063mm	42.2

Grading Analysis		
D100	mm	20
D60	mm	0.422
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

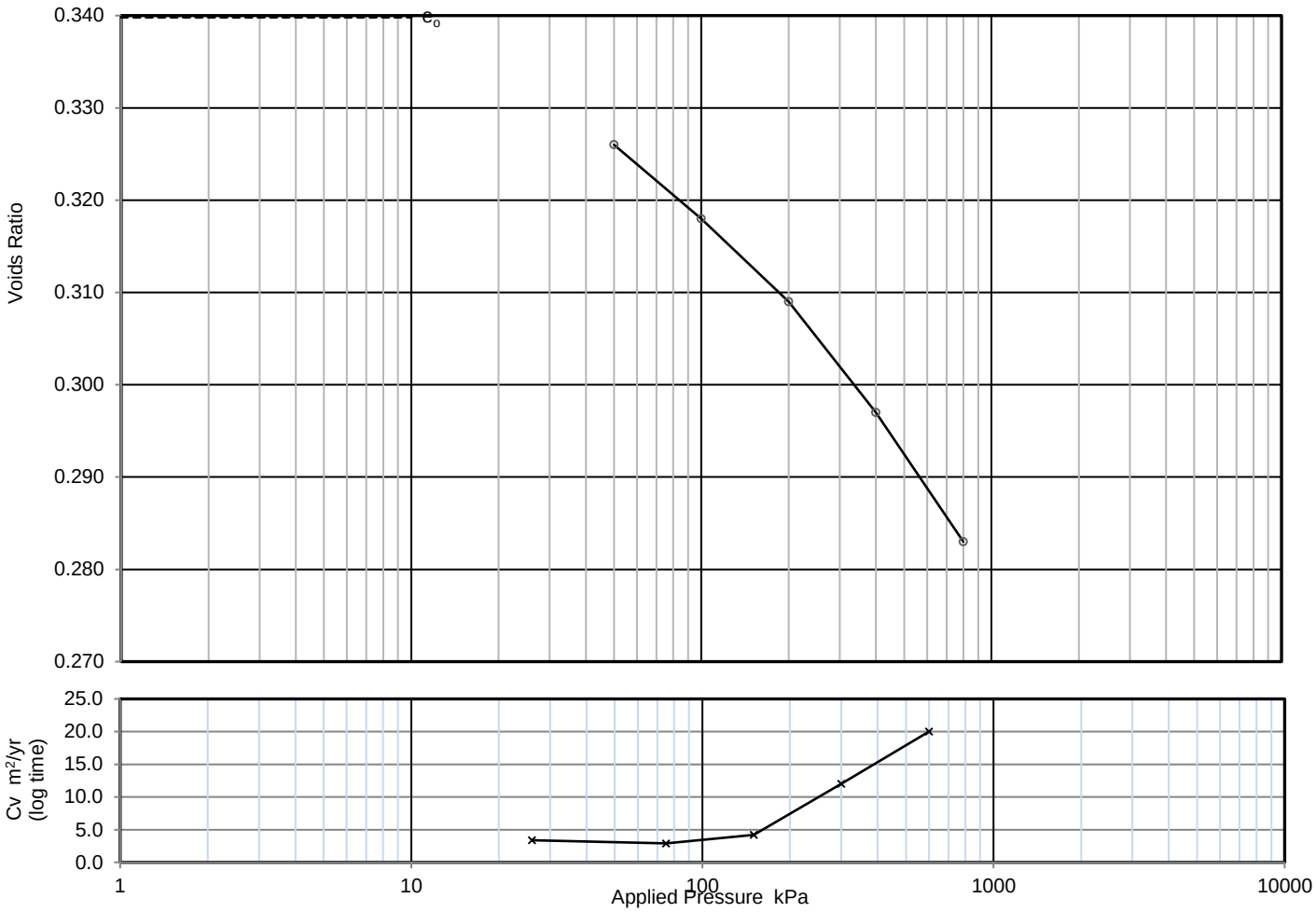
Preparation and testing in accordance with BS EN ISO 17892 unless noted below

Insufficient material to comply with the recommended minimum mass.

Date printed	Figure number	Sheet
14/03/2019	F.3.2	40

Incremental Loading Oedometer Test

				Project No.	G180030U
				Hole	BH02
				Sample No.	21
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Depth	15.50
Specimen Reference		Specimen Depth	15.74 m	Sample Type	C
Specimen Description	Brown slightly gravelly slightly sandy CLAY			KeyLAB ID	BH0220181106021
Test Method	BS EN ISO 17892-5:2017			Date started	29/01/2019



Applied Pressure kPa	Voids ratio	mv m²/MN	Cv (t50, log) m²/yr	Cv (t90, root) m²/yr	Csec
2.0	0.340	-	-	-	-
50	0.326	0.22	3.4	4.1	<0.00001
100	0.318	0.11	2.9	3.3	0.00055
200	0.309	0.073	4.2	22	*
400	0.297	0.044	12	9.6	0.00055
800	0.283	0.027	20	26	0.0011

Preparation: Hand Trimming

Particle density: assumed 2.70 Mg/m³

Specimen details	Initial	Final	
Diameter	74.99	-	mm
Height	18.90	18.09	mm
Water Content	11.3	10.5	%
Bulk density	2.24	2.33	Mg/m³
Dry density	2.02	2.10	Mg/m³
Voids Ratio	0.340	0.283	
Saturation	90	101	%
Average temperature for test	18.0		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Frame correction applied to height changes

Cv plotted at mid point of load increments

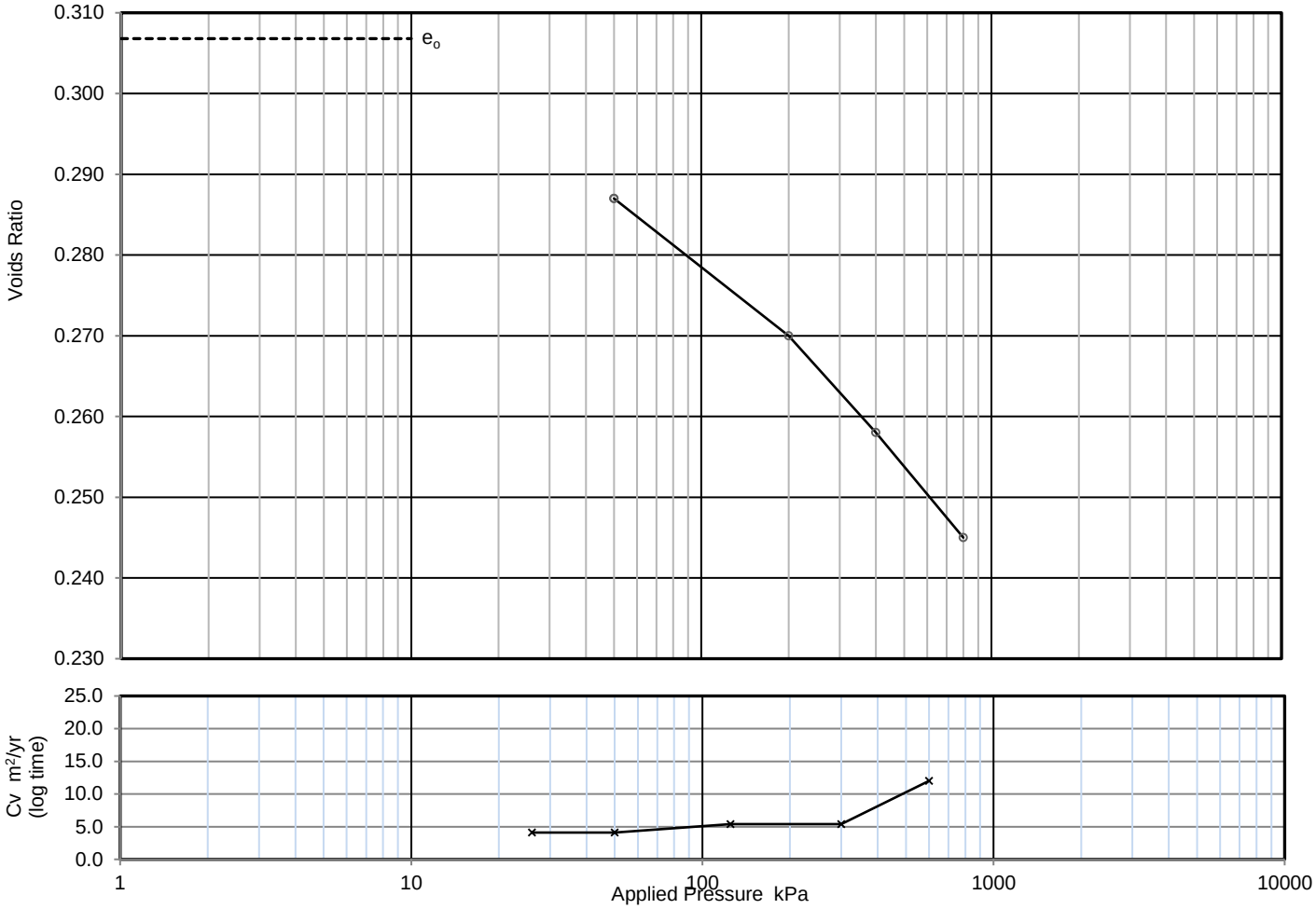
Cv corrected to 20°C

* Negative Csec determination

Date Printed	Figure Number	Sheet
14/03/2019	F.3.3	1

Incremental Loading Oedometer Test

				Project No.	G180030U
				Hole	BH03
				Sample No.	32
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Depth	18.15
Specimen Reference		Specimen Depth	18.15 m	Sample Type	C
Specimen Description	Brown slightly gravelly slightly sandy clay			KeyLAB ID	BH0320181110032
Test Method	BS EN ISO 17892-5:2017			Date started	29/01/2019



Applied Pressure kPa	Voids ratio	mv m²/MN	Cv (t50, log) m²/yr	Cv (t90, root) m²/yr	Csec
2.0	0.307	-	-	-	-
50	0.287	0.32	4.1	1.5	0.00002
50	0.287	0.32	4.1	1.5	0.00002
200	0.270	0.074	5.4	13	0.00057
400	0.258	0.045	5.4	4.7	<0.00001
800	0.245	0.026	12	18	0.0011

Preparation: Hand Trimming

Particle density: assumed 2.70 Mg/m³

Specimen details	Initial	Final	
Diameter	74.96	-	mm
Height	18.91	18.02	mm
Water Content	11.4	10.2	%
Bulk density	2.30	2.39	Mg/m³
Dry density	2.07	2.17	Mg/m³
Voids Ratio	0.307	0.245	
Saturation	100	112	%
Average temperature for test	18.0		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Frame correction applied to height changes

Cv plotted at mid point of load increments

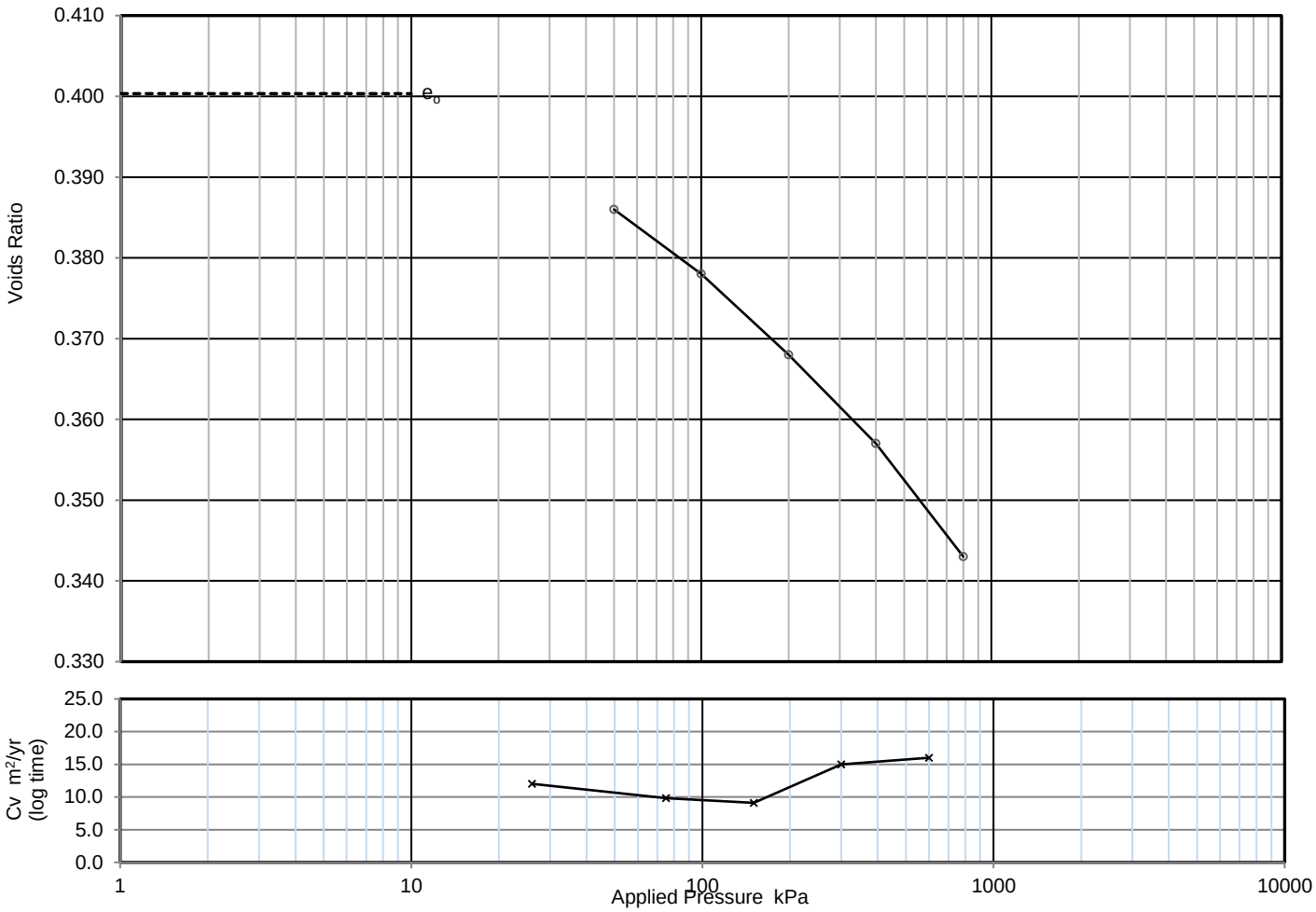
Cv corrected to 20°C

* Negative Csec determination

Date Printed	Figure Number	Sheet
14/03/2019	F.3.3	2

Incremental Loading Oedometer Test

				Project No.	G180030U
				Hole	BH04
				Sample No.	28
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Depth	9.85
Specimen Reference		Specimen Depth	9.88 m	Sample Type	C
Specimen Description	Brown slightly gravelly slightly sandy CLAY			KeyLAB ID	BH0420181104028
Test Method	BS EN ISO 17892-5:2017			Date started	30/01/2019



Applied Pressure kPa	Voids ratio	mv m²/MN	Cv (t50, log) m²/yr	Cv (t90, root) m²/yr	Csec
2.0	0.400	-	-	-	-
50	0.386	0.22	12	10	0.00057
100	0.378	0.11	9.8	8.8	0.00055
200	0.368	0.073	9.1	7.5	0.00055
400	0.357	0.04	15	20	0.00057
800	0.343	0.025	16	28	0.00057

Preparation: Hand Trimming

Particle density: assumed 2.70 Mg/m³

Specimen details	Initial	Final	
Diameter	75.05	-	mm
Height	18.83	18.07	mm
Water Content	14.7	12.6	%
Bulk density	2.21	2.26	Mg/m³
Dry density	1.93	2.01	Mg/m³
Voids Ratio	0.400	0.343	
Saturation	99	99	%
Average temperature for test	18.0		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Frame correction applied to height changes

Cv corrected to 20°C

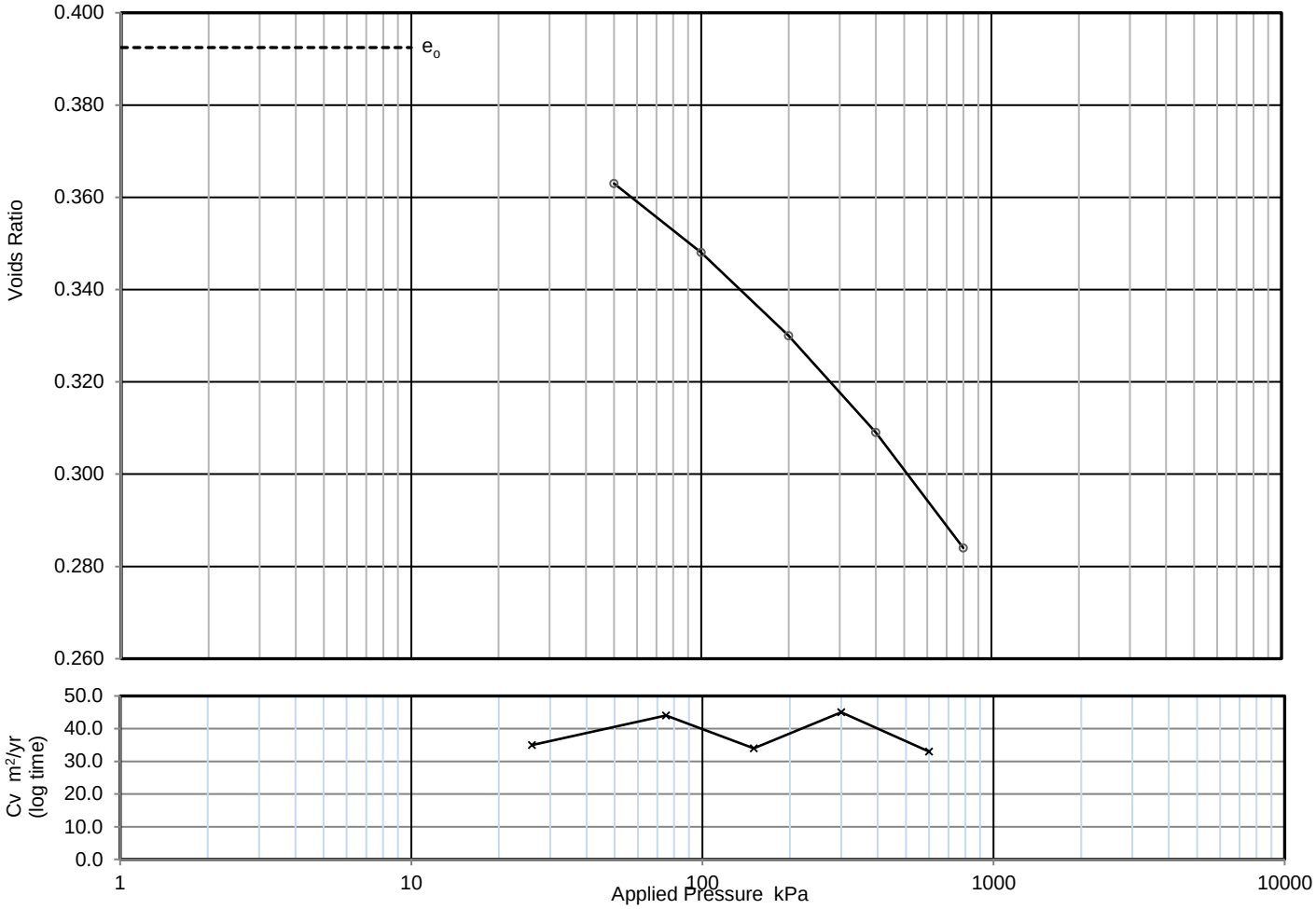
Cv plotted at mid point of load increments

* Negative Csec determination

Date Printed	Figure Number	Sheet
14/03/2019	F.3.3	3

Incremental Loading Oedometer Test

				Project No.	G180030U
				Hole	BH20
				Sample No.	15
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Depth	6.65
Specimen Reference		Specimen Depth	6.90 m	Sample Type	C
Specimen Description	Brown slightly gravelly slightly sandy CLAY			KeyLAB ID	BH2020181112015
Test Method	BS EN ISO 17892-5:2017			Date started	30/01/2019



Applied Pressure kPa	Voids ratio	mv m²/MN	Cv (t50, log) m²/yr	Cv (t90, root) m²/yr	Csec
2.0	0.392	-	-	-	-
50	0.363	0.43	35	8.2	0.0011
100	0.348	0.22	44	34	0.0011
200	0.330	0.13	34	21	0.00057
400	0.309	0.082	45	49	0.0011
800	0.284	0.047	33	44	0.00055

Preparation: Hand Trimming

Particle density: assumed 2.70 Mg/m³

Specimen details	Initial	Final	
Diameter	74.97	-	mm
Height	18.87	17.40	mm
Water Content	10.2	10.6	%
Bulk density	2.14	2.33	Mg/m³
Dry density	1.94	2.10	Mg/m³
Voids Ratio	0.392	0.284	
Saturation	70	101	%
Average temperature for test	18.0		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Frame correction applied to height changes

Cv plotted at mid point of load increments

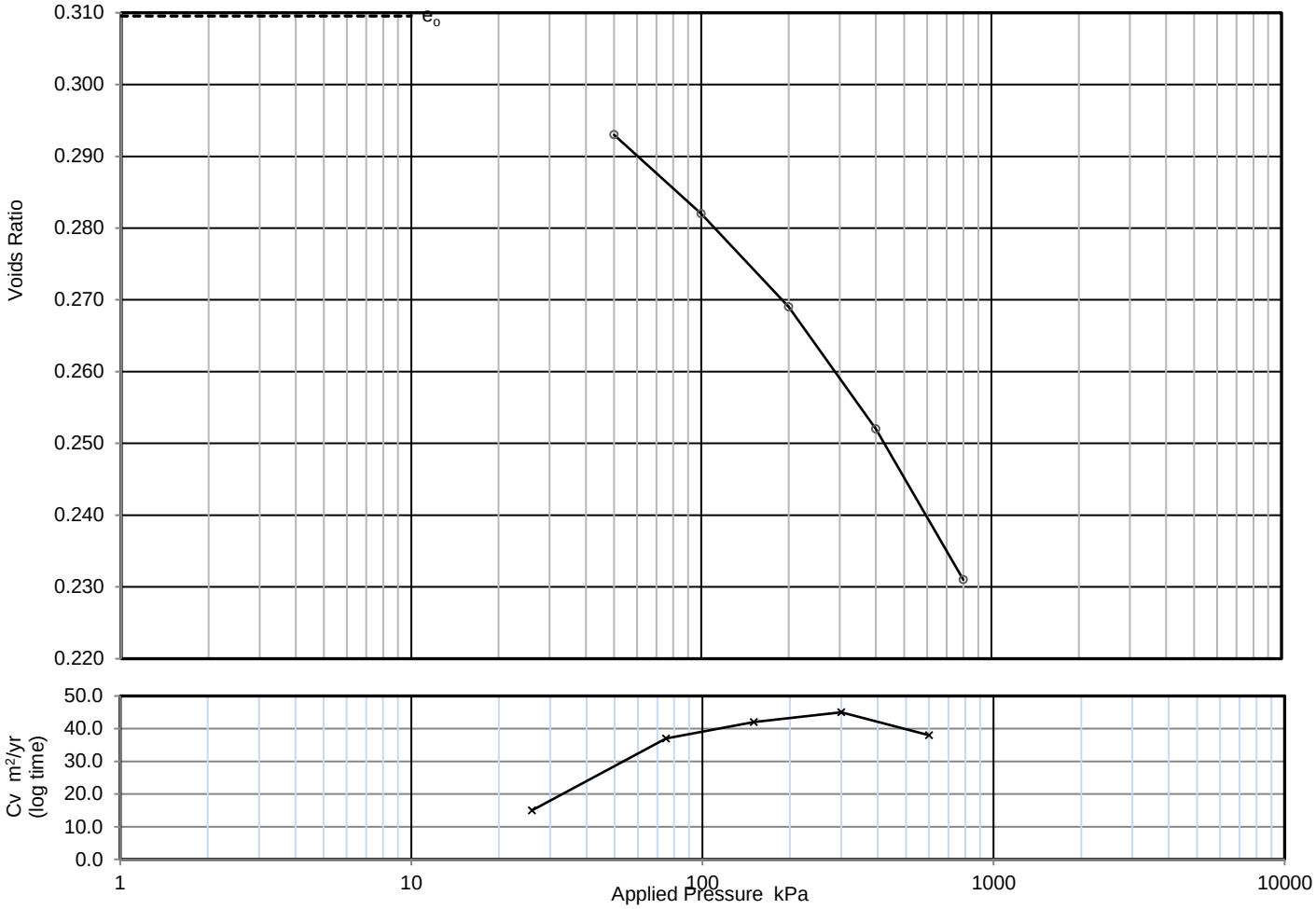
Cv corrected to 20°C

* Negative Csec determination

Date Printed	Figure Number	Sheet
14/03/2019	F.3.3	4

Incremental Loading Oedometer Test

				Project No.	G180030U
				Hole	BH21
				Sample No.	20
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Depth	7.45
Specimen Reference		Specimen Depth	7.45 m	Sample Type	C
Specimen Description	Brown slightly sandy gravelly CLAY			KeyLAB ID	BH2120181113020
Test Method	BS EN ISO 17892-5:2017			Date started	30/01/2019



Applied Pressure kPa	Voids ratio	mv m²/MN	Cv (t50, log) m²/yr	Cv (t90, root) m²/yr	Csec
2.0	0.310	-	-	-	-
50	0.293	0.26	15	1.7	*
100	0.282	0.17	37	36	0.00057
200	0.269	0.1	42	24	0.0011
400	0.252	0.066	45	35	0.0011
800	0.231	0.042	38	25	0.0011

Preparation: Hand Trimming

Particle density: assumed 2.70 Mg/m³

Specimen details	Initial	Final	
Diameter	74.88	-	mm
Height	18.88	17.74	mm
Water Content	8.8	10.3	%
Bulk density	2.24	2.42	Mg/m³
Dry density	2.06	2.19	Mg/m³
Voids Ratio	0.310	0.231	
Saturation	77	120	%
Average temperature for test	18.0		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Frame correction applied to height changes

Cv corrected to 20°C

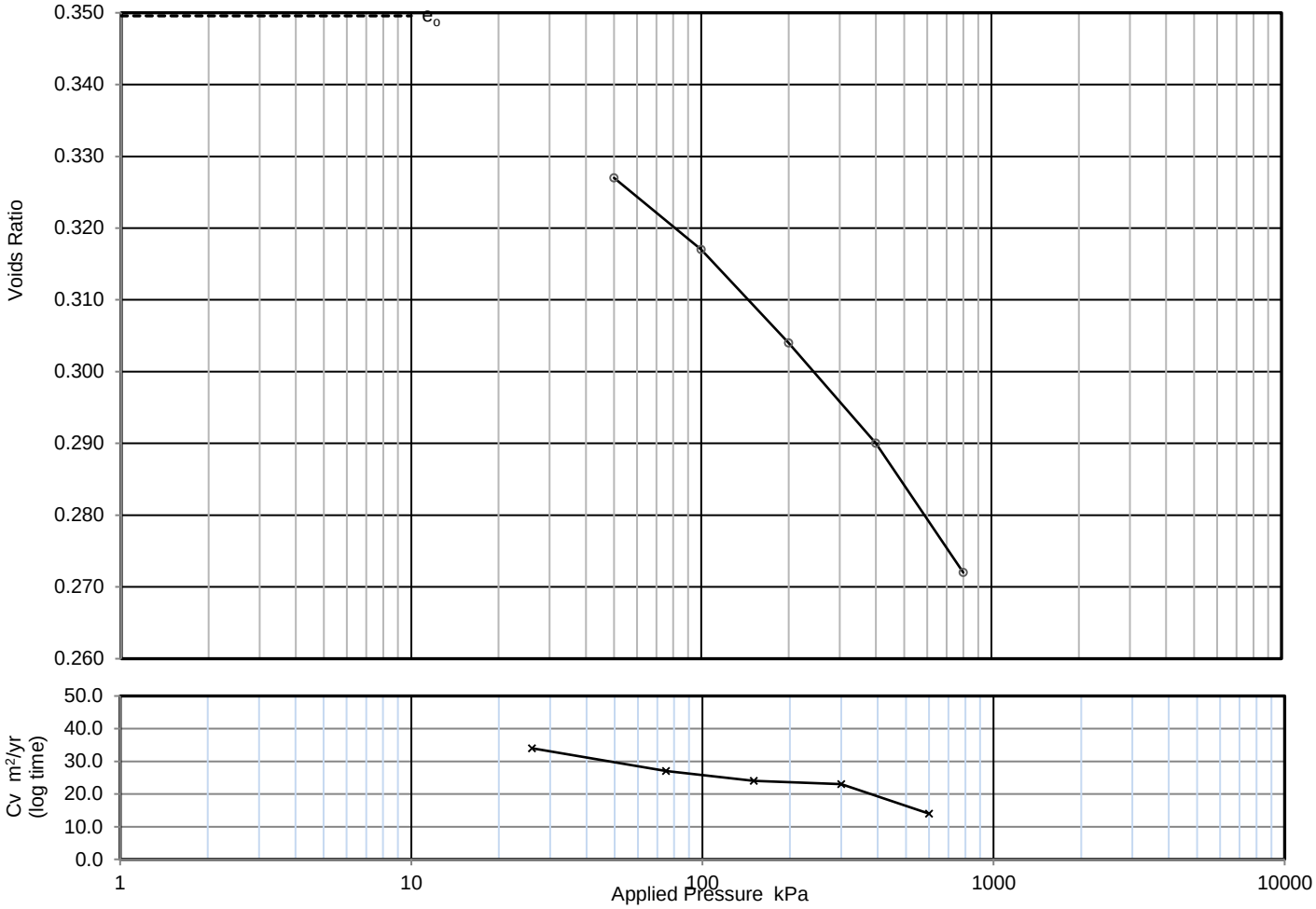
Cv plotted at mid point of load increments

* Negative Csec determination

Date Printed	Figure Number	Sheet
14/03/2019	F.3.3	5

Incremental Loading Oedometer Test

				Project No.	G180030U
				Hole	BH22
				Sample No.	18
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Depth	9.65
Specimen Reference		Specimen Depth	9.92 m	Sample Type	C
Specimen Description	Brown slightly sandy slightly gravelly CLAY			KeyLAB ID	BH2220181113018
Test Method	BS EN ISO 17892-5:2017			Date started	30/01/2019



Applied Pressure kPa	Voids ratio	mv m²/MN	Cv (t50, log) m²/yr	Cv (t90, root) m²/yr	Csec
2.0	0.350	-	-	-	-
50	0.327	0.35	34	11	*
100	0.317	0.15	27	7	0.00057
200	0.304	0.097	24	6.6	0.00057
400	0.290	0.055	23	23	0.00055
800	0.272	0.034	14	32	0.00057

Preparation: Hand Trimming

Particle density: assumed 2.70 Mg/m³

Specimen details	Initial	Final	
Diameter	74.94	-	mm
Height	18.93	17.85	mm
Water Content	11.0	11.2	%
Bulk density	2.22	2.36	Mg/m³
Dry density	2.00	2.12	Mg/m³
Voids Ratio	0.350	0.272	
Saturation	85	111	%
Average temperature for test	18.0		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Frame correction applied to height changes

Cv plotted at mid point of load increments

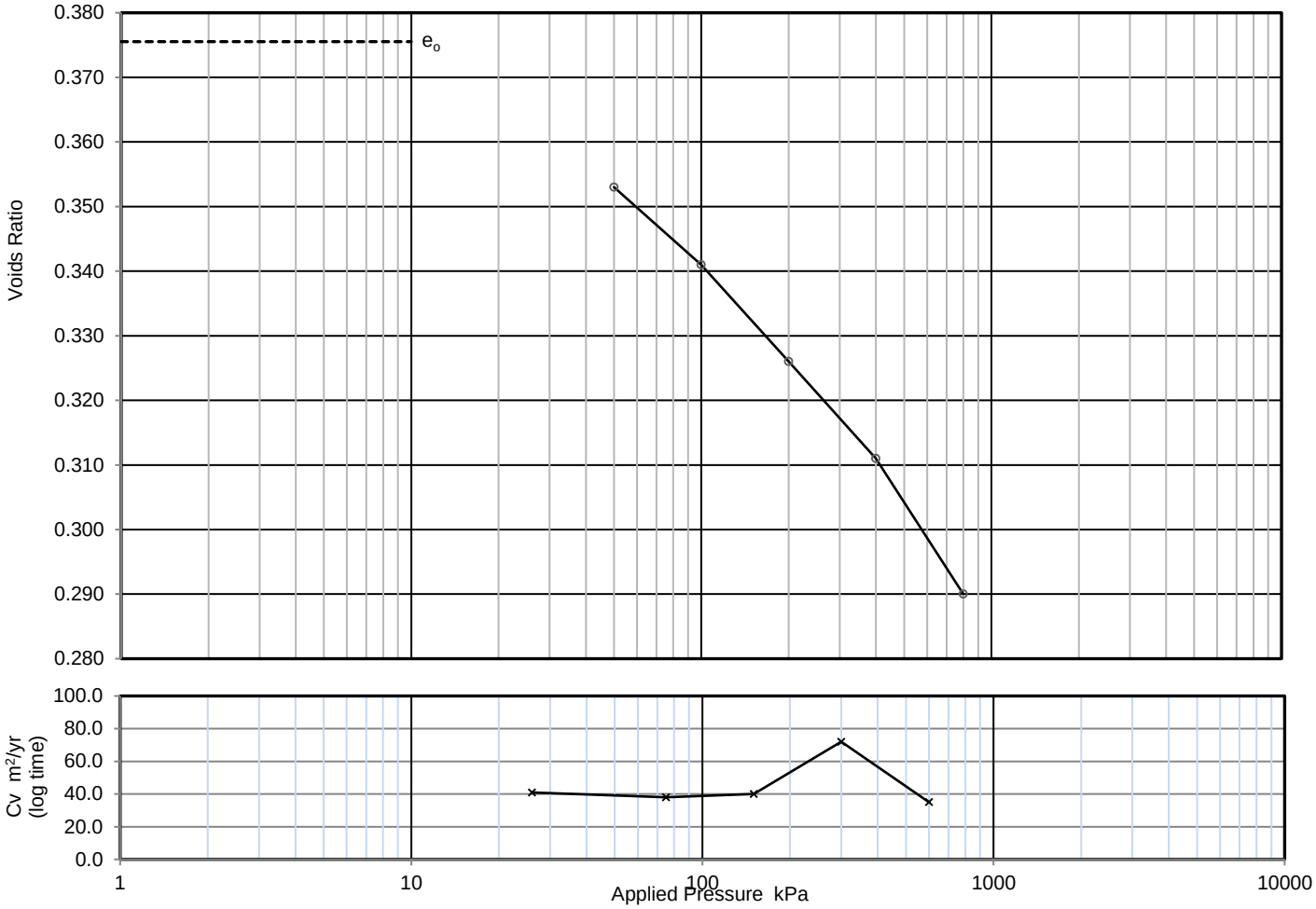
Cv corrected to 20°C

* Negative Csec determination

Date Printed	Figure Number	Sheet
14/03/2019	F.3.3	6

Incremental Loading Oedometer Test

				Project No.	G180030U
				Hole	BH22
				Sample No.	26
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Depth	18.53
Specimen Reference		Specimen Depth	18.80 m	Sample Type	C
Specimen Description	Brown grey slightly gravelly sandy SILT			KeyLAB ID	BH2220181113026
Test Method	BS EN ISO 17892-5:2017			Date started	30/01/2019



Applied Pressure kPa	Voids ratio	mv m²/MN	Cv (t50, log) m²/yr	Cv (t90, root) m²/yr	Csec
2.0	0.376	-	-	-	-
50	0.353	0.34	41	27	0.00055
100	0.341	0.18	38	36	0.0011
200	0.326	0.11	40	16	0.0011
400	0.311	0.059	72	43	0.0017
800	0.290	0.04	35	30	0.0011

Preparation: Hand Trimming

Particle density: assumed 2.70 Mg/m³

Specimen details	Initial	Final	
Diameter	74.86	-	mm
Height	18.90	17.72	mm
Water Content	11.4	11.4	%
Bulk density	2.19	2.33	Mg/m³
Dry density	1.96	2.09	Mg/m³
Voids Ratio	0.376	0.290	
Saturation	82	106	%
Average temperature for test	18.0		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Frame correction applied to height changes

Cv plotted at mid point of load increments

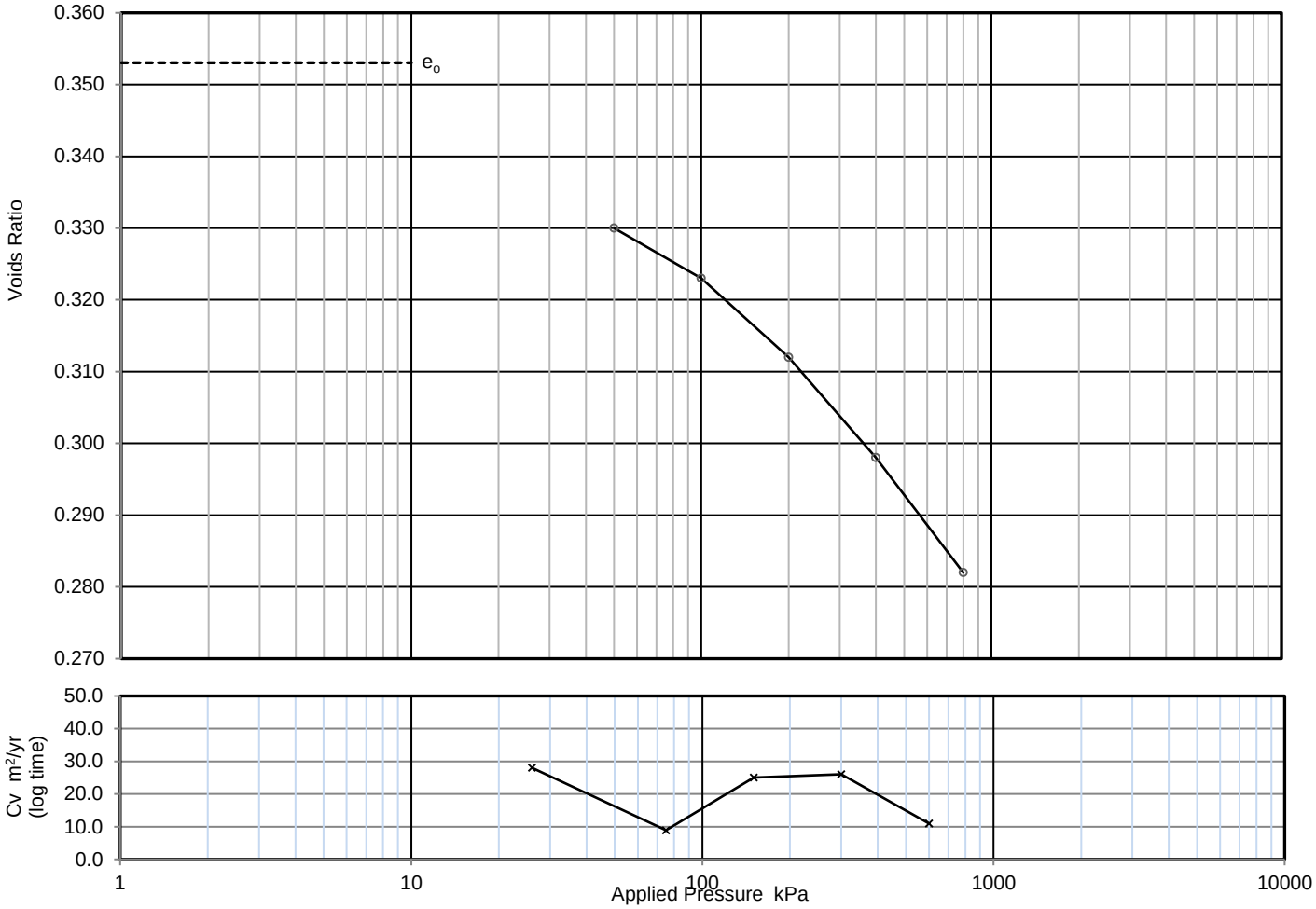
Cv corrected to 20°C

* Negative Csec determination

Date Printed	Figure Number	Sheet
14/03/2019	F.3.3	7

Incremental Loading Oedometer Test

				Project No.	G180030U
				Hole	BH23
				Sample No.	23
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Depth	9.72
Specimen Reference		Specimen Depth	2.73 m	Sample Type	C
Specimen Description	Brown slightly gravelly slightly sandy CLAY			KeyLAB ID	BH2314112018023
Test Method	BS EN ISO 17892-5:2017			Date started	21/02/2019



Applied Pressure kPa	Voids ratio	mv m²/MN	Cv (t50, log) m²/yr	Cv (t90, root) m²/yr	Csec
2.0	0.353	-	-	-	-
50	0.330	0.35	28	14	0.00055
100	0.323	0.12	8.9	3.8	0.00057
200	0.312	0.081	25	5.7	0.0011
400	0.298	0.051	26	17	0.0011
800	0.282	0.031	11	15	0.00057

Preparation: Hand Trimming

Particle density: assumed 2.70 Mg/m³

Specimen details	Initial	Final	
Diameter	74.99	-	mm
Height	19.03	18.03	mm
Water Content	12.2	11.6	%
Bulk density	2.24	2.35	Mg/m³
Dry density	2.00	2.11	Mg/m³
Voids Ratio	0.353	0.282	
Saturation	93	111	%
Average temperature for test	20.0		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Frame correction applied to height changes

Cv plotted at mid point of load increments

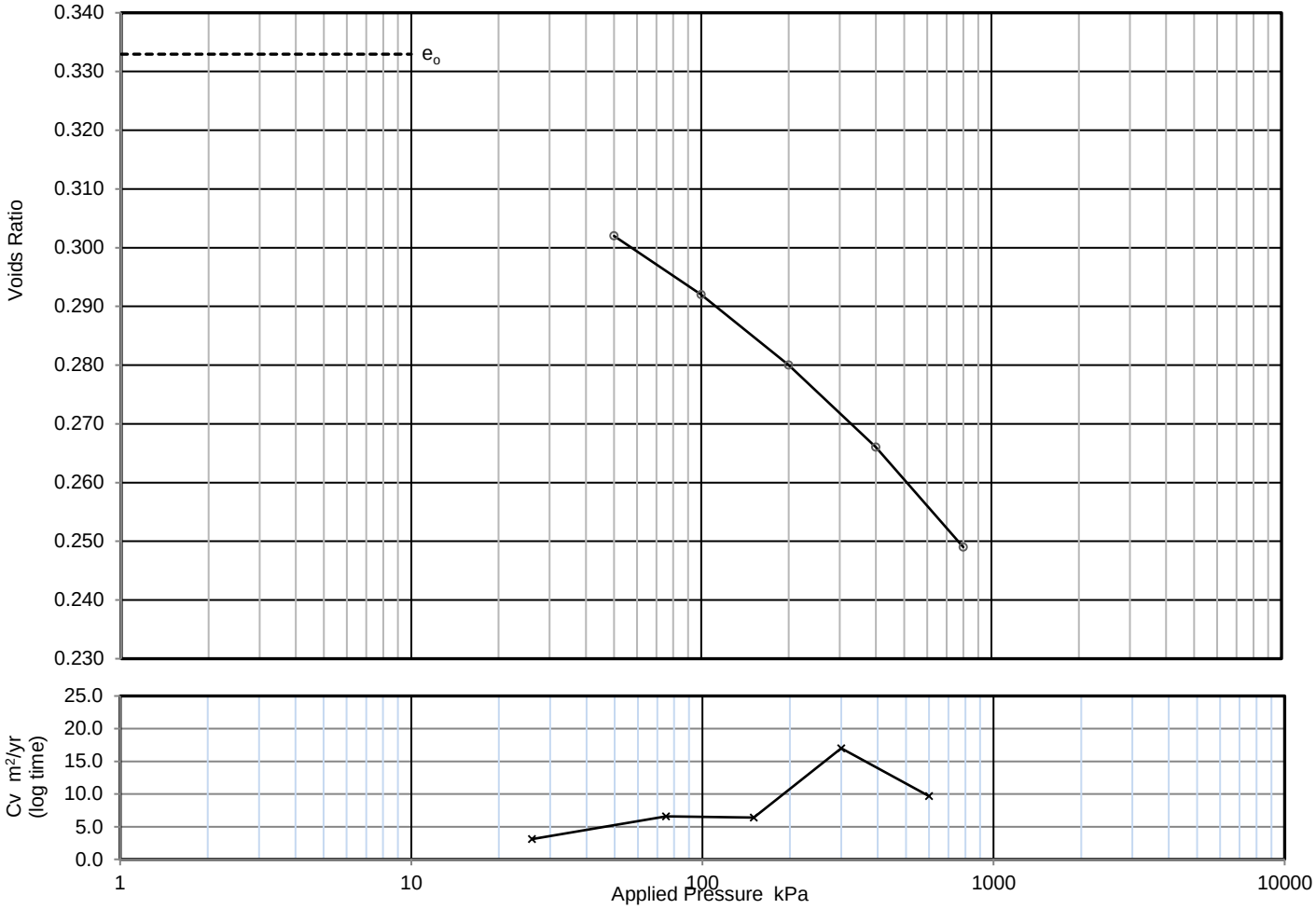
Cv corrected to 20°C

* Negative Csec determination

Date Printed	Figure Number	Sheet
14/03/2019	F.3.3	8

Incremental Loading Oedometer Test

				Project No.	G180030U
				Hole	BH23
				Sample No.	30
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Depth	17.70
Specimen Reference		Specimen Depth	17.74 m	Sample Type	C
Specimen Description	Brown slightly sandy slightly gravelly CLAY			KeyLAB ID	BH2314112018030
Test Method	BS EN ISO 17892-5:2017			Date started	30/01/2019



Applied Pressure kPa	Voids ratio	mv m²/MN	Cv (t50, log) m²/yr	Cv (t90, root) m²/yr	Csec
2.0	0.333	-	-	-	-
50	0.302	0.49	3.1	1.7	*
100	0.292	0.15	6.6	8.2	0.0011
200	0.280	0.097	6.4	8.6	0.00057
400	0.266	0.054	17	5.8	0.0011
800	0.249	0.034	9.7	24	0.0011

Preparation: Hand Trimming

Particle density: assumed 2.70 Mg/m³

Specimen details	Initial	Final	
Diameter	74.98	-	mm
Height	18.85	17.65	mm
Water Content	11.6	10.4	%
Bulk density	2.26	2.39	Mg/m³
Dry density	2.03	2.16	Mg/m³
Voids Ratio	0.333	0.249	
Saturation	94	113	%
Average temperature for test	18.0		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Frame correction applied to height changes

Cv corrected to 20°C

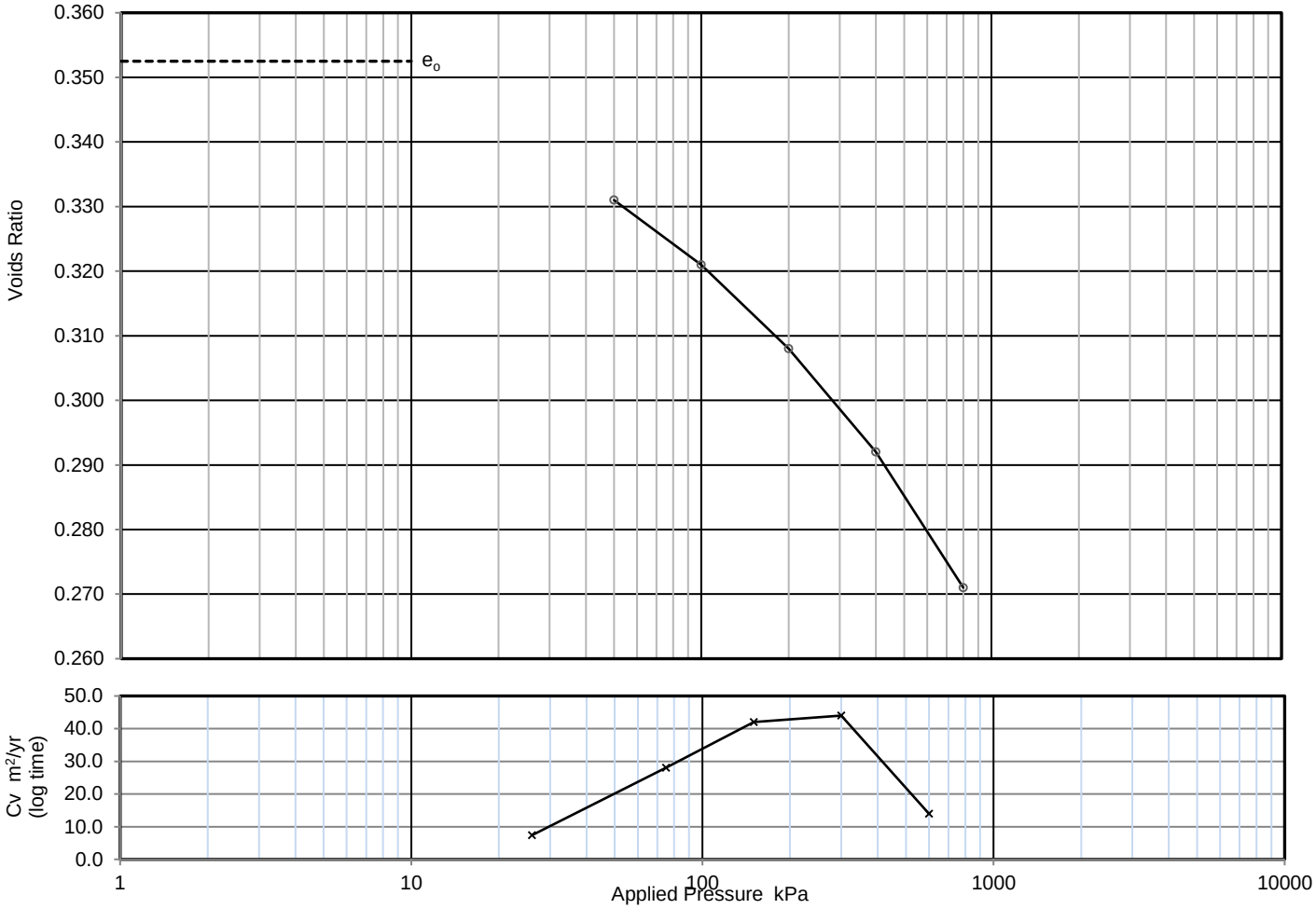
Cv plotted at mid point of load increments

* Negative Csec determination

Date Printed	Figure Number	Sheet
14/03/2019	F.3.3	9

Incremental Loading Oedometer Test

				Project No.	G180030U
				Hole	BH24a
				Sample No.	18
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Depth	9.96
Specimen Reference		Specimen Depth	9.97 m	Sample Type	C
Specimen Description	Brown slightly sandy gravelly CLAY			KeyLAB ID	18
Test Method	BS EN ISO 17892-5:2017			Date started	30/01/2019



Applied Pressure kPa	Voids ratio	mv m²/MN	Cv (t50, log) m²/yr	Cv (t90, root) m²/yr	Csec
2.0	0.353	-	-	-	-
50	0.331	0.33	7.4	16	*
100	0.321	0.15	28	20	0.00057
200	0.308	0.099	42	21	0.0011
400	0.292	0.062	44	29	0.0011
800	0.271	0.04	14	27	0.00055

Preparation: Hand Trimming

Particle density: assumed 2.70 Mg/m³

Specimen details	Initial	Final	
Diameter	74.90	-	mm
Height	18.84	17.71	mm
Water Content	9.8	10.4	%
Bulk density	2.19	2.35	Mg/m³
Dry density	2.00	2.12	Mg/m³
Voids Ratio	0.353	0.271	
Saturation	75	104	%
Average temperature for test	18.0		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Frame correction applied to height changes

Cv corrected to 20°C

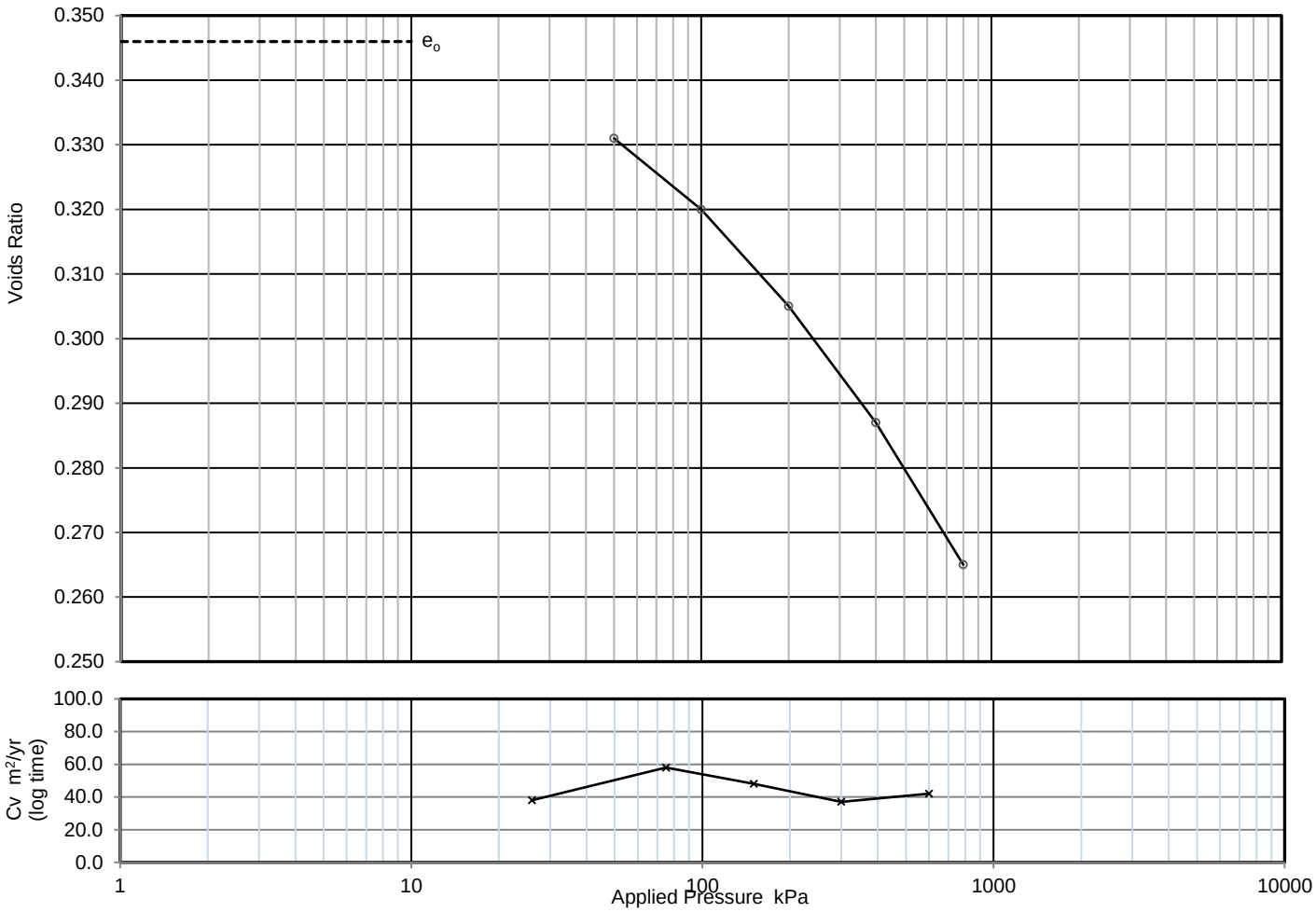
Cv plotted at mid point of load increments

* Negative Csec determination

Date Printed	Figure Number	Sheet
14/03/2019	F.3.3	10

Incremental Loading Oedometer Test

				Project No.	G180030U
				Hole	BH30
				Sample No.	12
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)			Depth	5.05
Specimen Reference		Specimen Depth	5.10 m	Sample Type	C
Specimen Description	Grey brown slightly sandy slightly gravelly CLAY			KeyLAB ID	BH3020181116012
Test Method	BS EN ISO 17892-5:2017			Date started	30/01/2019



Applied Pressure kPa	Voids ratio	mv m²/MN	Cv (t50, log) m²/yr	Cv (t90, root) m²/yr	Csec
2.0	0.346	-	-	-	-
50	0.331	0.24	38	23	0.00057
100	0.320	0.16	58	48	0.0011
200	0.305	0.11	48	14	0.0011
400	0.287	0.069	37	38	0.0011
800	0.265	0.043	42	33	0.0011

Preparation: Hand Trimming

Particle density: assumed 2.70 Mg/m³

Specimen details	Initial	Final	
Diameter	74.89	-	mm
Height	18.82	17.69	mm
Water Content	8.7	10.4	%
Bulk density	2.18	2.36	Mg/m³
Dry density	2.01	2.13	Mg/m³
Voids Ratio	0.346	0.265	
Saturation	68	105	%
Average temperature for test	18.0		°C
Swelling Pressure			kPa
Settlement on saturation			%

Remarks

Frame correction applied to height changes

Cv corrected to 20°C

Cv plotted at mid point of load increments

* Negative Csec determination

Date Printed	Figure Number	Sheet
14/03/2019	F.3.3	11

Unconsolidated Undrained Triaxial Compression tests without measurement of pore pressure
Summary of Results

Project Name: St. Ola Pier Refurbishment - Site Investigation (Marine)

Project No.: G180030U

Hole	Sample Ref	Sample Top	Sample Type	Sample Spec. Depth	Description	Test Type	Density bulk Mg/m3	Density dry Mg/m3	w %	Length mm	Dia. mm	σ3 kPa	At failure Axial strain %	At failure σ1 - σ3 kPa	At failure cu kPa	At failure Mode	Remarks
BH01	22	10.63	C	10.68	Very stiff brown slightly sandy slightly gravelly CLAY	UU	2.37	2.17	8.8	200.0	101.9	200	19.9	369	185	C	
BH03	19	6.22	C	6.26	Very stiff brown slightly sandy slightly gravelly CLAY	UU	2.36	2.13	10.8	194.4	101.4	100	7.6	927	464	B	
BH03	30	14.00	C	14.06	(Stiff) brown slightly sandy gravelly CLAY	UU	2.30	2.07	11.0	209.0	101.9	200	14.2	479	239	C	
BH04	27	7.30	C	7.31	Very stiff brown slightly sandy slightly gravelly CLAY	UU	2.28	2.00	13.7	199.2	100.5	100	8.2	829	414	B	
BH21	19	6.05	C	6.11	Very stiff brown slightly sandy slightly gravelly CLAY	UU	2.34	2.17	7.8	199.9	101.6	100	5.0	1,090	545	B	
BH21	25	13.50	C	13.53	Very stiff brown slightly sandy slightly gravelly CLAY	UU	2.35	2.14	10.1	199.4	102.2	200	7.6	1,063	532	B	
BH22	19	11.30	C	11.41	Very stiff brown slightly sandy slightly gravelly CLAY	UU	2.34	2.13	10.0	199.2	101.4	200	9.8	846	423	B	
BH23	24	11.00	C	11.02	(Stiff) brown slightly sandy slightly gravelly CLAY	UU	2.33	2.11	10.1	209.9	100.3	200	15.2	609	304	C	
BH23	26	13.20	C	13.23	(Stiff) brown slightly sandy gravelly CLAY	UU	2.32	2.12	9.5	209.2	99.3	200	12.8	752	376	C	
BH24a	13	3.75	C	3.89	Very stiff brown slightly sandy slightly gravelly CLAY	UU	2.33	2.12	10.0	194.0	102.2	100	4.6	1,184	592	B	
BH24a	24	15.17	C	15.23	(Stiff) brown slightly sandy slightly gravelly CLAY	UU	2.30	2.05	11.9	200.4	100.2	200	19.5	553	276	C	
BH30	5	1.15	C	1.17	Very stiff brown slightly sandy slightly gravelly CLAY	UU	2.38	2.19	8.7	181.5	101.4	100	8.4	915	458	B	

Key
- UU - single stage test (single and multiple specimens)
- UUM - Multistage test on a single specimen
- suffix R - remoulded or recompacted
- σ3 Cell pressure
- σ1 - σ3 Maximum corrected deviator stress
- cu Undrained shear strength, ½ (σ1 - σ3)
- Mode of failure ; B - Brittle; P - Plastic; C - Compound

Notes

Tests carried out in accordance with BS1377:Part 7 : 1990 clause 8 or 9 as appropriate to test type.

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Figure Number: F.3.4.1

RESULTS OF UNDRAINED SHEAR STRENGTH TESTS IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF POREWATER PRESSURE

BS 1377 Part 7:1990:Test 8 and 9 / BS EN ISO 17892:2014 (see additional Method Sheet for details)

Hole	Sample No.	Sample Type	Sample Depth [Specimen Depth] (m)	Test Type	Bulk Density (Mg/m^3)	Water Content (%)	Dry Density (Mg/m^3)	Diameter (mm)	Preparation	Cell Pressure (kPa)	Failure Strain (%)	Mode of Failure	Undrained Shear Strength c_u (kPa)	Average c_u (kPa)	Description
BH02	20	CS	12.60 [12.61]	UU M	2.34	7.8	2.17	100.9	UD	100 200 400	2.8 9.5 16.8	B	285 522 752	520	Very stiff brown slightly sandy slightly gravelly CLAY
BH03	22	CS	11.00 [11.13]	UU M	2.34	10.0	2.12	100.9	UD	100 200 400	9.0 14.0 18.8	B	399 435 481	439	Very stiff brown slightly sandy slightly gravelly CLAY
BH21	23	CS	10.70 [10.72]	UU M	2.33	8.5	2.15	101.9	UD	100 200 400	10.5 15.8 20.0	B	328 375 415	373	Very stiff brown slightly sandy slightly gravelly CLAY
BH22	15	CS	6.70 [6.77]	UU M	2.36	8.9	2.17	101.2	UD	50 100 200	6.0 7.7 11.4	B	493 513 577	528	Very stiff brown slightly sandy slightly gravelly CLAY
BH22	21	CS	13.00 [13.09]	UU M	2.32	11.1	2.09	100.7	UD	100 200 400	9.0 12.1 20.0	C	185 190 198	191	Stiff brown slightly sandy gravelly CLAY
BH22	23	CS	15.95 [16.01]	UU M	2.27	10.7	2.05	100.5	UD	100 200 400	3.0 5.3 8.0	B	304 339 372	338	Very stiff brown slightly sandy slightly gravelly CLAY
BH23	18	CS	5.45 [5.58]	UU M	2.33	10.9	2.10	100.3	UD	50 100 200	4.2 7.0 8.8	B	409 438 494	447	Very stiff brown slightly sandy slightly gravelly CLAY

Test Type:	UU - Unconsolidated undrained; UUM - Unconsolidated undrained multistage
Sample Preparation:	REM - Remoulded; UD - Undisturbed
Sample Type:	See key sheet
Sample & Specimen Depth:	Metres below exploratory hole datum
Sample Orientation:	Vertical unless stated
Undrained Shear Strength:	Corrected maximum deviator stress at failure divided by two
Mode of Failure:	B - Brittle; C - Compound; P - Plastic
Membrane:	The correction applied to the undrained shear strength (kPa) is between 0.01 - 0.09 kPa per 1% strain for 102mm samples and 0.03 - 0.09 kPa for 38mm samples dependent on the membrane used. A latex membrane was used.
Remarks	

SUMMARY OF ISOTROPICALLY CONSOLIDATED DRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of volume change

			Project No.	G180030U
			Borehole No.	BH04
			Sample No.	29
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Sample Type	C
Specimen Description	Very stiff dark grey brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse subangular to rounded		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 8		
Test type	CD	assumed ☑ measured ☐	Specific gravity	2.70
			Date started	31/01/2019

Specimen Reference

INITIAL CONDITIONS

Sample depth	[m]	11.35		
Specimen depth	[mm]	50		
Diameter	[mm]	101.88		
Length	[mm]	192.40		
Moisture content	[%]	9.1		
Bulk density	[Mg/m^3]	2.35		
Dry density	[Mg/m^3]	2.15		
Voids ratio		0.25		
Degree of saturation	[%]	96.12		

SATURATION STAGE

Final cell pressure	[kPa]	600		
Final pore pressure	[kPa]	579		
Pres. Increments/Differential pres.	[kPa]	50;100 / 30-20		
B value achieved	[%]	99		
Duration	[days]	8		

CONSOLIDATION STAGE

Cell pressure	[kPa]	600		
Back pressure	[kPa]	400		
Effective pressure	[kPa]	200		
Final pore pressure	[kPa]	400		
Final pore pressure dissipation	[%]	100		
Duration	[days]	1		

COMPRESSION STAGE

Cell Pressure	[kPa]	600		
Initial pore pressure	[kPa]	400		
Initial effective stress	[kPa]	200		
Rate of strain	[mm/min]	0.0095		
Duration	[days]	3		

Remarks

	Date Printed	Figure Number	Sheet Number
	14/02/2019	F.3.5.1	1

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH04
		Sample No.	29
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)	Test type	CD

Conditions at failure

Assumed failure criterion		Maximum deviator stress		
Pore pressure	[kPa]	400		
Minor effective principal stress	[kPa]	200		
Deviator stress	[kPa]	769		
Major effective principal stress	[kPa]	969		
Effective principal stress ratio		4.8		
Axial strain	[%]	4.5		
Volumetric strain	[%]	-0.1		
Corrections to dev. stress M/Sd	[kPa]	09 / 3.5		
Duration	[days]	3		

EFFECTIVE STRESS PARAMETERS

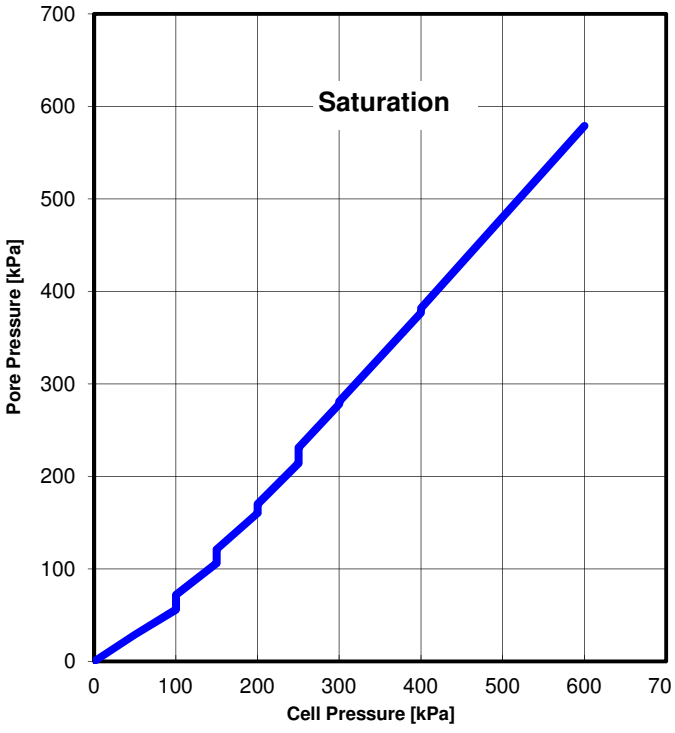
Cohesion c'	[kPa]	n/a
Angle of shearing resistance ϕ'	degrees	n/a

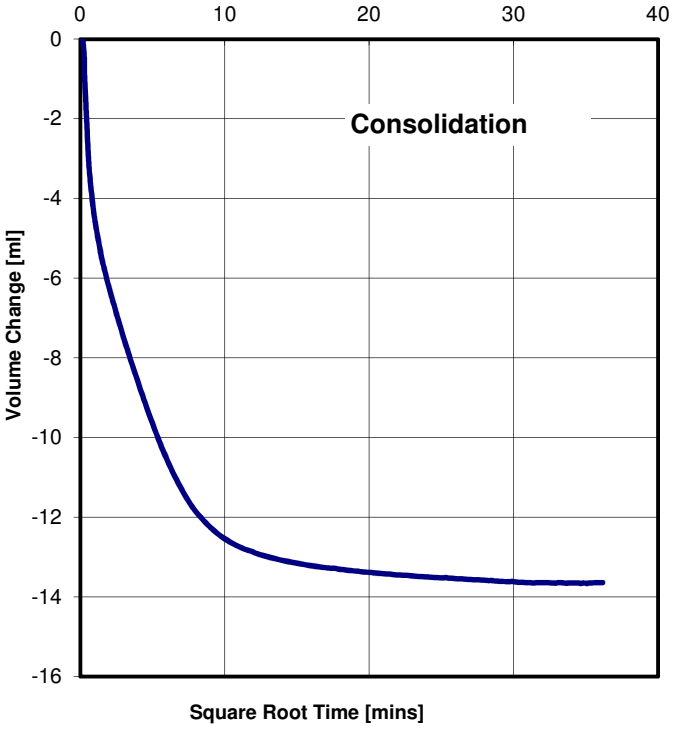
FINAL CONDITIONS

Moisture content	[%]	9.9		
Bulk density	[Mg/m^3]	2.34		

OTHER PARAMETERS

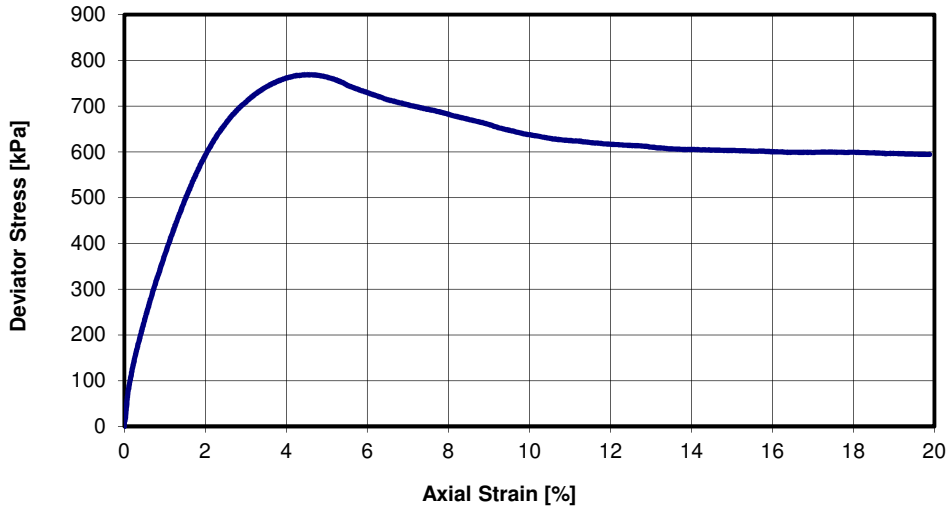
Secant modulus E' 50	[MPa]	37.13		
Strain at ε_{50}	[%]	1.03		

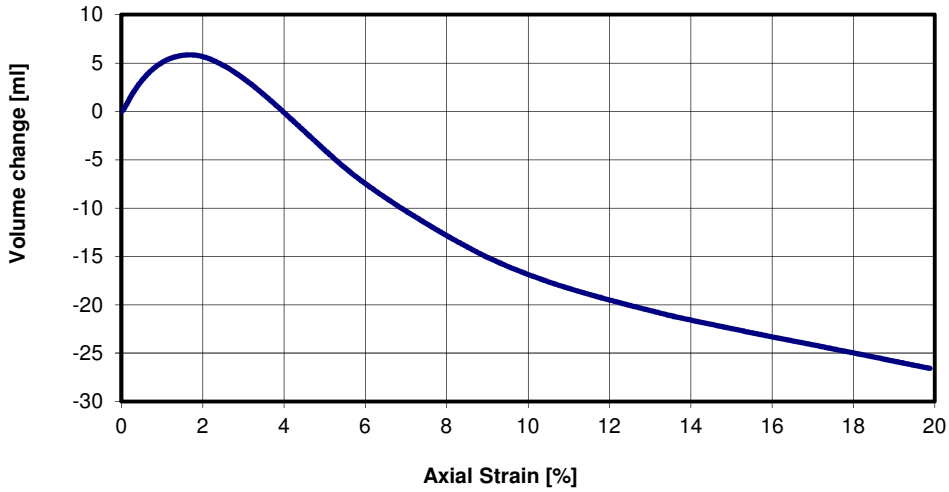


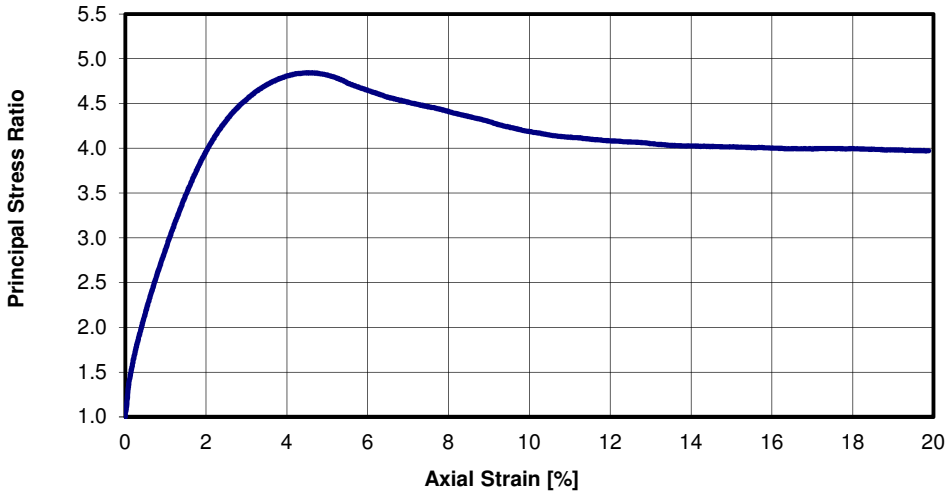


Date Printed	Figure Number	Sheet Number
14/02/2019	F.3.5.1	2

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH04
		Sample No.	29
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)	Test type	CD

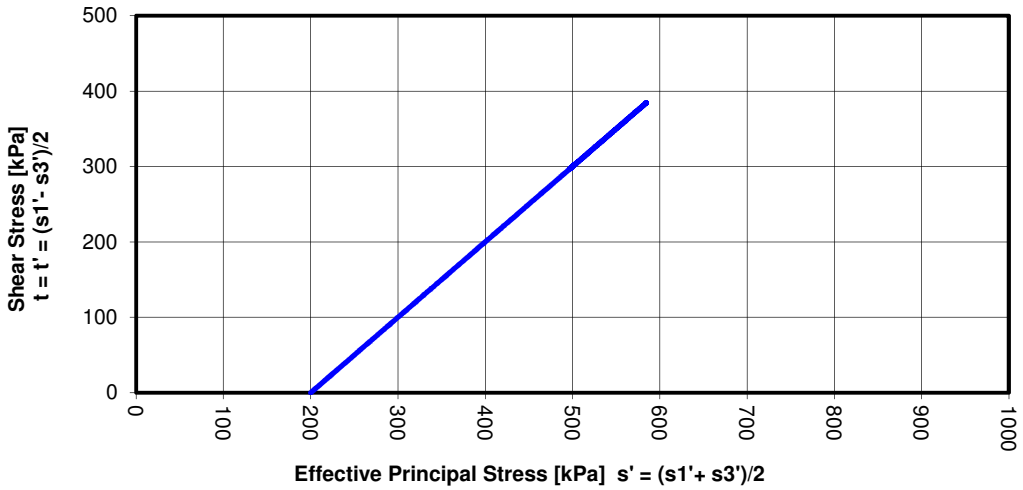


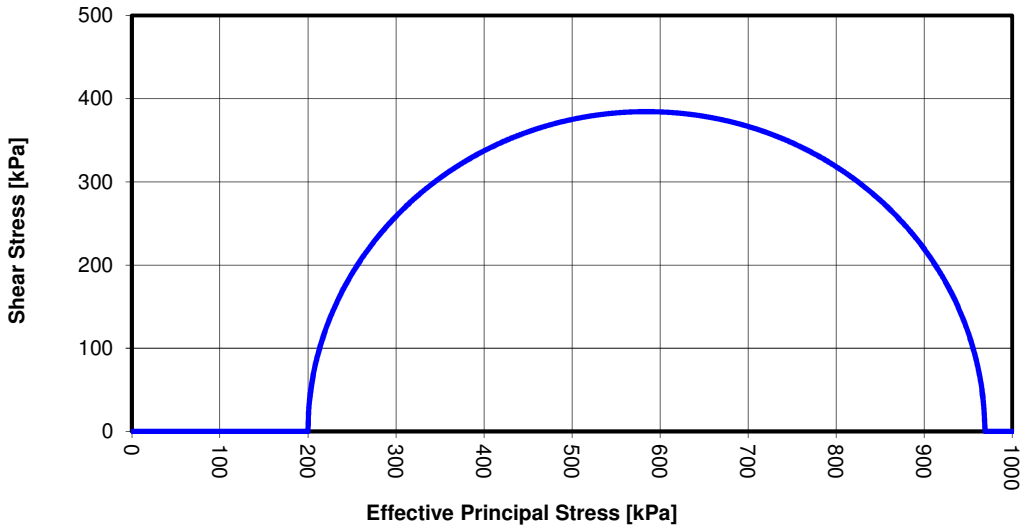




Date Printed	Figure Number	Sheet Number
14/02/2019	F.3.5.1	3

	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure	Project No.	G180030U
		Hole	BH04
		Sample No.	29
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)	Test type	CD





Mode of failure:

Compound

Date Printed	Figure Number	Sheet Number
14/02/2019	F.3.5.1	4

SUMMARY OF ISOTROPICALLY CONSOLIDATED DRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of volume change

Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Sample Type	C
Specimen Description	Very stiff dark grey slightly gravelly slightly sandy CLAY. Gravel is fine to coarse subangular to rounded		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 8		
Test type	CD	assumed ☑ measured ☐	Specific gravity	2.70
			Date started	04/02/2019

Project No.	G180030U
Borehole No.	BH21
Sample No.	21

Specimen Reference

INITIAL CONDITIONS

Sample depth	[m]	9.25		
Specimen depth	[mm]	70		
Diameter	[mm]	101.44		
Length	[mm]	192.00		
Moisture content	[%]	8.3		
Bulk density	[Mg/m^3]	2.38		
Dry density	[Mg/m^3]	2.20		
Voids ratio		0.23		
Degree of saturation	[%]	98.96		

SATURATION STAGE

Final cell pressure	[kPa]	500		
Final pore pressure	[kPa]	482		
Pres. Increments/Differential pres.	[kPa]	50;100 / 20-15		
B value achieved	[%]	98		
Duration	[days]	6		

CONSOLIDATION STAGE

Cell pressure	[kPa]	500		
Back pressure	[kPa]	400		
Effective pressure	[kPa]	100		
Final pore pressure	[kPa]	400		
Final pore pressure dissipation	[%]	100		
Duration	[days]	1		

COMPRESSION STAGE

Cell Pressure	[kPa]	500		
Initial pore pressure	[kPa]	400		
Initial effective stress	[kPa]	100		
Rate of strain	[mm/min]	0.0300		
Duration	[days]	1		

Remarks

Date Printed	Figure Number	Sheet Number
14/02/2019	F.3.5.1	5

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH21
		Sample No.	21
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)	Test type	CD

Conditions at failure

Assumed failure criterion		Maximum deviator stress		
Pore pressure	[kPa]	400		
Minor effective principal stress	[kPa]	100		
Deviator stress	[kPa]	544		
Major effective principal stress	[kPa]	644		
Effective principal stress ratio		6.4		
Axial strain	[%]	2.4		
Volumetric strain	[%]	0.0		
Corrections to dev. stress M/Sd	[kPa]	0.5 / 3.5		
Duration	[days]	1		

EFFECTIVE STRESS PARAMETERS

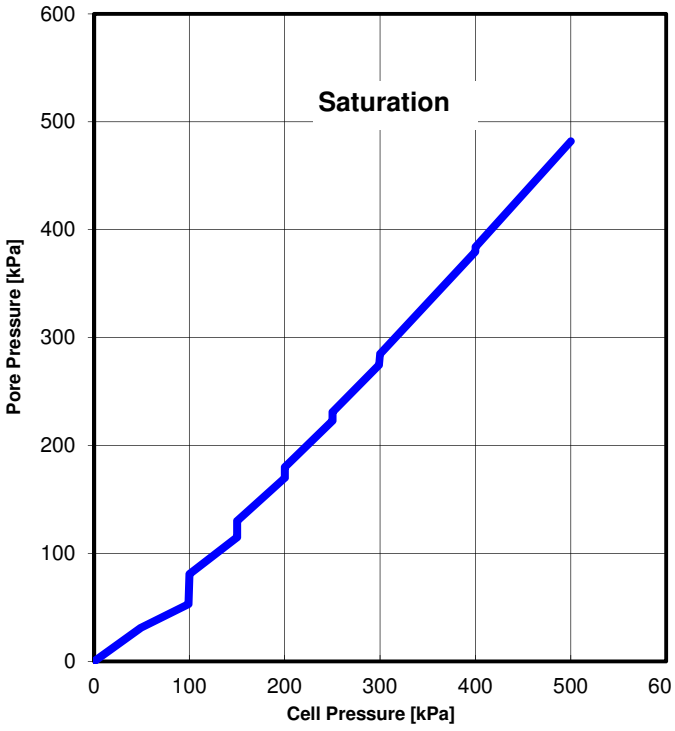
Cohesion c'	[kPa]	n/a
Angle of shearing resistance ϕ'	degrees	n/a

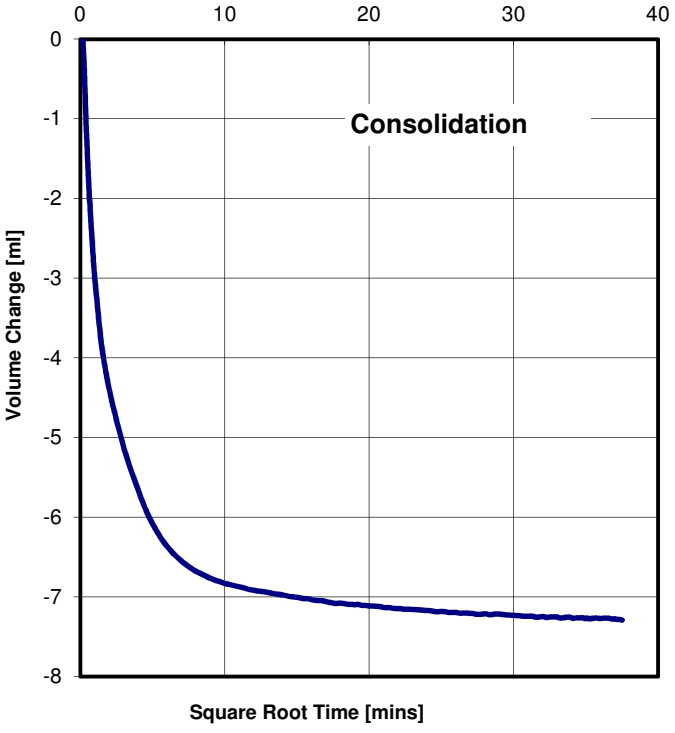
FINAL CONDITIONS

Moisture content	[%]	9.4		
Bulk density	[Mg/m^3]	2.37		

OTHER PARAMETERS

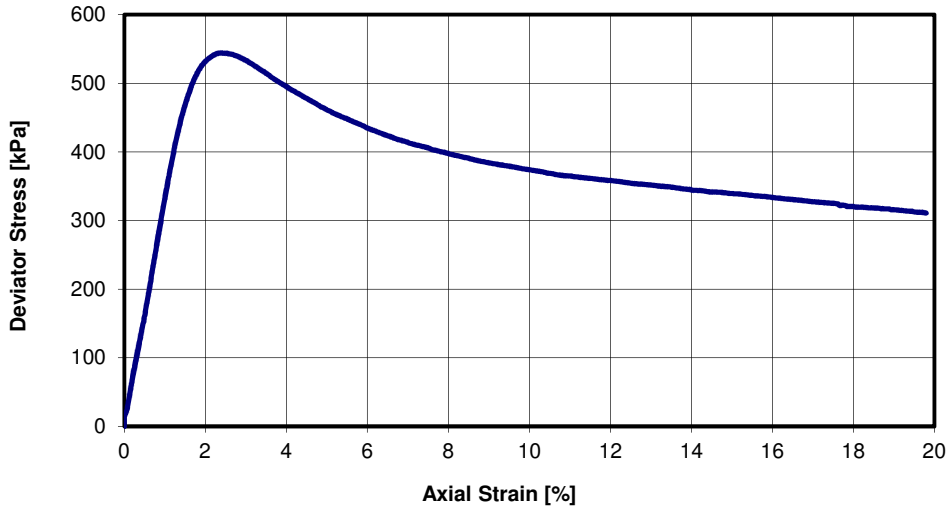
Secant modulus E' 50	[MPa]	33.27		
Strain at ε_{50}	[%]	0.82		

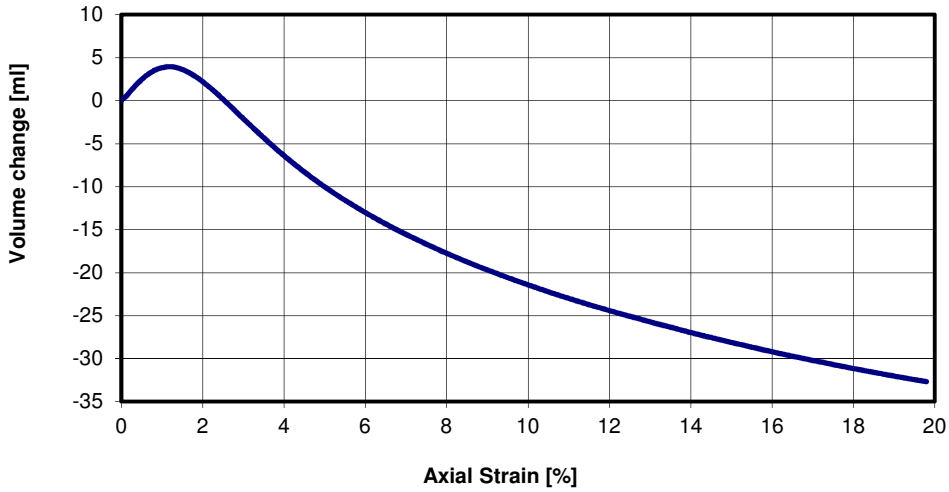


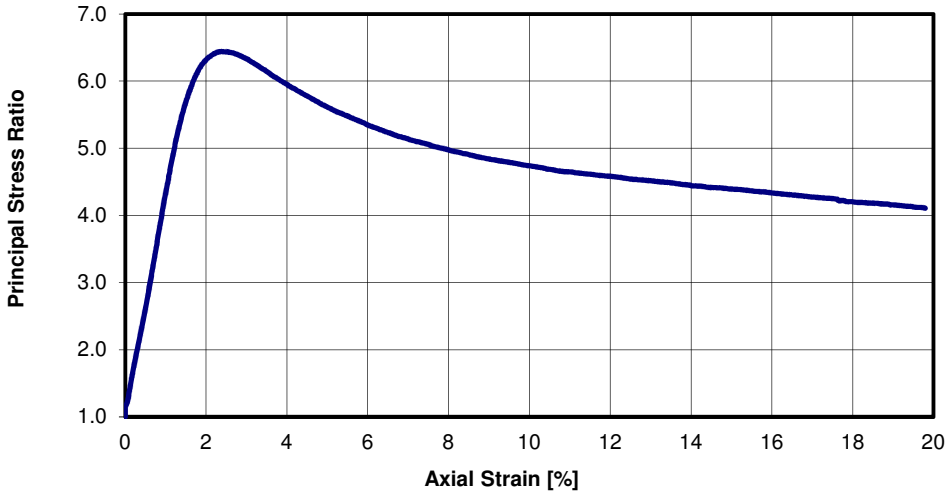


Date Printed	Figure Number	Sheet Number
14/02/2019	F.3.5.1	6

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH21
		Sample No.	21
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)	Test type	CD

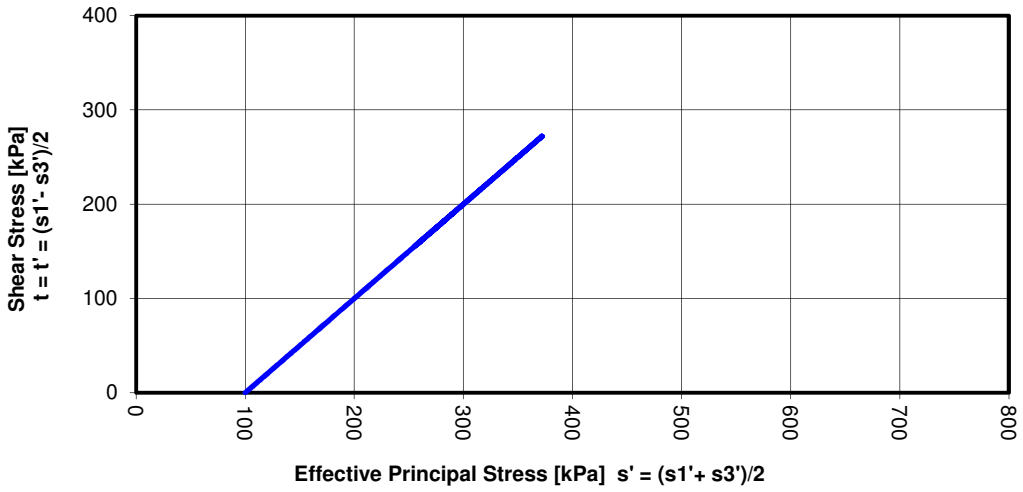


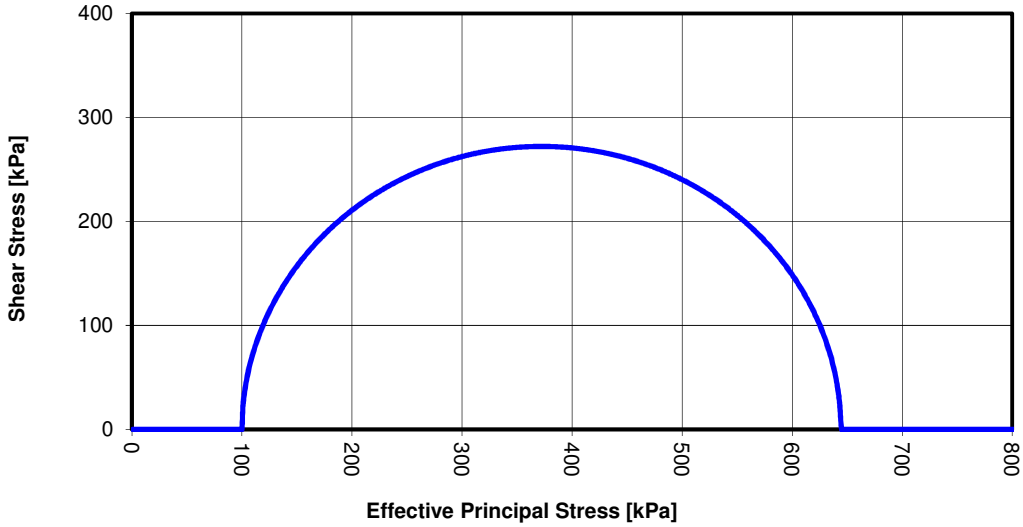




Date Printed	Figure Number	Sheet Number
14/02/2019	F.3.5.1	7

	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure	Project No.	G180030U
		Hole	BH21
		Sample No.	21
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)	Test type	CD





Mode of failure:

Compound

Date Printed	Figure Number	Sheet Number
14/02/2019	F.3.5.1	8

SUMMARY OF ISOTROPICALLY CONSOLIDATED DRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of volume change

			Project No.	G180030U
			Borehole No.	BH24a
			Sample No.	15
Project Name	Scrabster Harbour Trust		Sample Type	C
Specimen Description	Very stiff grey brown slightly gravelly sandy CLAY. Gravel is fine to medium angular to rounded		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 8		
Test type	CD	assumed ☑ measured ☐	Specific gravity	2.70
			Date started	05/02/2019

Specimen Reference

INITIAL CONDITIONS

Sample depth	[m]	6.60		
Specimen depth	[mm]	20		
Diameter	[mm]	99.78		
Length	[mm]	193.00		
Moisture content	[%]	15.2		
Bulk density	[Mg/m^3]	2.23		
Dry density	[Mg/m^3]	1.94		
Voids ratio		0.39		
Degree of saturation	[%]	100		

SATURATION STAGE

Final cell pressure	[kPa]	500		
Final pore pressure	[kPa]	478		
Pres. Increments/Differential pres.	[kPa]	50;100 / 30-20		
B value achieved	[%]	98		
Duration	[days]	4		

CONSOLIDATION STAGE

Cell pressure	[kPa]	500		
Back pressure	[kPa]	400		
Effective pressure	[kPa]	100		
Final pore pressure	[kPa]	400		
Final pore pressure dissipation	[%]	100		
Duration	[days]	1		

COMPRESSION STAGE

Cell Pressure	[kPa]	500		
Initial pore pressure	[kPa]	400		
Initial effective stress	[kPa]	100		
Rate of strain	[mm/min]	0.0010		
Duration	[days]	18		

Remarks

	Date Printed	Figure Number	Sheet Number
	05/03/2019	F.3.5.1	9

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED DRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of volume change**	Project No.	G180030U
		Hole	BH24a
		Sample No.	15
Project Name	Scrabster Harbour Trust	Test type	CD

Conditions at failure

Assumed failure criterion		Maximum deviator stress		
Pore pressure	[kPa]	400		
Minor effective principal stress	[kPa]	100		
Deviator stress	[kPa]	323		
Major effective principal stress	[kPa]	423		
Effective principal stress ratio		4.2		
Axial strain	[%]	3.2		
Volumetric strain	[%]	0.2		
Corrections to dev. stress M/Sd	[kPa]	0.7 / 3.5		
Duration	[days]	18		

EFFECTIVE STRESS PARAMETERS

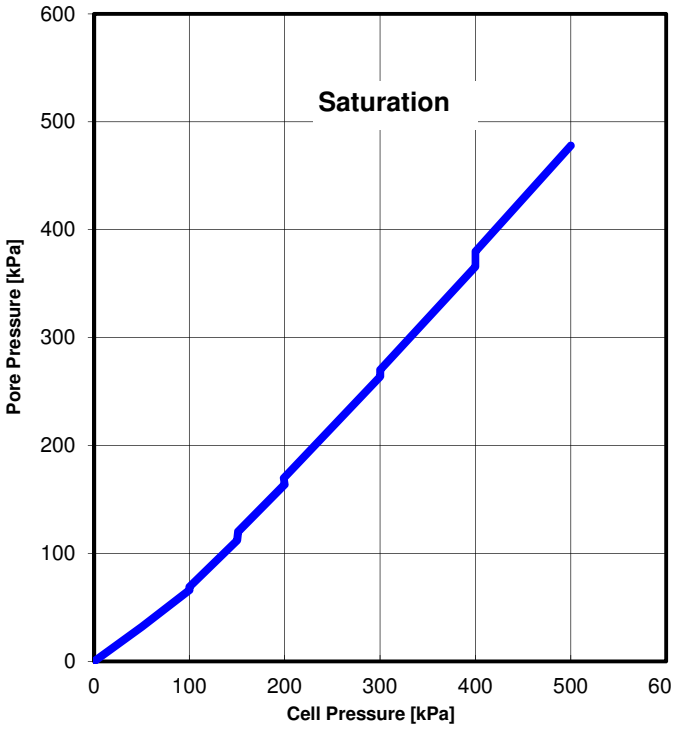
Cohesion c'	[kPa]	n/a
Angle of shearing resistance ϕ'	degrees	n/a

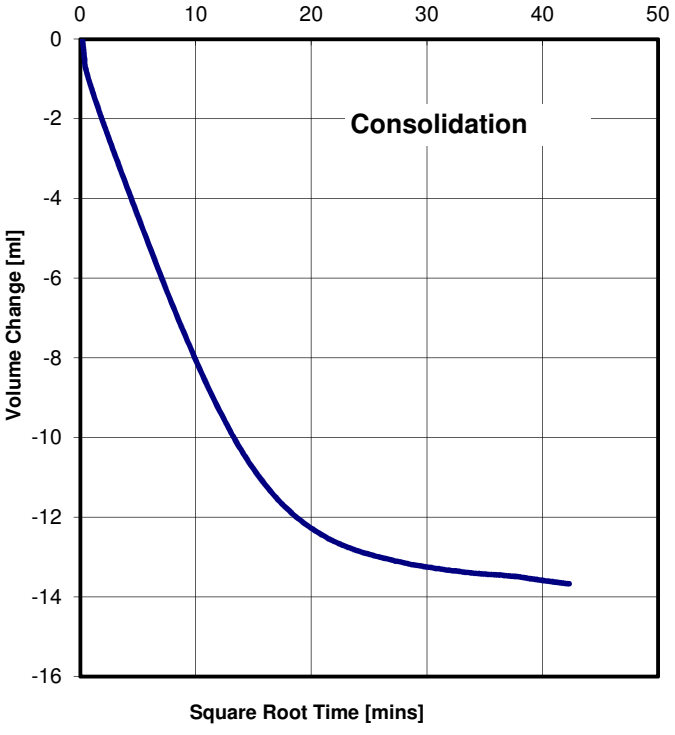
FINAL CONDITIONS

Moisture content	[%]	14.5		
Bulk density	[Mg/m^3]	2.24		

OTHER PARAMETERS

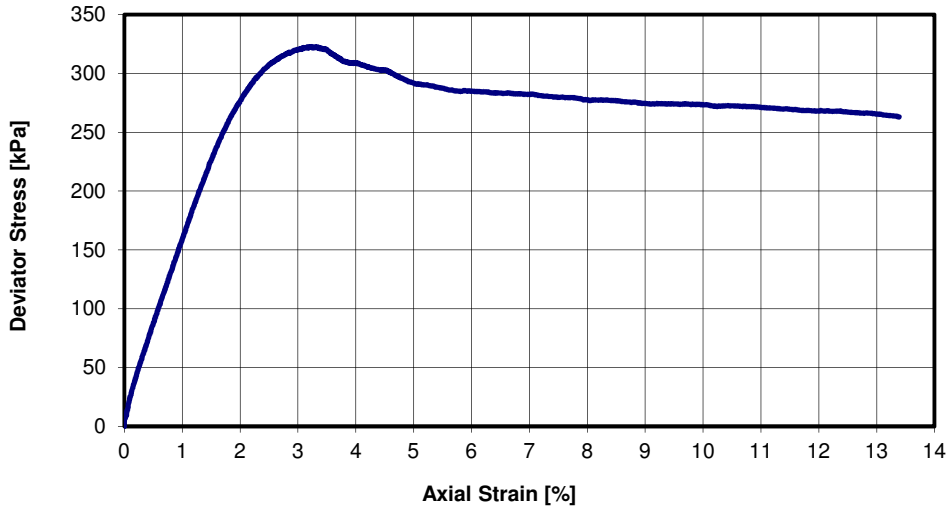
Secant modulus E' 50	[MPa]	15.9		
Strain at ε_{50}	[%]	1.02		

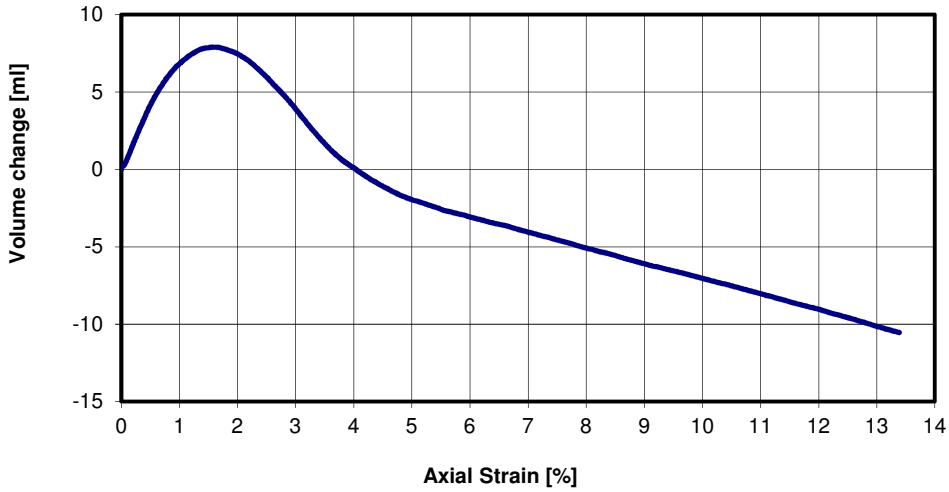


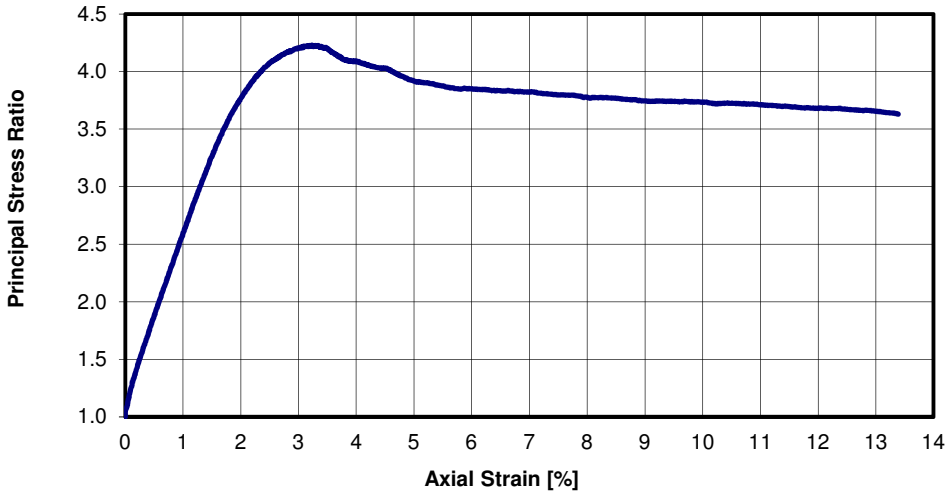


Date Printed	Figure Number	Sheet Number
05/03/2019	F.3.5.1	10

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED DRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of volume change**	Project No.	G180030U
		Hole	BH24a
		Sample No.	15
Project Name	Scrabster Harbour Trust	Test type	CD

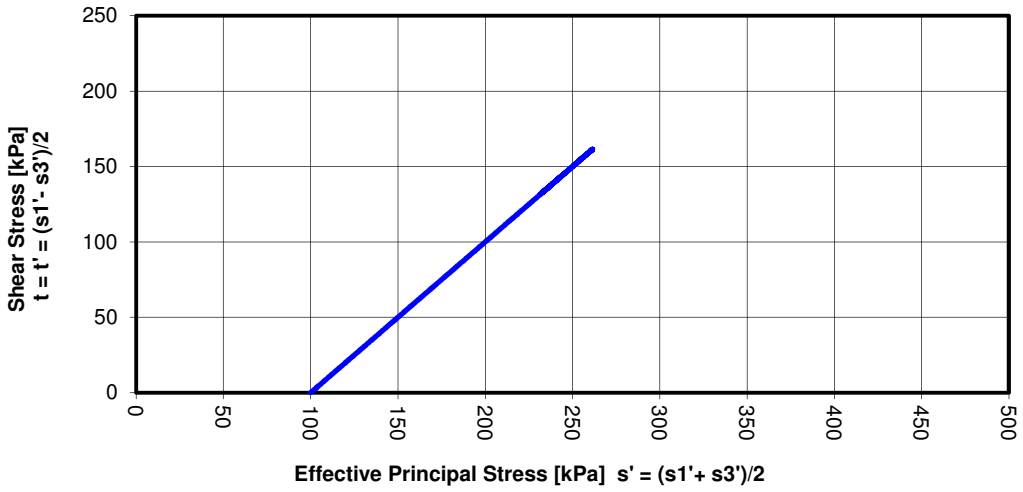


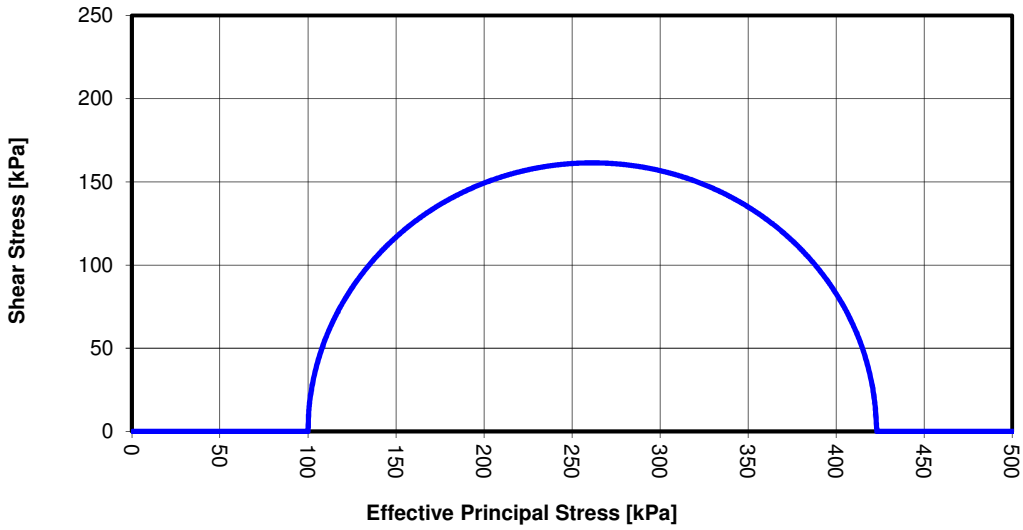




Date Printed	Figure Number	Sheet Number
05/03/2019	F.3.5.1	11

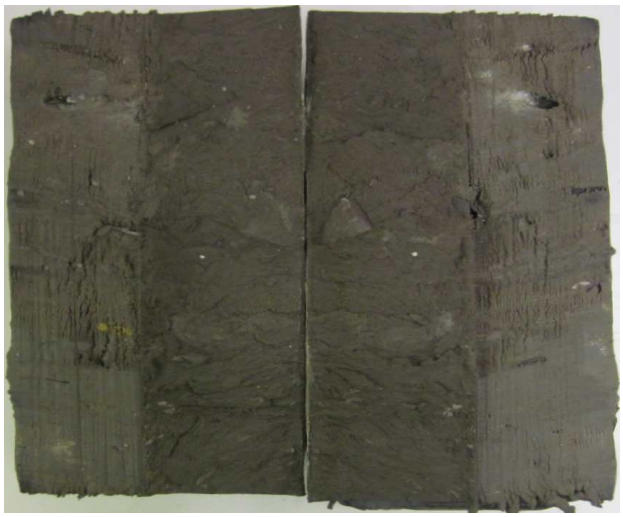
	SUMMARY OF ISOTROPICALLY CONSOLIDATED DRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of volume change	Project No.	G180030U
		Hole	BH24a
		Sample No.	15
Project Name	Scrabster Harbour Trust	Test type	CD





Mode of failure:

Brittle



Date Printed	Figure Number	Sheet Number
05/03/2019	F.3.5.1	12

SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure

			Project No.	G180030U
			Borehole No.	BH02
			Sample No.	23
Project Name	Scrabster Harbour Trust		Sample Type	C
Specimen Description	Very stiff grey brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse angular to rounded		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 7		
Test type	CU	assumed ☑ measured ☐	Specific gravity	2.70
			Date started	22/02/2019

Specimen Reference

INITIAL CONDITIONS

Sample depth	[m]	18.42		
Specimen depth	[mm]	10		
Diameter	[mm]	101.18		
Length	[mm]	186.60		
Moisture content	[%]	11.5		
Bulk density	[Mg/m^3]	2.26		
Dry density	[Mg/m^3]	2.03		
Voids ratio		0.33		
Degree of saturation	[%]	93		

SATURATION STAGE

Final cell pressure	[kPa]	600		
Final pore pressure	[kPa]	589		
Pres. Increments/Differential pres.	[kPa]	50;100 / 20-10		
B value achieved	[%]	99		
Duration	[days]	4		

CONSOLIDATION STAGE

Cell pressure	[kPa]	600		
Back pressure	[kPa]	400		
Effective pressure	[kPa]	200		
Final pore pressure	[kPa]	400		
Final pore pressure dissipation	[%]	100		
Duration	[days]	1		

COMPRESSION STAGE

Cell Pressure	[kPa]	600		
Initial pore pressure	[kPa]	400		
Initial effective stress	[kPa]	200		
Rate of strain	[mm/min]	0.0200		
Duration	[days]	1		

Remarks

	Date Printed	Figure Number	Sheet Number
	05/03/2019	F.3.5.2	1

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH02
		Sample No.	23
Project Name	Scrabster Harbour Trust	Test type	CU

Conditions at failure

Assumed failure criterion		Maximum deviator stress		
Pore pressure	[kPa]	341		
Minor effective principal stress	[kPa]	259		
Deviator stress	[kPa]	530		
Major effective principal stress	[kPa]	789		
Effective principal stress ratio		3.0		
Axial strain	[%]	14.9		
Volumetric strain	[%]	0.0		
Corrections to dev. stress M/Sd	[kPa]	2.5 / 3.5		
Duration	[days]	1		

EFFECTIVE STRESS PARAMETERS

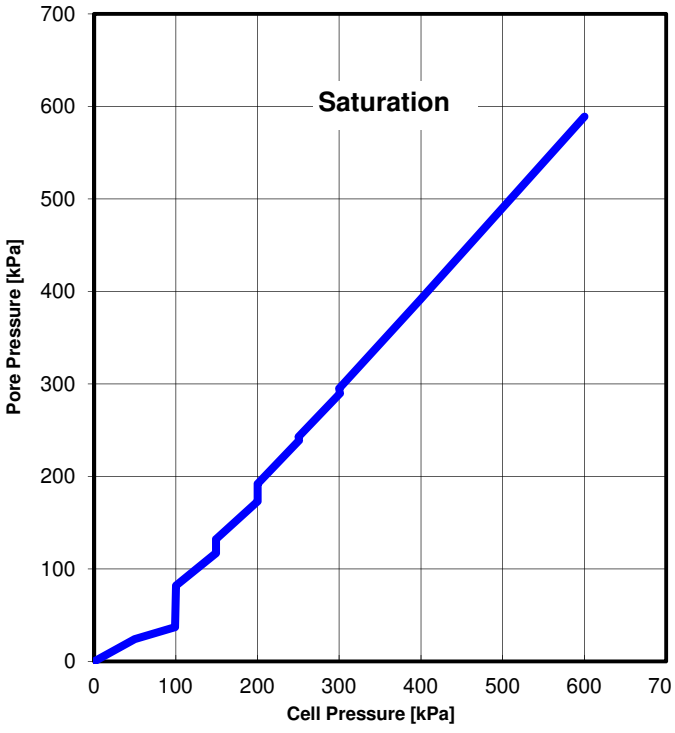
Cohesion c'	[kPa]	n/a
Angle of shearing resistance ϕ'	degrees	n/a

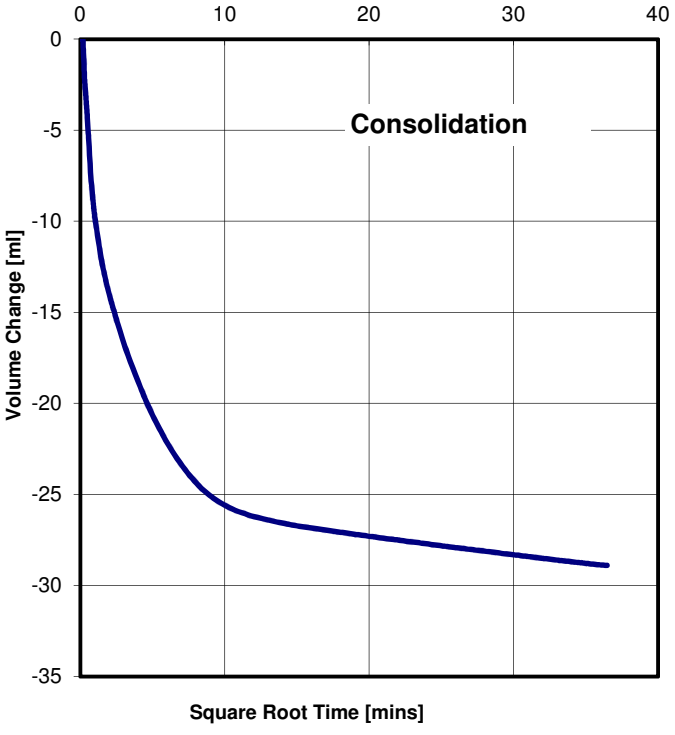
FINAL CONDITIONS

Moisture content	[%]	11.7		
Bulk density	[Mg/m^3]	2.31		

OTHER PARAMETERS

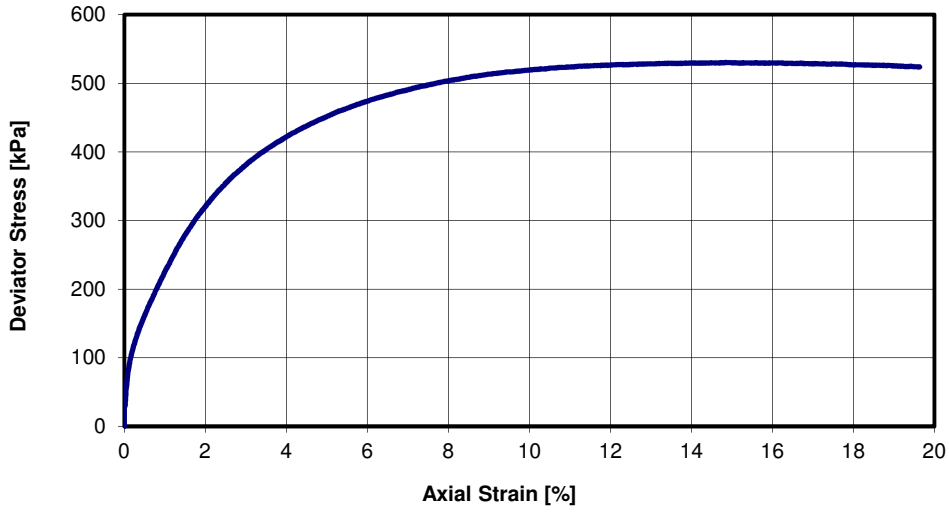
Secant modulus Eu 50	[MPa]	19.5		
Strain at ε_{50}	[%]	1.36		

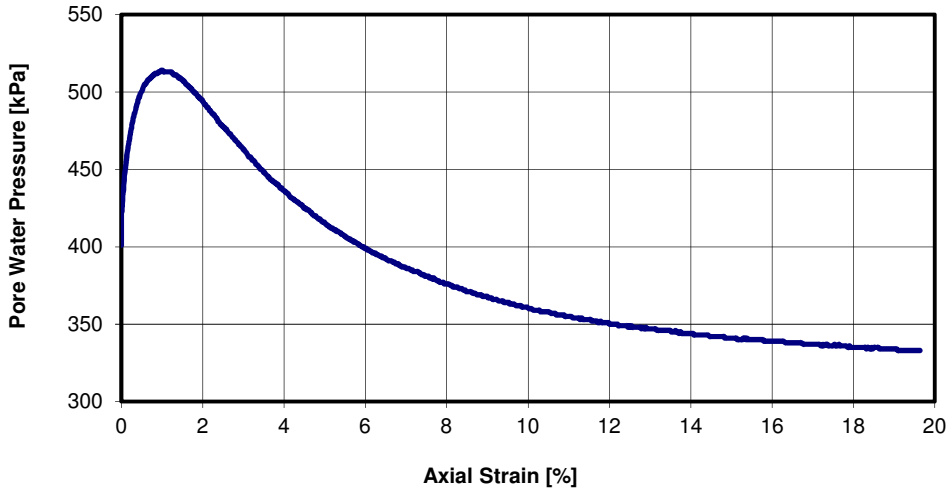


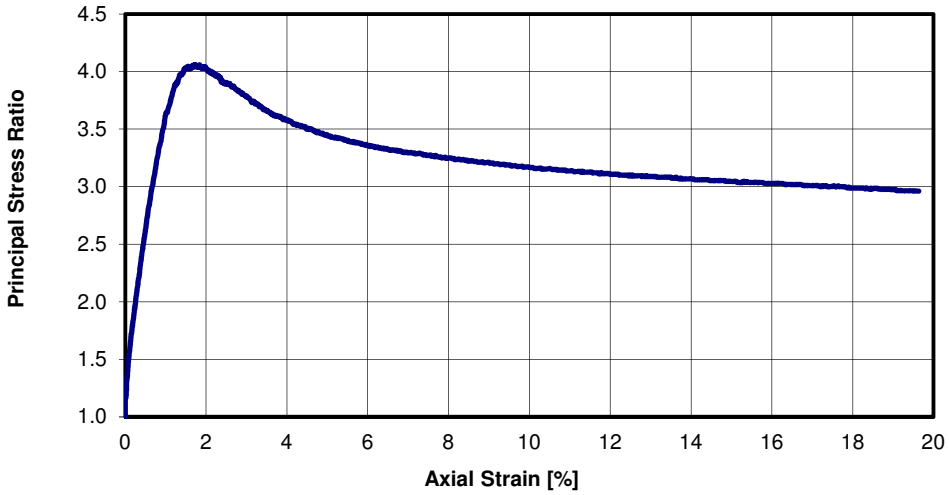


Date Printed	Figure Number	Sheet Number
05/03/2019	F.3.5.2	2

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH02
		Sample No.	23
Project Name	Scrabster Harbour Trust	Test type	CU

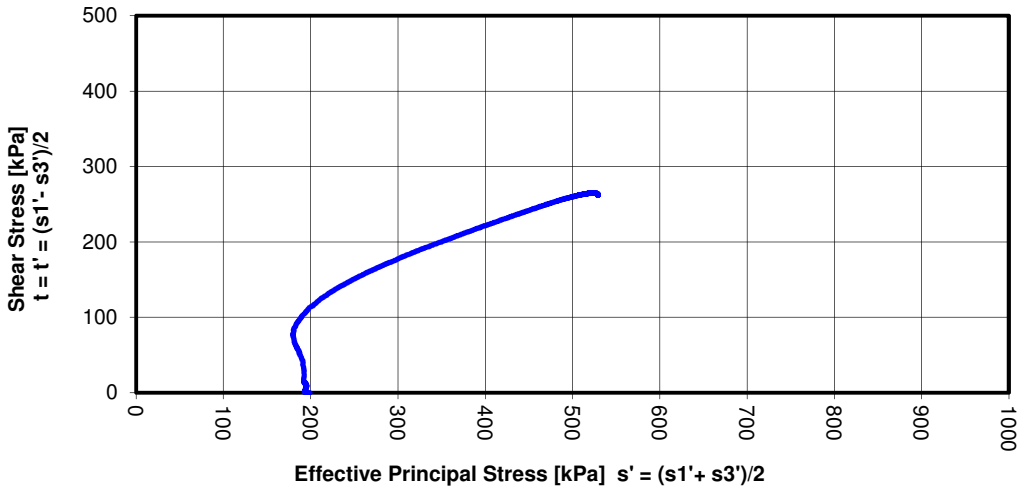


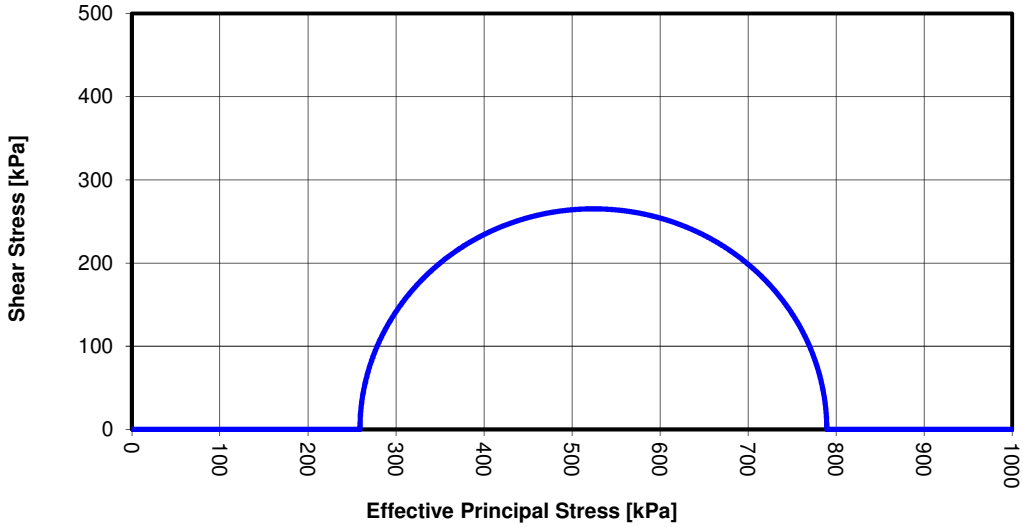




Date Printed	Figure Number	Sheet Number
05/03/2019	F.3.5.2	3

	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure	Project No.	G180030U
		Hole	BH02
		Sample No.	23
Project Name	Scrabster Harbour Trust	Test type	CU





Mode of failure:

Compound

Date Printed	Figure Number	Sheet Number
05/03/2019	F.3.5.2	4

SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST
with measurement of pore water pressure

			Project No.	G180030U
			Borehole No.	BH03
			Sample No.	33
Project Name	Scrabster Harbour Trust		Sample Type	C
Specimen Description	Very stiff dark grey brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse angular to rounded		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 7		
Test type	CUM	assumed ☑ measured ☐	Specific gravity	2.70
			Date started	12/02/2019

Specimen Reference

INITIAL CONDITIONS

Sample depth	[m]	19.75		
Specimen depth	[mm]	10		
Diameter	[mm]	101.10		
Length	[mm]	193.58		
Moisture content	[%]	10.4		
Bulk density	[Mg/m^3]	2.30		
Dry density	[Mg/m^3]	2.09		
Voids ratio		0.29		
Degree of saturation	[%]	96		

SATURATION STAGE

Final cell pressure	[kPa]	399		
Final pore pressure	[kPa]	387		
Pres. Increments/Differential pres.	[kPa]	50;100 / 20-10		
B value achieved	[%]	99		
Duration	[days]	4		

CONSOLIDATION STAGE

Cell pressure	[kPa]	400	500	700
Back pressure	[kPa]	300	300	300
Effective pressure	[kPa]	100	200	400
Final pore pressure	[kPa]	300	300	300
Final pore pressure dissipation	[%]	100	100	100
Duration	[days]	2	1	1

COMPRESSION STAGE

Cell Pressure	[kPa]	400	500	700
Initial pore pressure	[kPa]	300	300	300
Initial effective stress	[kPa]	100	200	400
Rate of strain	[mm/min]	0.0300	0.0160	0.0120
Duration	[days]	1	1	2

Remarks

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH03
		Sample No.	33
Project Name	Scrabster Harbour Trust	Test type	CUM

Conditions at failure		**1**	**2**	**3**
Assumed failure criterion		Maximum effective principal stress ratio		
Pore pressure	[kPa]	348	362	448
Minor effective principal stress	[kPa]	52	138	252
Deviator stress	[kPa]	237	415	662
Major effective principal stress	[kPa]	289	553	914
Effective principal stress ratio		5.6	4.0	3.6
Axial strain	[%]	1.0	0.9	1.4
Volumetric strain	[%]	0.0	0.0	0.0
Corrections to dev. stress M/Sd	[kPa]	0.2 / 3.5	0.5 / 3.5	0.8 / 3.5
Duration	[days]	1	1	2

EFFECTIVE STRESS PARAMETERS

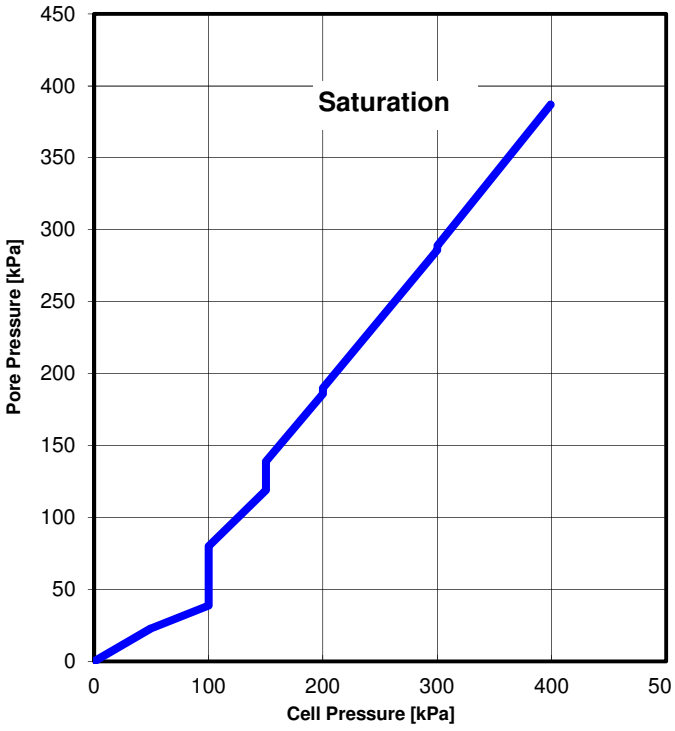
Cohesion c'	[kPa]	**35.3**
Angle of shearing resistance ϕ'	degrees	**31.0**

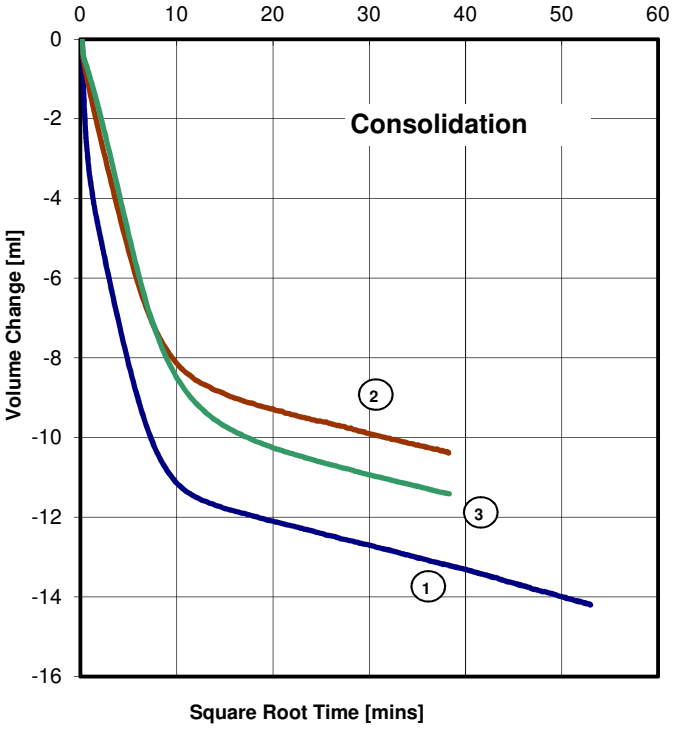
FINAL CONDITIONS

Moisture content	[%]			10.0
Bulk density	[Mg/m^3]			2.37

OTHER PARAMETERS

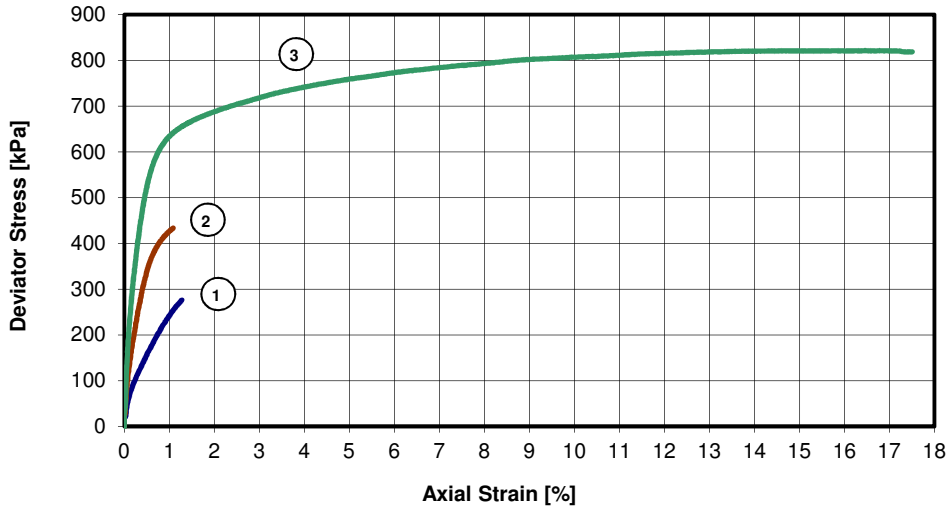
Secant modulus Eu 50	[MPa]	34.0	88.2	130.4
Strain at ε_{50}	[%]	0.41	0.25	0.32

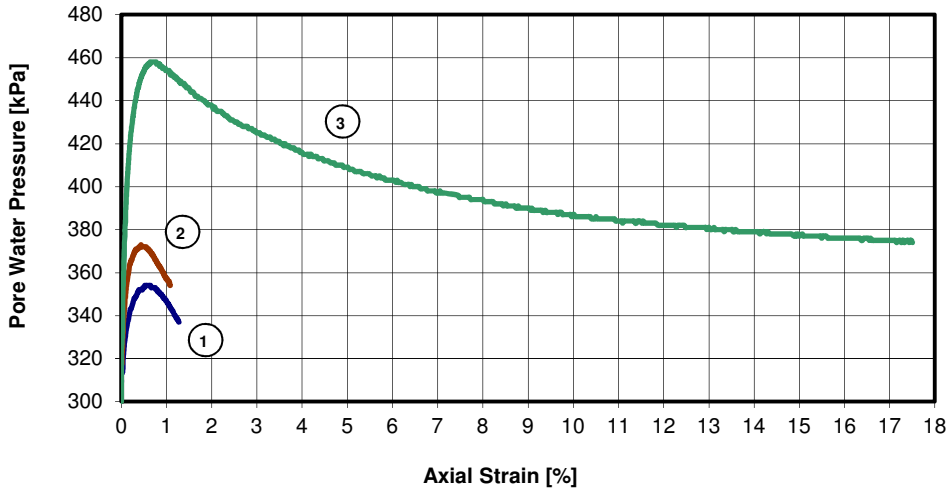


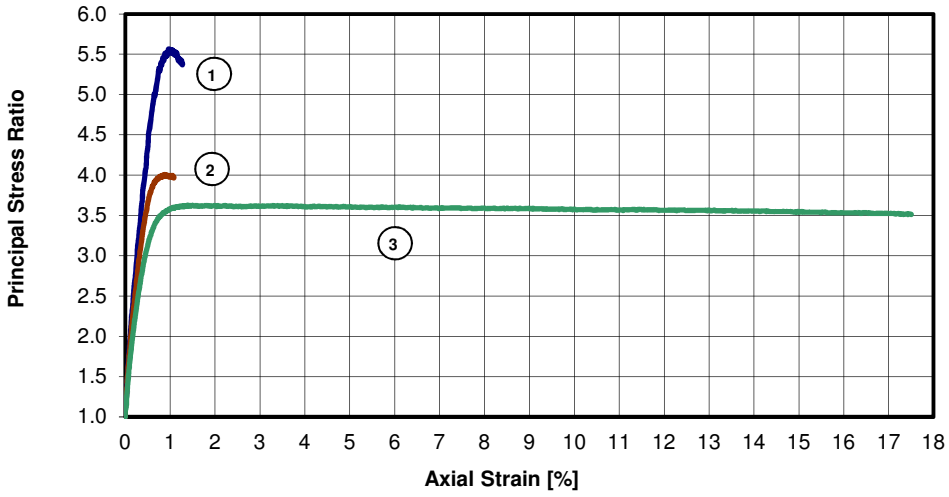


Date Printed	Figure Number	Sheet Number
28/02/2019	F.3.5.2	6

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH03
		Sample No.	33
Project Name	Scrabster Harbour Trust	Test type	CUM

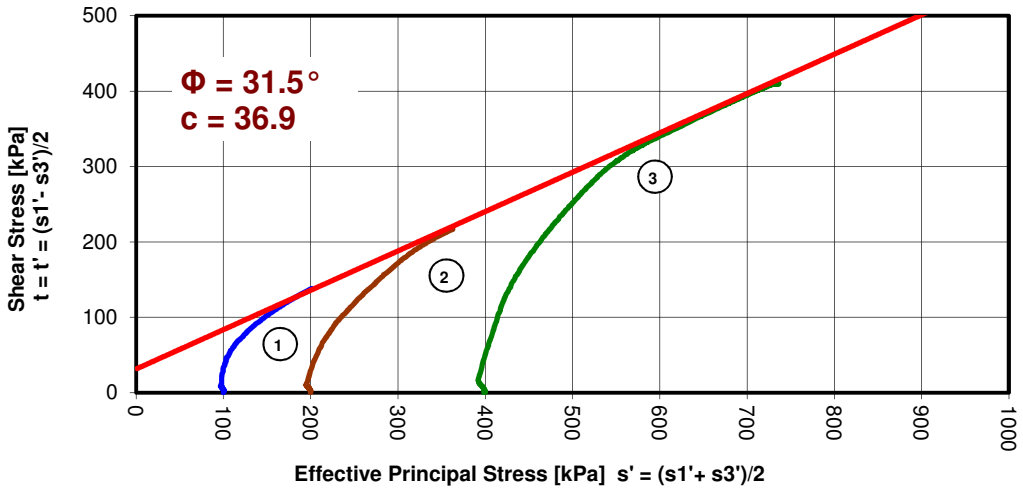


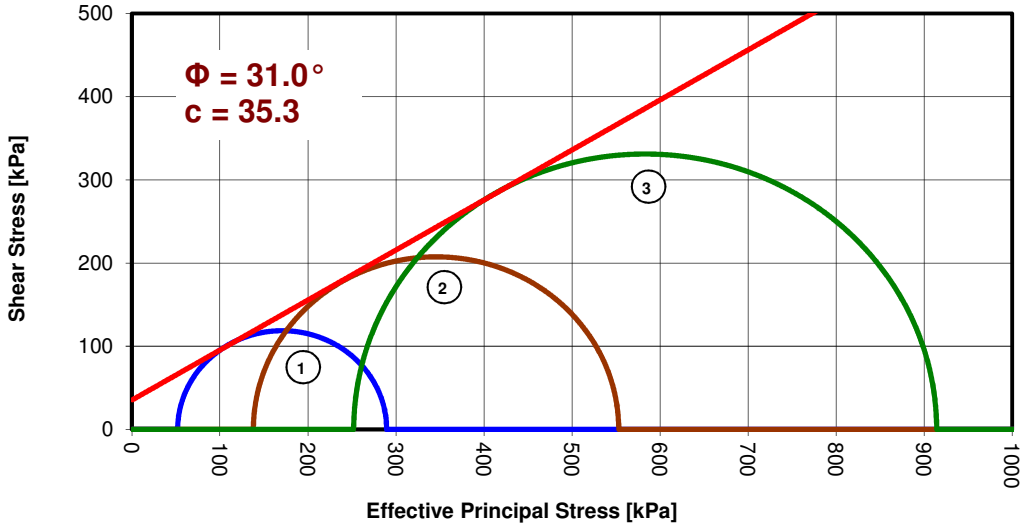




Date Printed	Figure Number	Sheet Number
28/02/2019	F.3.5.2	7

	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST with measurement of pore water pressure	Project No.	G180030U
		Hole	BH03
		Sample No.	33
Project Name	Scrabster Harbour Trust	Test type	CUM





Mode of failure:

Plastic

Date Printed	Figure Number	Sheet Number
28/02/2019	F.3.5.2	8

SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST
with measurement of pore water pressure

			Project No.	G180030U
			Borehole No.	BH21
			Sample No.	24
Project Name	Scrabster Harbour Trust		Sample Type	C
Specimen Description	Very stiff grey brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse angular to rounded		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 7		
Test type	CUM	assumed ☑ measured ☐	Specific gravity	2.70
			Date started	22/02/2019

Specimen Reference

INITIAL CONDITIONS

Sample depth	[m]	12.10		
Specimen depth	[mm]	140		
Diameter	[mm]	102.04		
Length	[mm]	193.68		
Moisture content	[%]	8.6		
Bulk density	[Mg/m^3]	2.39		
Dry density	[Mg/m^3]	2.20		
Voids ratio		0.23		
Degree of saturation	[%]	102		

SATURATION STAGE

Final cell pressure	[kPa]	400		
Final pore pressure	[kPa]	391		
Pres. Increments/Differential pres.	[kPa]	50;100 / 20-10		
B value achieved	[%]	97		
Duration	[days]	5		

CONSOLIDATION STAGE

Cell pressure	[kPa]	400	500	700
Back pressure	[kPa]	300	300	300
Effective pressure	[kPa]	100	200	400
Final pore pressure	[kPa]	300	300	300
Final pore pressure dissipation	[%]	100	100	100
Duration	[days]	1	1	1

COMPRESSION STAGE

Cell Pressure	[kPa]	400	500	700
Initial pore pressure	[kPa]	300	300	300
Initial effective stress	[kPa]	100	200	400
Rate of strain	[mm/min]	0.0200	0.0180	0.0130
Duration	[days]	1	1	2

Remarks

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH21
		Sample No.	24
Project Name	Scrabster Harbour Trust	Test type	CUM

Conditions at failure		**1**	**2**	**3**
Assumed failure criterion		Maximum effective principal stress ratio		
Pore pressure	[kPa]	335	350	403
Minor effective principal stress	[kPa]	65	150	297
Deviator stress	[kPa]	283	537	975
Major effective principal stress	[kPa]	348	687	1272
Effective principal stress ratio		5.4	4.6	4.3
Axial strain	[%]	0.9	0.9	1.3
Volumetric strain	[%]	0.0	0.0	0.0
Corrections to dev. stress M/Sd	[kPa]	0.2 / 3.5	0.4 / 3.5	0.7 / 3.5
Duration	[days]	1	1	2

EFFECTIVE STRESS PARAMETERS

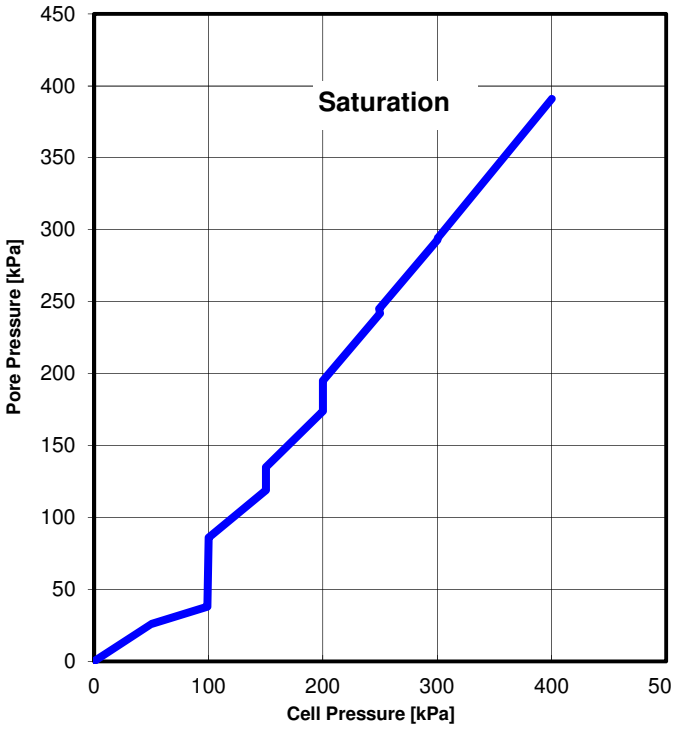
Cohesion c'	[kPa]	**22.4**
Angle of shearing resistance ϕ'	degrees	**36.8**

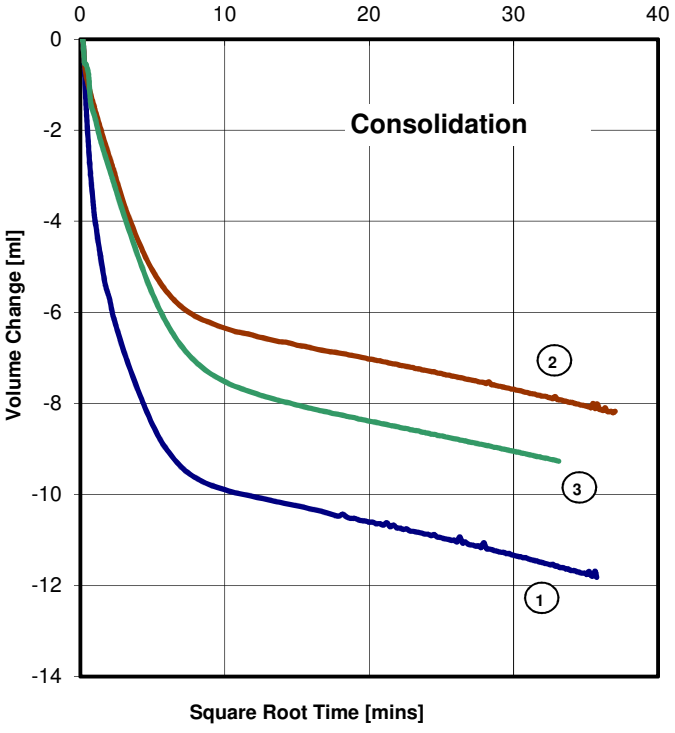
FINAL CONDITIONS

Moisture content	[%]			8.4
Bulk density	[Mg/m^3]			2.44

OTHER PARAMETERS

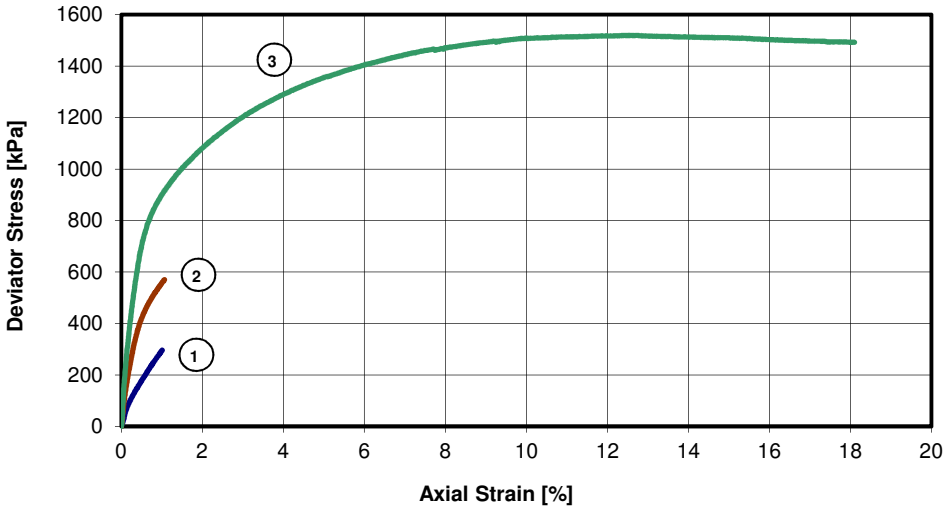
Secant modulus Eu 50	[MPa]	38.8	105.2	125.1
Strain at ε_{50}	[%]	0.38	0.27	0.61

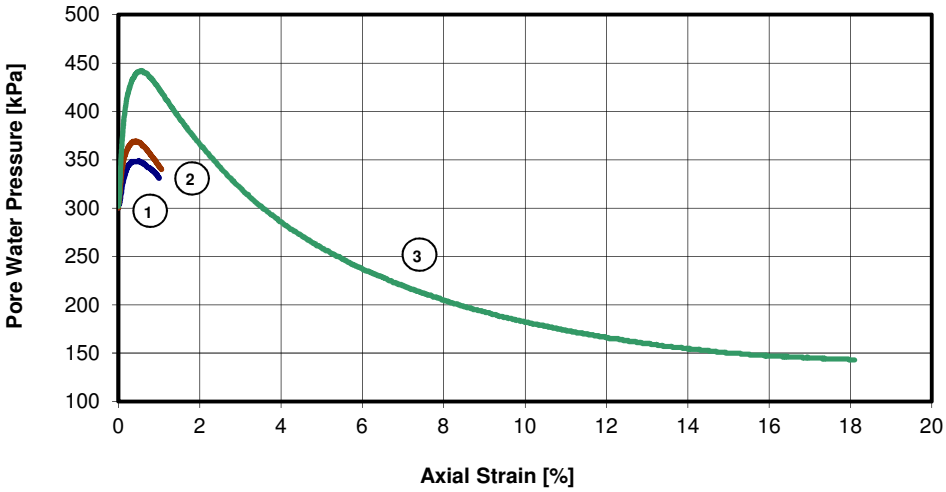


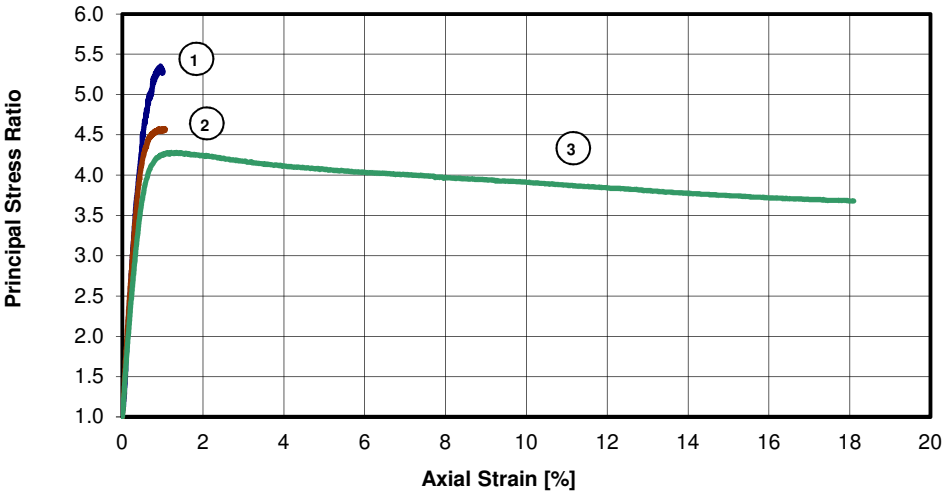


Date Printed	Figure Number	Sheet Number
05/03/2019	F.3.5.2	10

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH21
		Sample No.	24
Project Name	Scrabster Harbour Trust	Test type	CUM

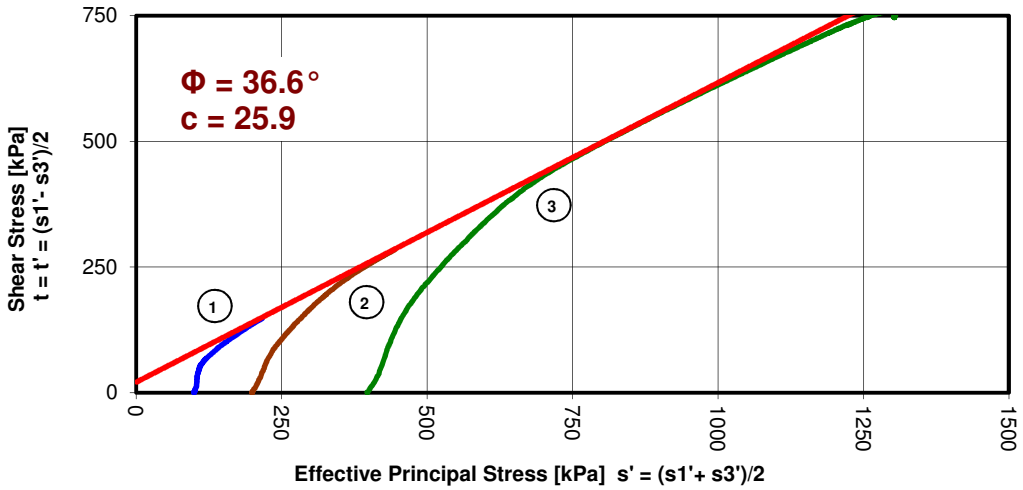


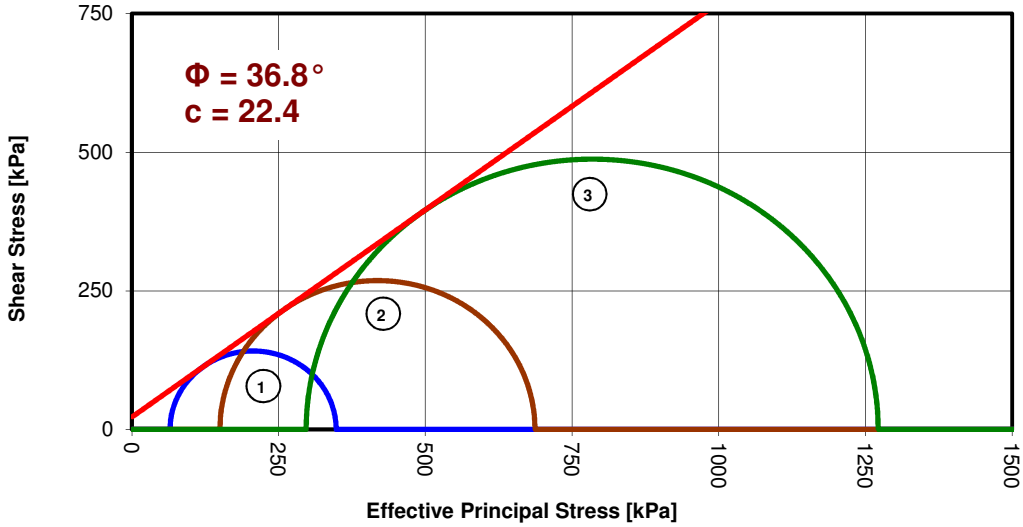




Date Printed	Figure Number	Sheet Number
05/03/2019	F.3.5.2	11

	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST with measurement of pore water pressure	Project No.	G180030U
		Hole	BH21
		Sample No.	24
Project Name	Scrabster Harbour Trust	Test type	CUM





Mode of failure:

Compound

Date Printed	Figure Number	Sheet Number
05/03/2019	F.3.5.2	12

SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure

Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)		Sample Type	C
Specimen Description	Very stiff dark grey brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse subangular to rounded		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 7		
Test type	CU	assumed ☑ measured ☐	Specific gravity	2.70
			Date started	04/02/2019

Project No.	G180030U
Borehole No.	BH22
Sample No.	14

Specimen Reference

INITIAL CONDITIONS

Sample depth	[m]	5.2		
Specimen depth	[mm]	80		
Diameter	[mm]	101.38		
Length	[mm]	194.10		
Moisture content	[%]	9.0		
Bulk density	[Mg/m^3]	2.39		
Dry density	[Mg/m^3]	2.19		
Voids ratio		0.23		
Degree of saturation	[%]	103.81		

SATURATION STAGE

Final cell pressure	[kPa]	500		
Final pore pressure	[kPa]	488		
Pres. Increments/Differential pres.	[kPa]	50;100 / 20-10		
B value achieved	[%]	98		
Duration	[days]	6		

CONSOLIDATION STAGE

Cell pressure	[kPa]	500		
Back pressure	[kPa]	400		
Effective pressure	[kPa]	100		
Final pore pressure	[kPa]	400		
Final pore pressure dissipation	[%]	100		
Duration	[days]	1		

COMPRESSION STAGE

Cell Pressure	[kPa]	500		
Initial pore pressure	[kPa]	400		
Initial effective stress	[kPa]	100		
Rate of strain	[mm/min]	0.0300		
Duration	[days]	1		

Remarks

	Date Printed	Figure Number	Sheet Number
	14/02/2019	F.3.5.2	13

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH22
		Sample No.	14
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)	Test type	CU

Conditions at failure

Assumed failure criterion		Maximum deviator stress		
Pore pressure	[kPa]	105		
Minor effective principal stress	[kPa]	395		
Deviator stress	[kPa]	1080		
Major effective principal stress	[kPa]	1475		
Effective principal stress ratio		3.7		
Axial strain	[%]	19.7		
Volumetric strain	[%]	0.0		
Corrections to dev. stress M/Sd	[kPa]	3.0 / 3.5		
Duration	[days]	1		

EFFECTIVE STRESS PARAMETERS

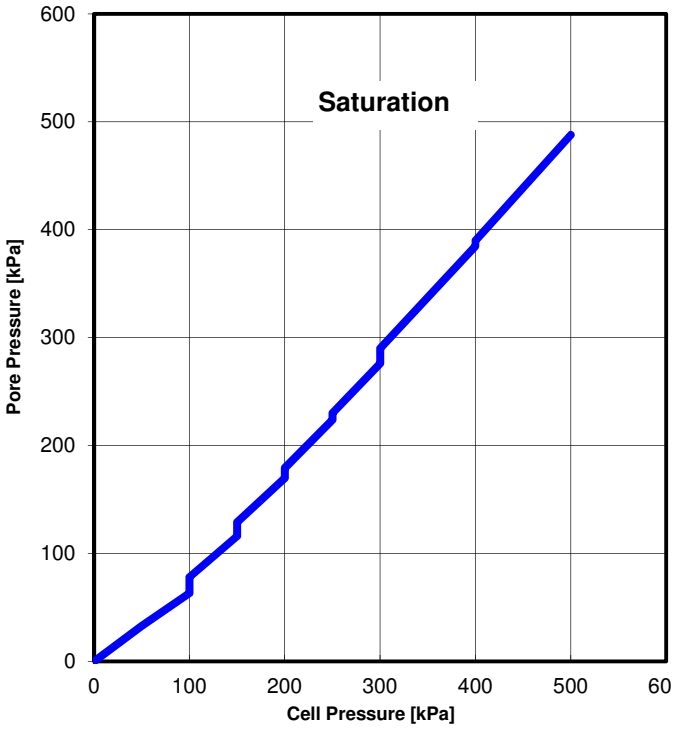
Cohesion c'	[kPa]	n/a
Angle of shearing resistance ϕ'	degrees	n/a

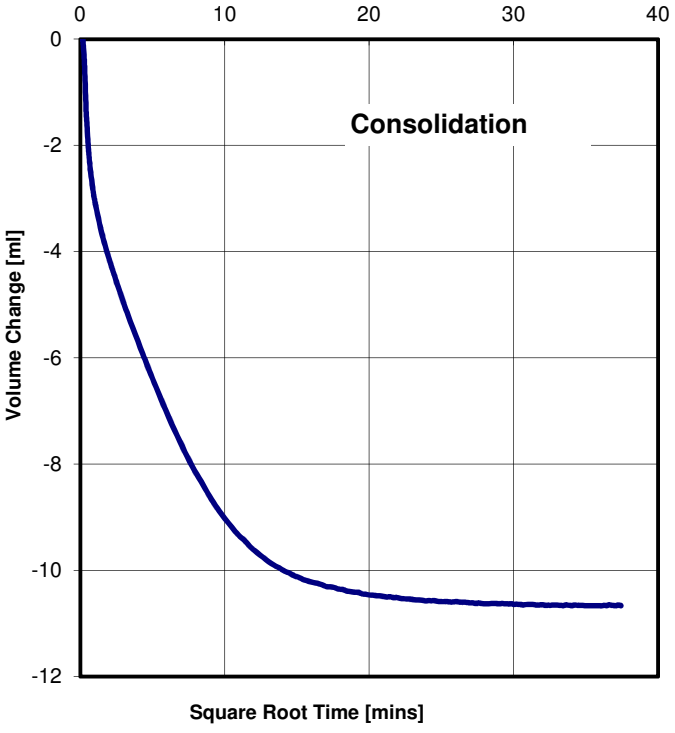
FINAL CONDITIONS

Moisture content	[%]	9.2		
Bulk density	[Mg/m^3]	2.40		

OTHER PARAMETERS

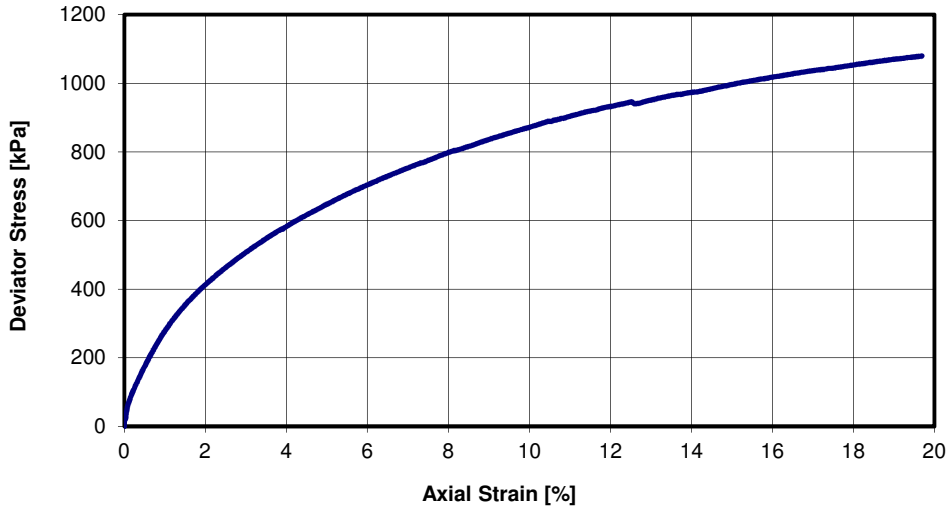
Secant modulus Eu 50	[MPa]	15.93		
Strain at ε_{50}	[%]	3.37		

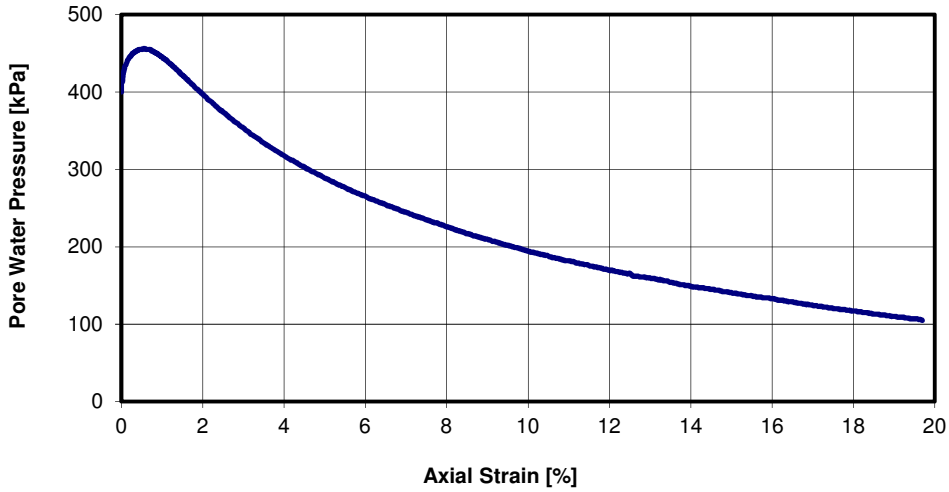


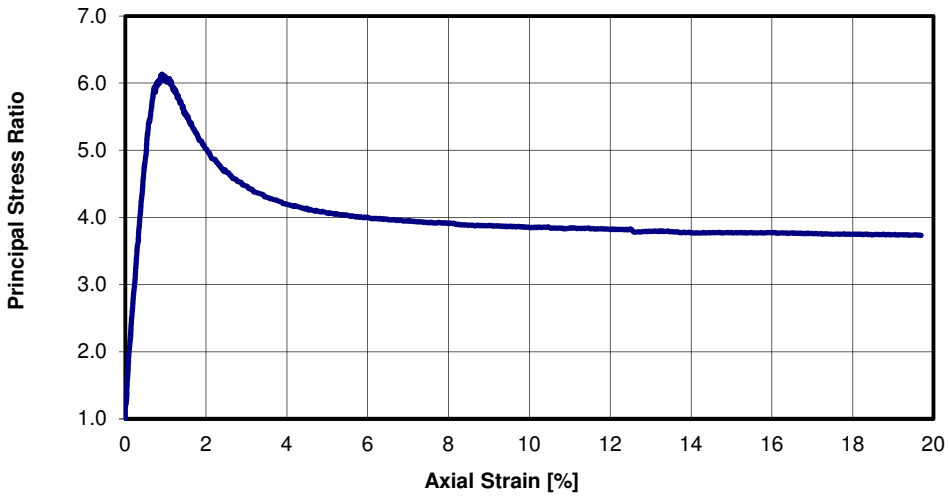


Date Printed	Figure Number	Sheet Number
14/02/2019	F.3.5.2	14

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH22
		Sample No.	14
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)	Test type	CU

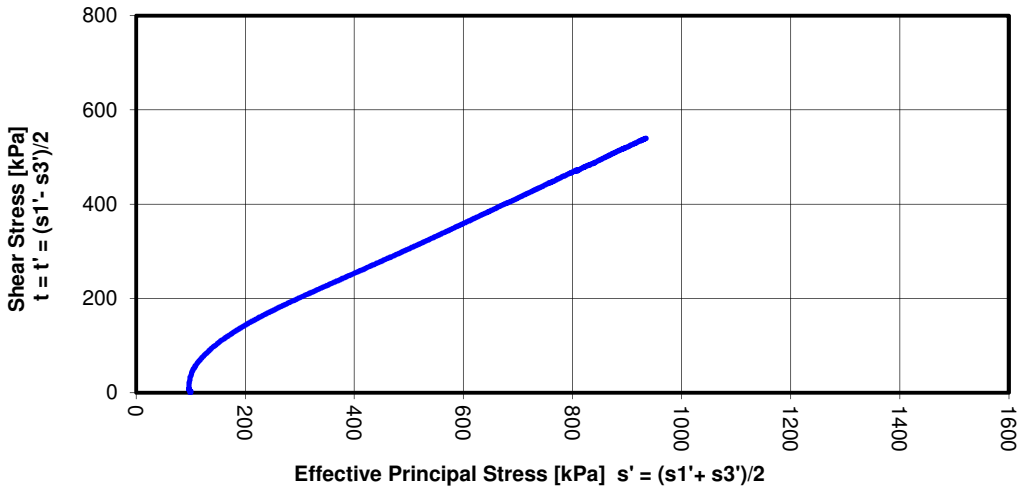


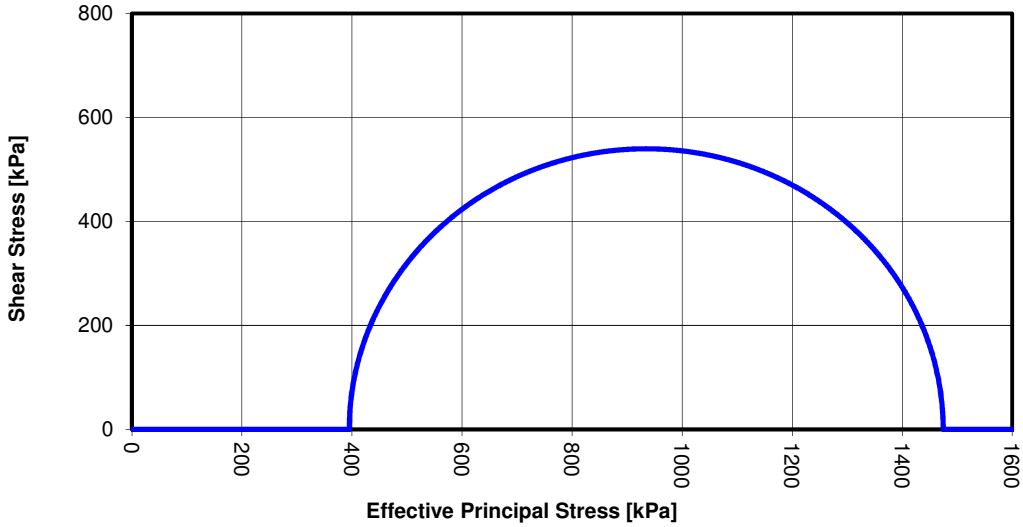




Date Printed	Figure Number	Sheet Number
14/02/2019	F.3.5.2	15

	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure	Project No.	G180030U
		Hole	BH22
		Sample No.	14
Project Name	St. Ola Pier Refurbishment - Site Investigation (Marine)	Test type	CU





Mode of failure:

Plastic

Date Printed	Figure Number	Sheet Number
14/02/2019	F.3.5.2	16

SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure

Project Name	Scrabster Harbour Trust		Sample Type	C
Specimen Description	Very stiff dark grey brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse angular to rounded		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 7		
Test type	CU	assumed ☑ measured ☐	Specific gravity	2.70
			Date started	18/02/2019

Project No.	G180030U
Borehole No.	BH22
Sample No.	17

Specimen Reference

INITIAL CONDITIONS

Sample depth	[m]	8.05		
Specimen depth	[mm]	160		
Diameter	[mm]	101.52		
Length	[mm]	193.30		
Moisture content	[%]	8.0		
Bulk density	[Mg/m^3]	2.35		
Dry density	[Mg/m^3]	2.18		
Voids ratio		0.24		
Degree of saturation	[%]	90		

SATURATION STAGE

Final cell pressure	[kPa]	400		
Final pore pressure	[kPa]	388		
Pres. Increments/Differential pres.	[kPa]	50;100 / 40-10		
B value achieved	[%]	97		
Duration	[days]	5		

CONSOLIDATION STAGE

Cell pressure	[kPa]	400		
Back pressure	[kPa]	300		
Effective pressure	[kPa]	100		
Final pore pressure	[kPa]	301		
Final pore pressure dissipation	[%]	100		
Duration	[days]	#VALUE!		

COMPRESSION STAGE

Cell Pressure	[kPa]	400		
Initial pore pressure	[kPa]	300		
Initial effective stress	[kPa]	100		
Rate of strain	[mm/min]	0.0300		
Duration	[days]	1		

Remarks

	Date Printed	Figure Number	Sheet Number
	26/02/2019	F.3.5.2	17

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH22
		Sample No.	17
Project Name	Scrabster Harbour Trust	Test type	CU

Conditions at failure

Assumed failure criterion		Maximum deviator stress		
Pore pressure	[kPa]	31		
Minor effective principal stress	[kPa]	369		
Deviator stress	[kPa]	947		
Major effective principal stress	[kPa]	1316		
Effective principal stress ratio		3.6		
Axial strain	[%]	16.6		
Volumetric strain	[%]	0.0		
Corrections to dev. stress M/Sd	[kPa]	2.6 / 3.5		
Duration	[days]	1		

EFFECTIVE STRESS PARAMETERS

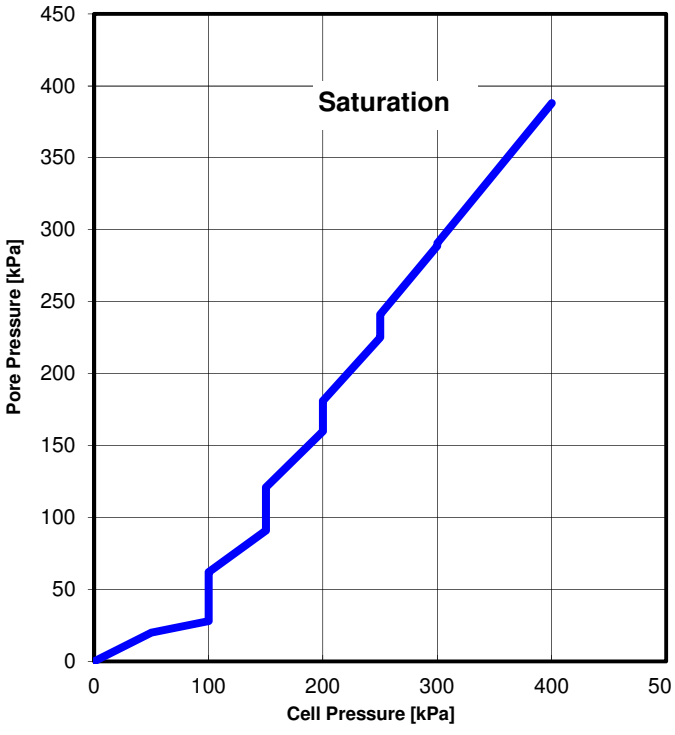
Cohesion c'	[kPa]	n/a
Angle of shearing resistance ϕ'	degrees	n/a

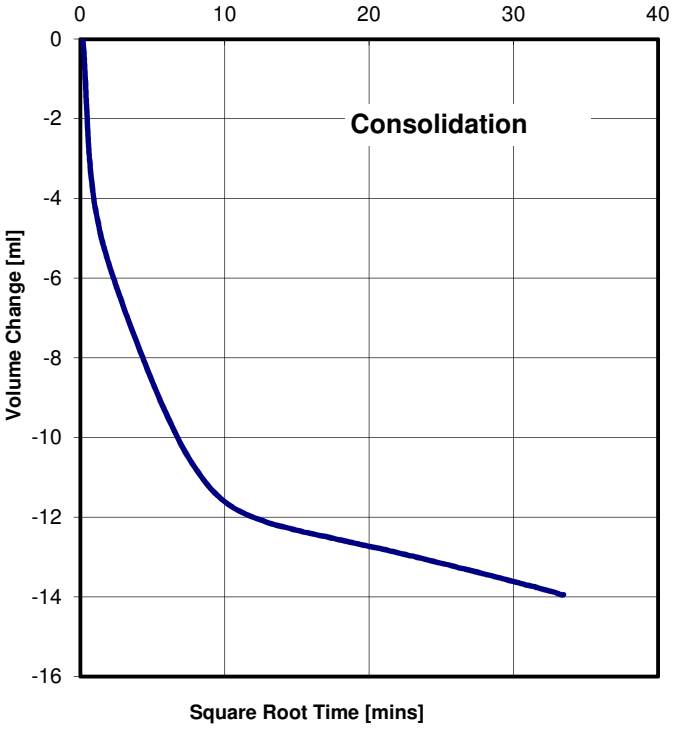
FINAL CONDITIONS

Moisture content	[%]	9.0		
Bulk density	[Mg/m^3]	2.39		

OTHER PARAMETERS

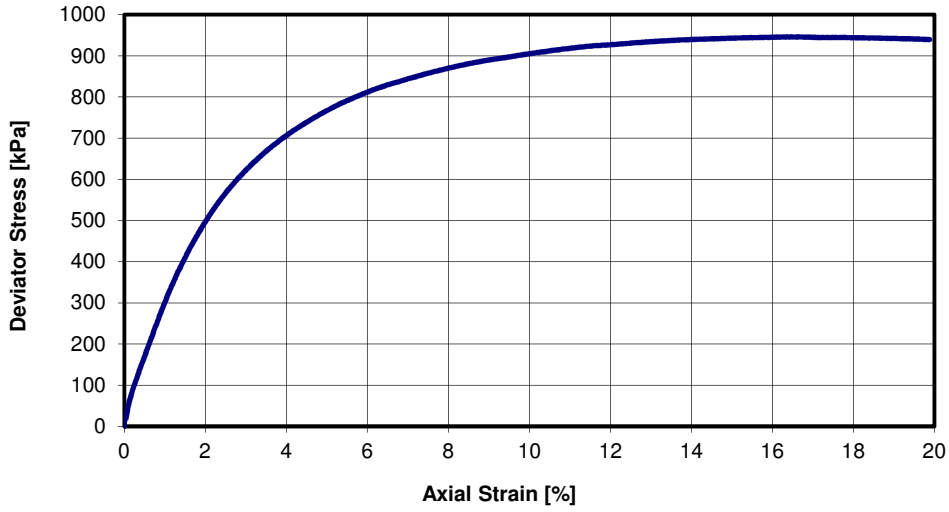
Secant modulus Eu 50	[MPa]	25.6		
Strain at ε_{50}	[%]	1.85		

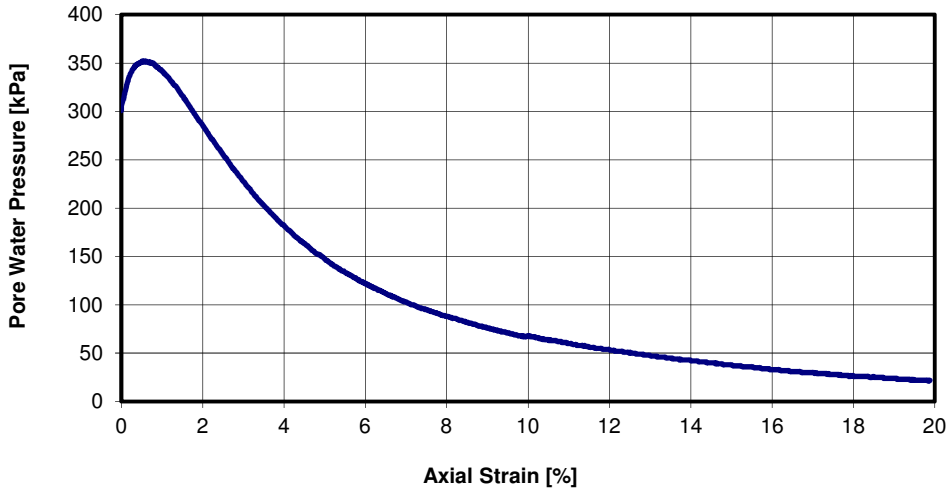


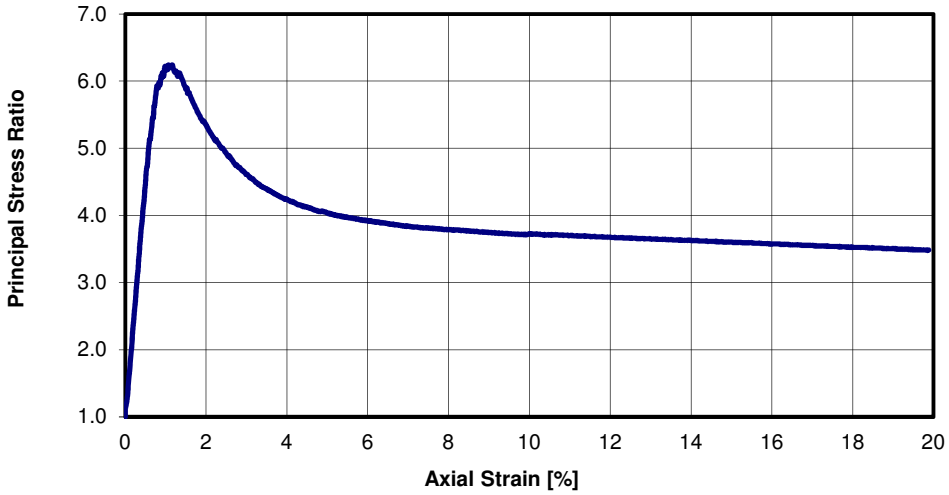


Date Printed	Figure Number	Sheet Number
26/02/2019	F.3.5.2	18

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH22
		Sample No.	17
Project Name	Scrabster Harbour Trust	Test type	CU

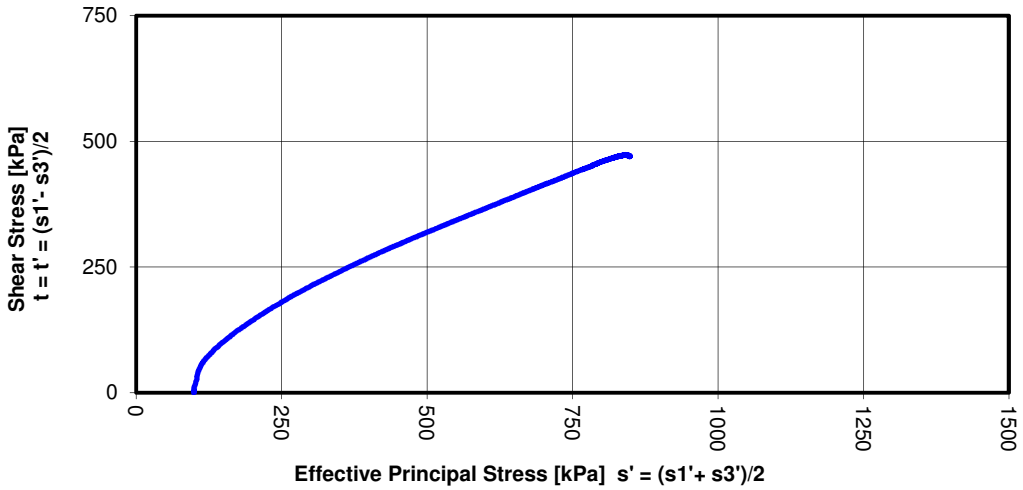


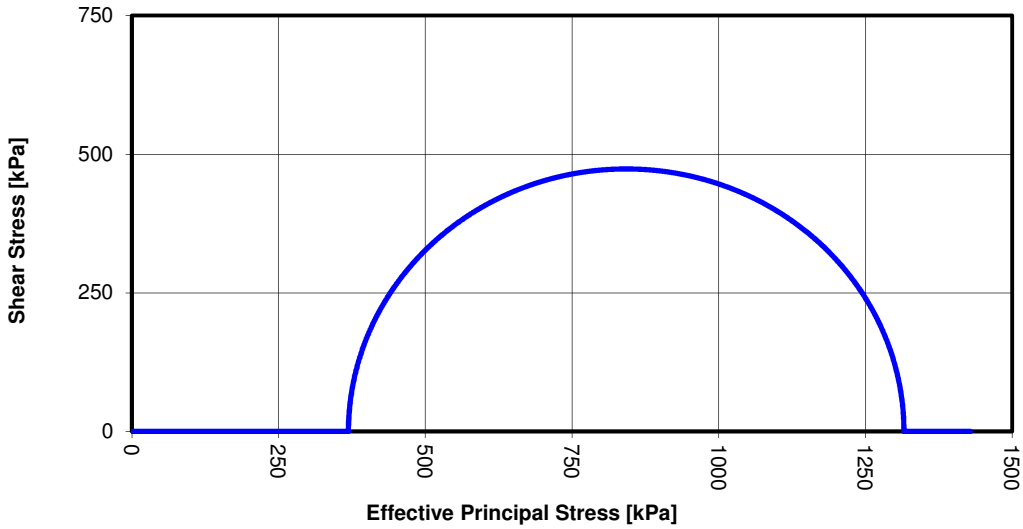




Date Printed	Figure Number	Sheet Number
26/02/2019	F.3.5.2	19

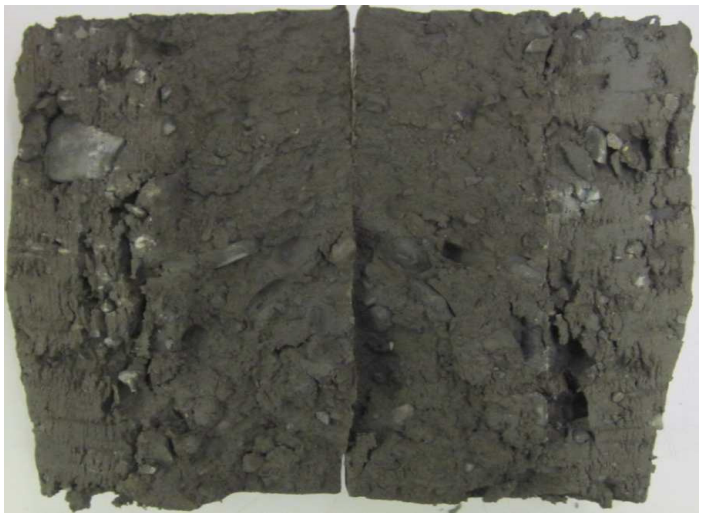
	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure	Project No.	G180030U
		Hole	BH22
		Sample No.	17
Project Name	Scrabster Harbour Trust	Test type	CU





Mode of failure:

Plastic



Date Printed	Figure Number	Sheet Number
26/02/2019	F.3.5.2	20

SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure

			Project No.	G180030U
			Borehole No.	BH23
			Sample No.	16
Project Name	Scrabster Harbour Trust		Sample Type	C
Specimen Description	Very stiff grey brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse angular to subrounded		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 7		
Test type	CU	assumed ☑ messured ☐	Specific gravity	2.70
			Date started	23/01/2019

Specimen Reference

INITIAL CONDITIONS

Sample depth	[m]	4.30		
Specimen depth	[mm]	110		
Diameter	[mm]	101.40		
Length	[mm]	182.12		
Moisture content	[%]	10.0		
Bulk density	[Mg/m^3]	2.32		
Dry density	[Mg/m^3]	2.11		
Voids ratio		0.28		
Degree of saturation	[%]	97.05		

SATURATION STAGE

Final cell pressure	[kPa]	400		
Final pore pressure	[kPa]	366		
Pres. Increments/Differential pres.	[kPa]	50;100 / 0		
B value achieved	[%]	103		
Duration	[days]	4		

CONSOLIDATION STAGE

Cell pressure	[kPa]	400		
Back pressure	[kPa]	300		
Effective pressure	[kPa]	100		
Final pore pressure	[kPa]	300		
Final pore pressure dissipation	[%]	100		
Duration	[days]	4		

COMPRESSION STAGE

Cell Pressure	[kPa]	400		
Initial pore pressure	[kPa]	300		
Initial effective stress	[kPa]	100		
Rate of strain	[mm/min]	0.0150		
Duration	[days]	2		

Remarks

	Date Printed	Figure Number	Sheet Number
	20/02/2019	F.3.5.2	21

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH23
		Sample No.	16
Project Name	Scrabster Harbour Trust	Test type	CU

Conditions at failure

Assumed failure criterion		Maximum deviator stress		
Pore pressure	[kPa]	128		
Minor effective principal stress	[kPa]	272		
Deviator stress	[kPa]	643		
Major effective principal stress	[kPa]	915		
Effective principal stress ratio		3.4		
Axial strain	[%]	19.8		
Volumetric strain	[%]	0.0		
Corrections to dev. stress M/Sd	[kPa]	3.0 / 3.5		
Duration	[days]	2		

EFFECTIVE STRESS PARAMETERS

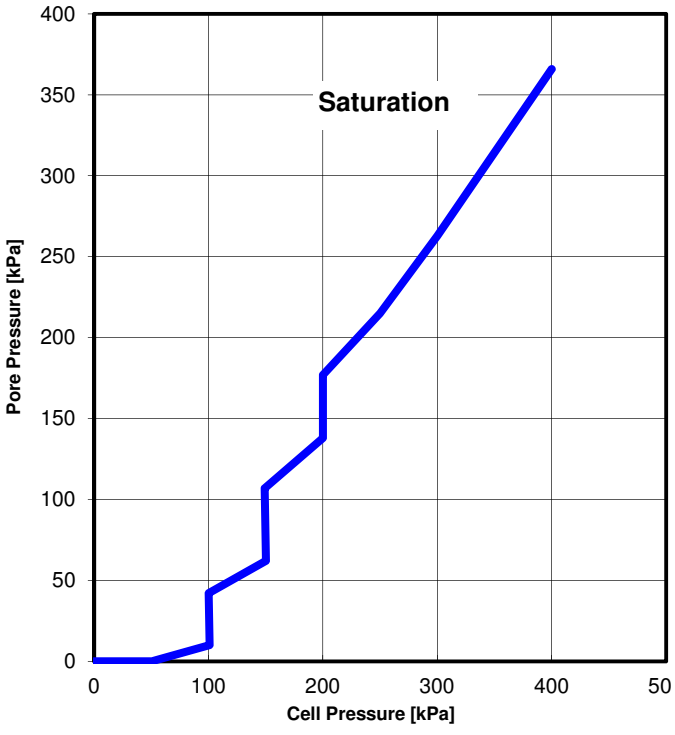
Cohesion c'	[kPa]	n/a
Angle of shearing resistance ϕ'	degrees	n/a

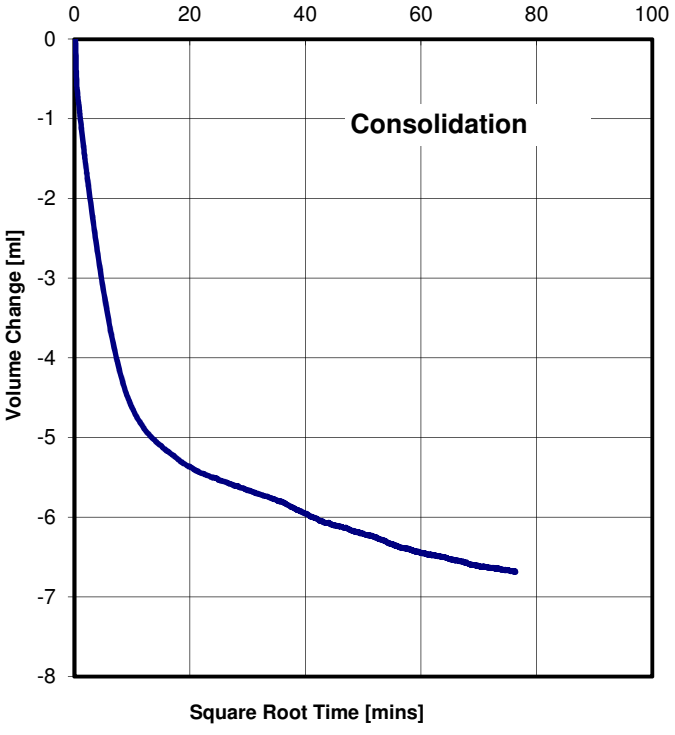
FINAL CONDITIONS

Moisture content	[%]	10.8		
Bulk density	[Mg/m^3]	2.34		

OTHER PARAMETERS

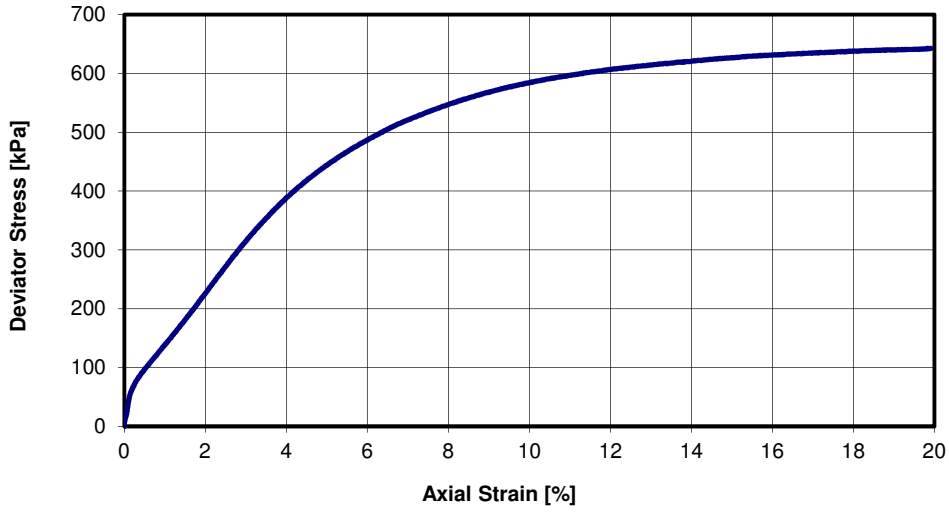
Secant modulus Eu 50	[MPa]	10.46		
Strain at ε_{50}	[%]	3.07		

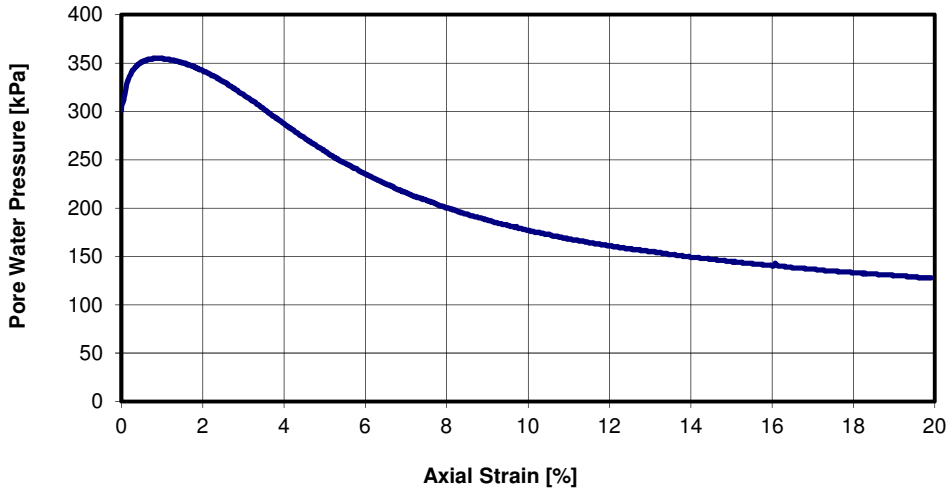


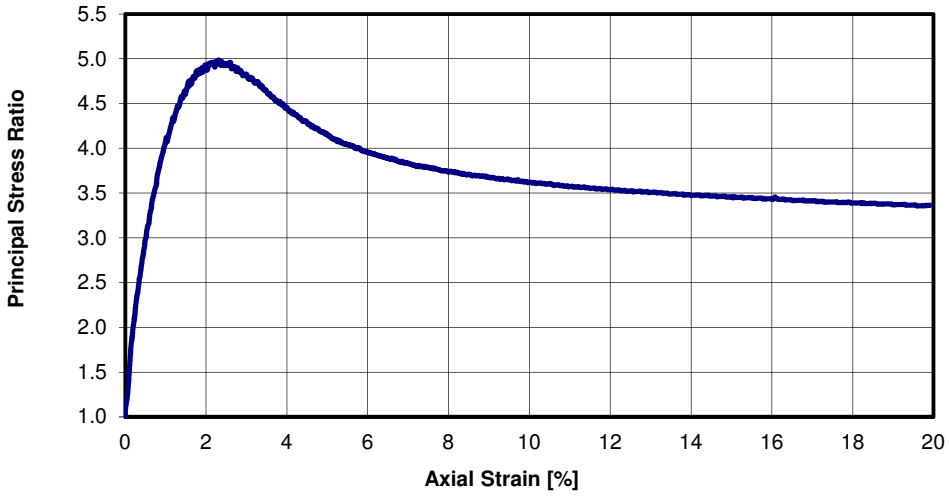


Date Printed	Figure Number	Sheet Number
20/02/2019	F.3.5.2	22

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH23
		Sample No.	16
Project Name	Scrabster Harbour Trust	Test type	CU

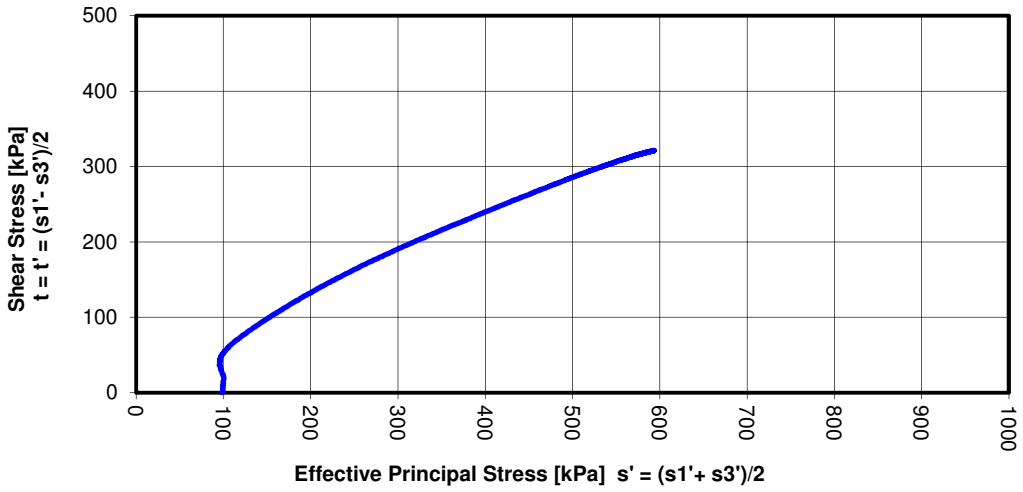


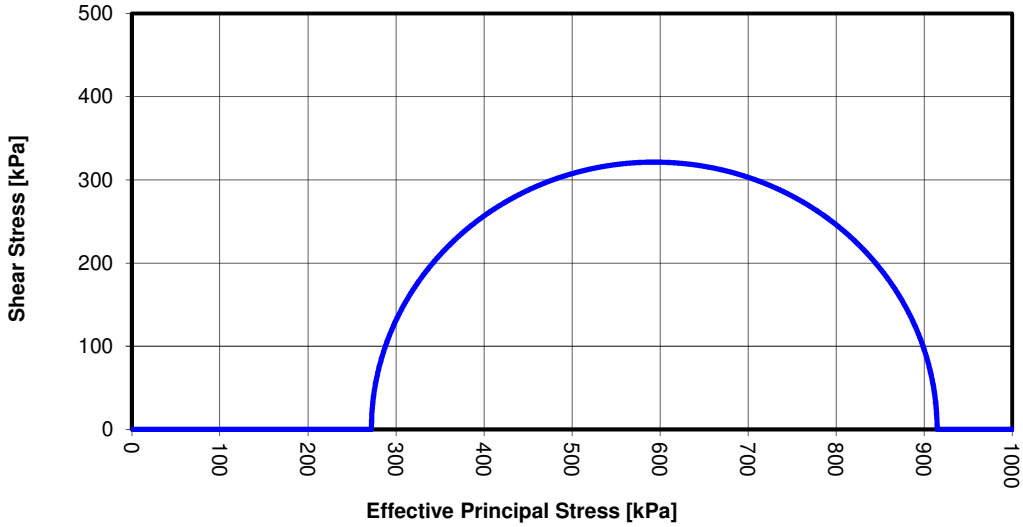




Date Printed	Figure Number	Sheet Number
20/02/2019	F.3.5.2	23

	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure	Project No.	G180030U
		Hole	BH23
		Sample No.	16
Project Name	Scrabster Harbour Trust	Test type	CU





Mode of failure:

Compound

Date Printed	Figure Number	Sheet Number
20/02/2019	F.3.5.2	24

SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure

Project Name	Scrabster Harbour Trust		Sample Type	C
Specimen Description	Very stiff grey brown slightly silty CLAY with thin diagonal silt laminae		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 7		
Test type	CU	assumed ☑ messured ☐	Specific gravity	2.70
			Date started	08/02/2019

Project No.	G180030U
Borehole No.	BH23
Sample No.	19

Specimen Reference

INITIAL CONDITIONS

Sample depth	[m]	7.4		
Specimen depth	[mm]	50		
Diameter	[mm]	99.80		
Length	[mm]	193.70		
Moisture content	[%]	20.7		
Bulk density	[Mg/m^3]	2.10		
Dry density	[Mg/m^3]	1.74		
Voids ratio		0.55		
Degree of saturation	[%]	100.72		

SATURATION STAGE

Final cell pressure	[kPa]	400		
Final pore pressure	[kPa]	395		
Pres. Increments/Differential pres.	[kPa]	50;100 / 50-20		
B value achieved	[%]	138		
Duration	[days]	3		

CONSOLIDATION STAGE

Cell pressure	[kPa]	400		
Back pressure	[kPa]	300		
Effective pressure	[kPa]	100		
Final pore pressure	[kPa]	300		
Final pore pressure dissipation	[%]	100		
Duration	[days]	1		

COMPRESSION STAGE

Cell Pressure	[kPa]	400		
Initial pore pressure	[kPa]	300		
Initial effective stress	[kPa]	100		
Rate of strain	[mm/min]	0.0100		
Duration	[days]	3		

Remarks

	Date Printed	Figure Number	Sheet Number
	19/02/2019	F.3.5.2	25

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH23
		Sample No.	19
Project Name	Scrabster Harbour Trust	Test type	CU

Conditions at failure		**1**	**2**	**3**
Assumed failure criterion		Maximum deviator stress		
Pore pressure	[kPa]	256		
Minor effective principal stress	[kPa]	144		
Deviator stress	[kPa]	268		
Major effective principal stress	[kPa]	412		
Effective principal stress ratio		2.9		
Axial strain	[%]	19.7		
Volumetric strain	[%]	0.0		
Corrections to dev. stress M/Sd	[kPa]	3.0 / 3.5		
Duration	[days]	3		

EFFECTIVE STRESS PARAMETERS

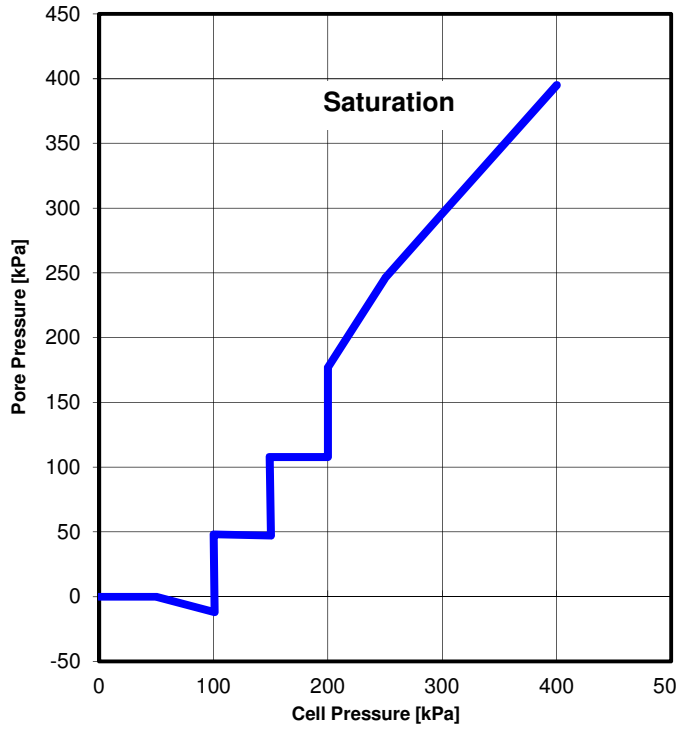
Cohesion c'	[kPa]	n/a
Angle of shearing resistance ϕ'	degrees	n/a

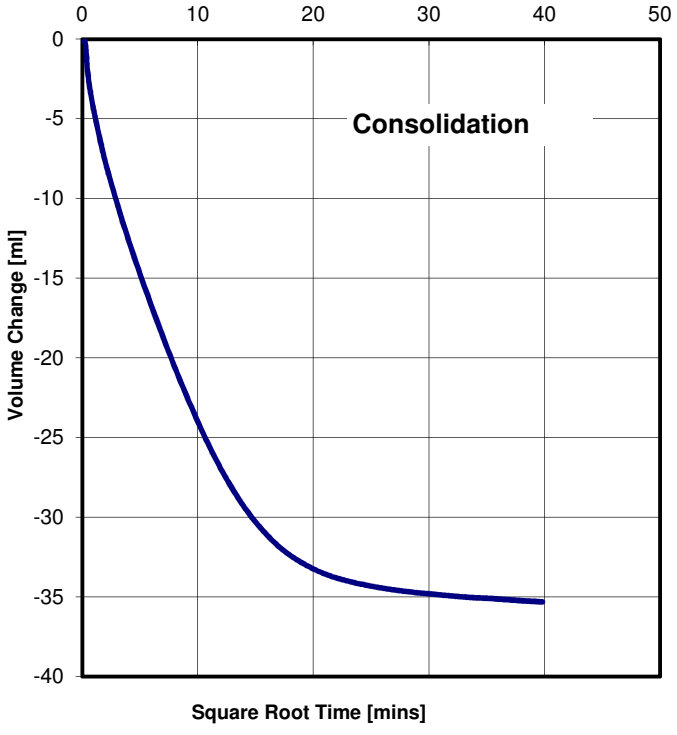
FINAL CONDITIONS

Moisture content	[%]	19.7		
Bulk density	[Mg/m^3]	2.14		

OTHER PARAMETERS

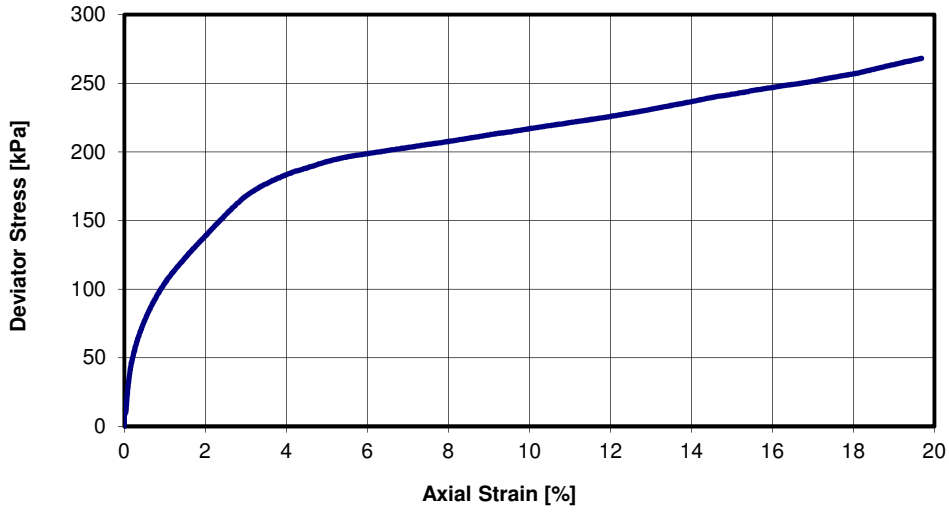
Secant modulus Eu 50	[MPa]	7.29		
Strain at ε_{50}	[%]	1.83		

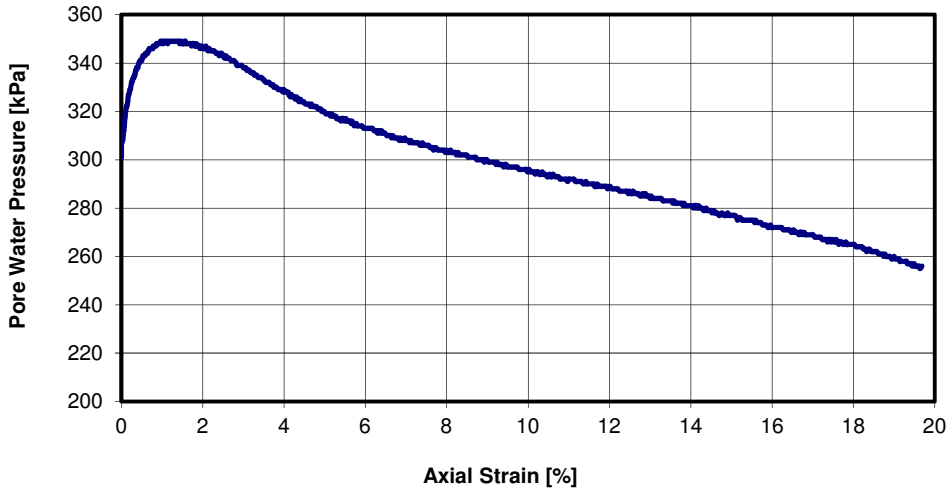


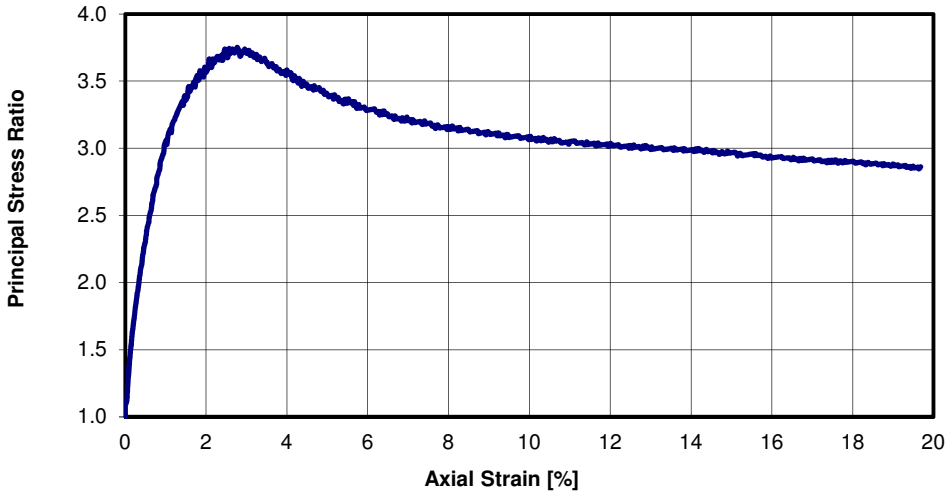


Date Printed	Figure Number	Sheet Number
19/02/2019	F.3.5.2	26

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH23
		Sample No.	19
Project Name	Scrabster Harbour Trust	Test type	CU

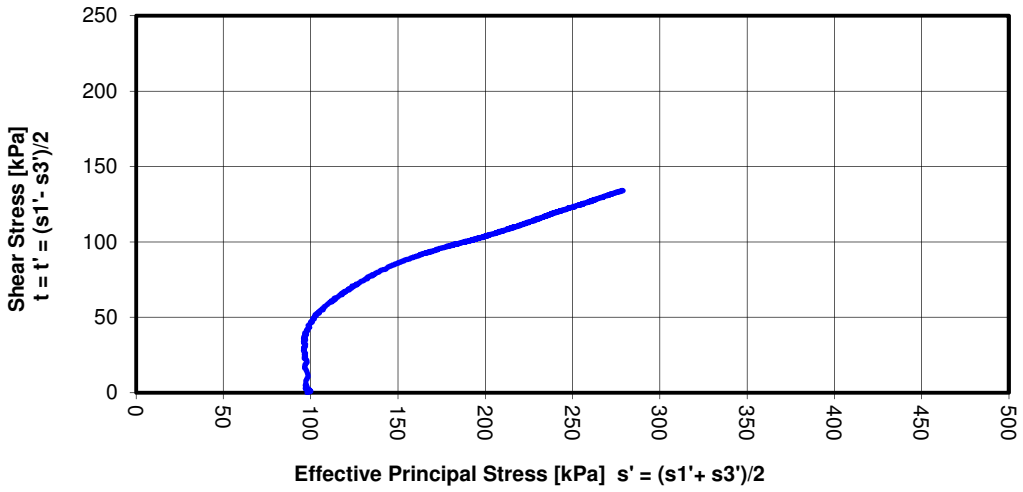


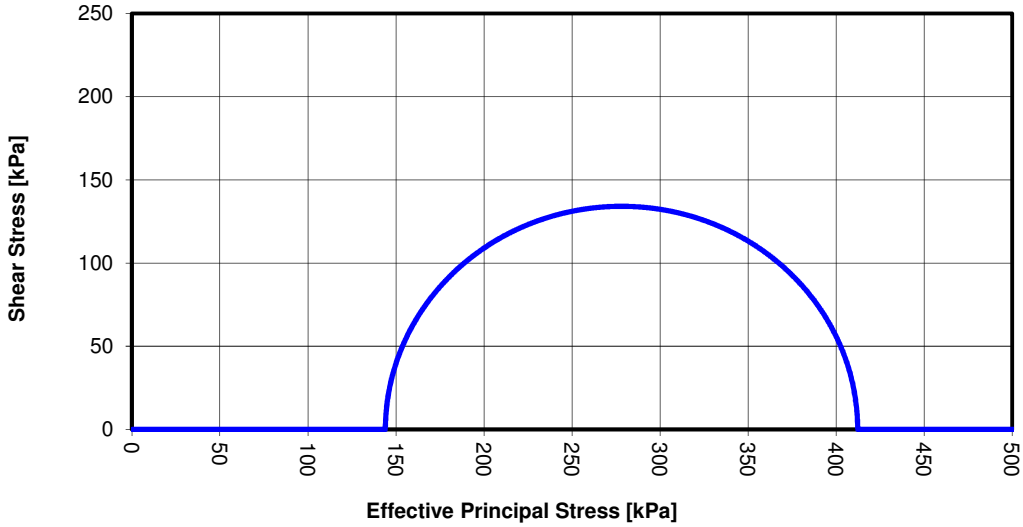




Date Printed	Figure Number	Sheet Number
19/02/2019	F.3.5.2	27

	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure	Project No.	G180030U
		Hole	BH23
		Sample No.	19
Project Name	Scrabster Harbour Trust	Test type	CU





Mode of failure:

Brittle

Date Printed	Figure Number	Sheet Number
19/02/2019	F.3.5.2	28

SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST
with measurement of pore water pressure

Project Name	Scrabster Harbour Trust		Sample Type	C
Specimen Description	Very stiff dark grey brown slightly gravelly sandy CLAY. Gravel is fine to medium angular to rounded		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 7		
Test type	CUM	assumed ☑ measured ☐	Specific gravity	2.70
			Date started	12/02/2019

Project No.	G180030U			
Borehole No.	BH24a			
Sample No.	17			

Specimen Reference

INITIAL CONDITIONS		1	2	3
Sample depth	[m]	8.00		
Specimen depth	[mm]	150		
Diameter	[mm]	101.12		
Length	[mm]	194.38		
Moisture content	[%]	11.6		
Bulk density	[Mg/m^3]	2.23		
Dry density	[Mg/m^3]	2.00		
Voids ratio		0.35		
Degree of saturation	[%]	89		

SATURATION STAGE				
Final cell pressure	[kPa]	349		
Final pore pressure	[kPa]	339		
Pres. Increments/Differential pres.	[kPa]	50;100 / 20-10		
B value achieved	[%]	100		
Duration	[days]	5		

CONSOLIDATION STAGE				
Cell pressure	[kPa]	350	400	500
Back pressure	[kPa]	300	300	300
Effective pressure	[kPa]	50	100	200
Final pore pressure	[kPa]	300	300	300
Final pore pressure dissipation	[%]	100	100	100
Duration	[days]	1	1	1

COMPRESSION STAGE				
Cell Pressure	[kPa]	350	400	500
Initial pore pressure	[kPa]	300	300	300
Initial effective stress	[kPa]	50	100	200
Rate of strain	[mm/min]	0.0150	0.0100	0.0080
Duration	[days]	1	1	3

Remarks

	Date Printed	Figure Number	Sheet Number
	26/02/2019	F.3.5.2	29

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH24a
		Sample No.	17
Project Name	Scrabster Harbour Trust	Test type	CUM

Conditions at failure		**1**	**2**	**3**
Assumed failure criterion		Maximum effective principal stress ratio		
Pore pressure	[kPa]	318	324	342
Minor effective principal stress	[kPa]	32	76	158
Deviator stress	[kPa]	160	266	453
Major effective principal stress	[kPa]	192	342	611
Effective principal stress ratio		6.0	4.5	3.9
Axial strain	[%]	1.4	1.1	1.5
Volumetric strain	[%]	0.0	0.0	0.0
Corrections to dev. stress M/Sd	[kPa]	0.3 / 3.5	0.6 / 3.5	0.8 / 3.5
Duration	[days]	1	1	3

EFFECTIVE STRESS PARAMETERS

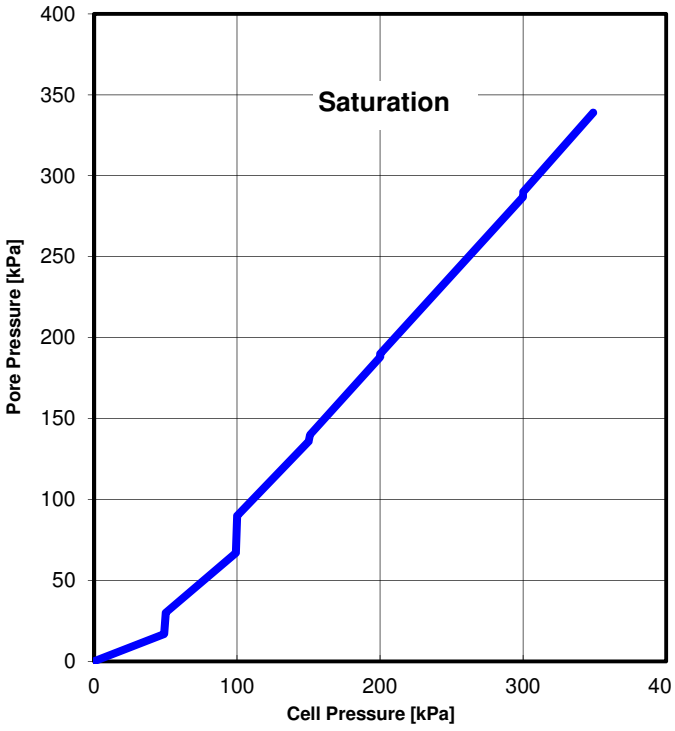
Cohesion c'	[kPa]	**23.9**
Angle of shearing resistance ϕ'	degrees	**32.5**

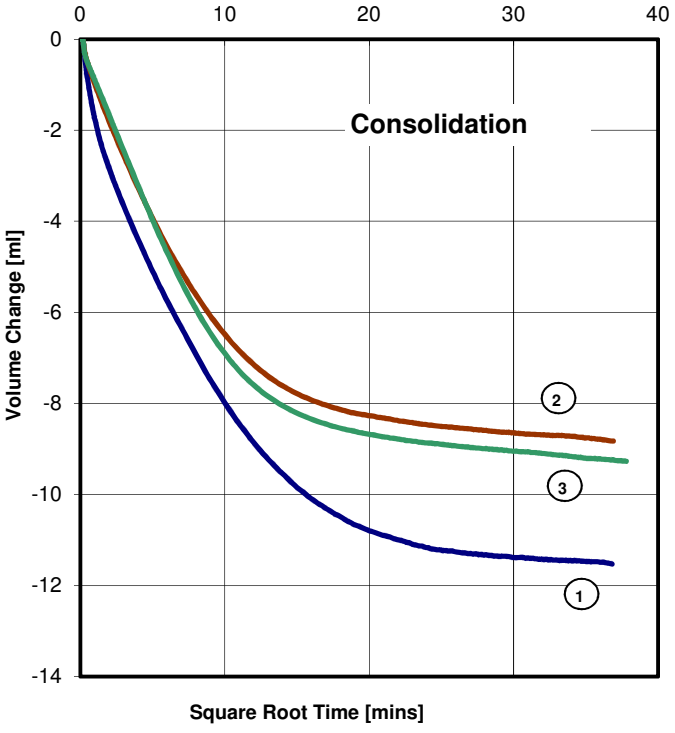
FINAL CONDITIONS

Moisture content	[%]			12.7
Bulk density	[Mg/m^3]			2.30

OTHER PARAMETERS

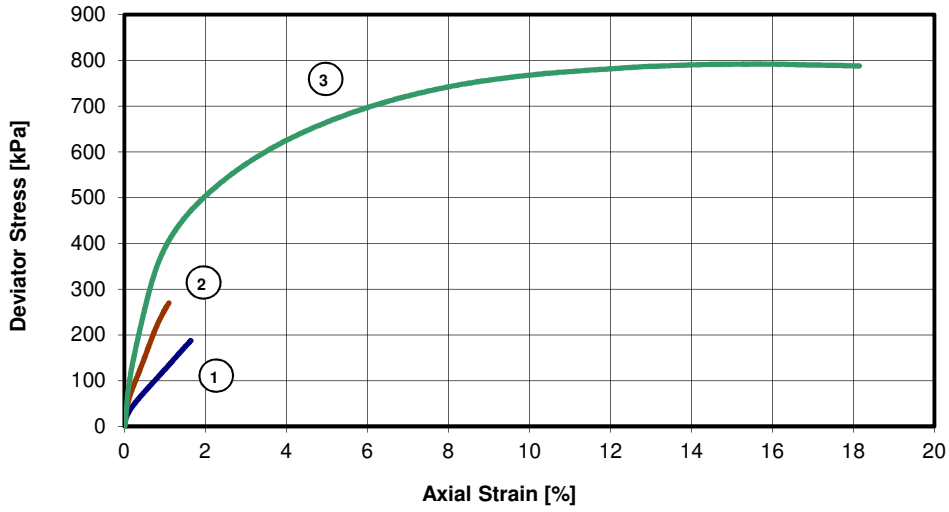
Secant modulus Eu 50	[MPa]	13.7	31.0	37.9
Strain at ε_{50}	[%]	0.68	0.44	1.04

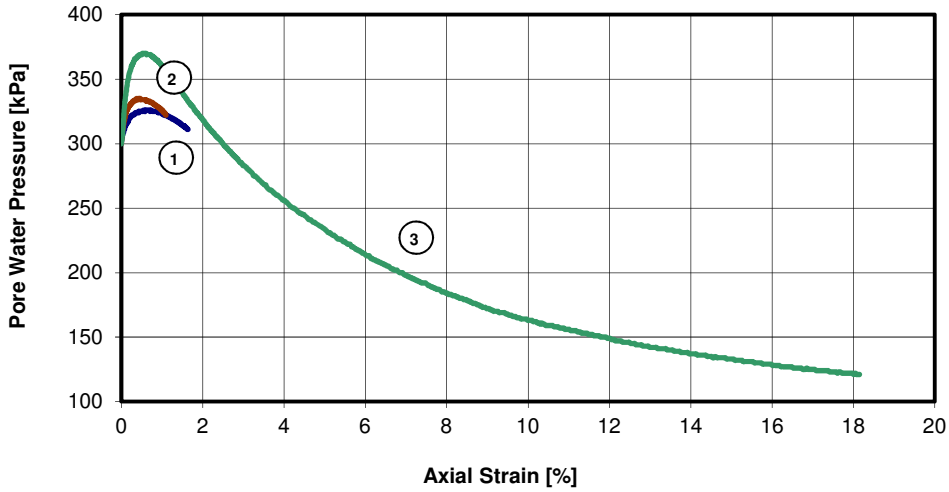


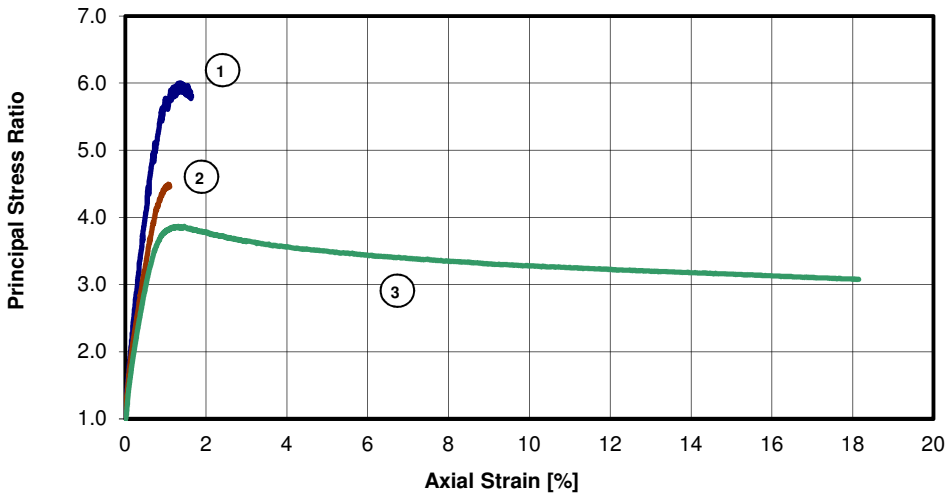


Date Printed	Figure Number	Sheet Number
26/02/2019	F.3.5.2	30

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH24a
		Sample No.	17
Project Name	Scrabster Harbour Trust	Test type	CUM

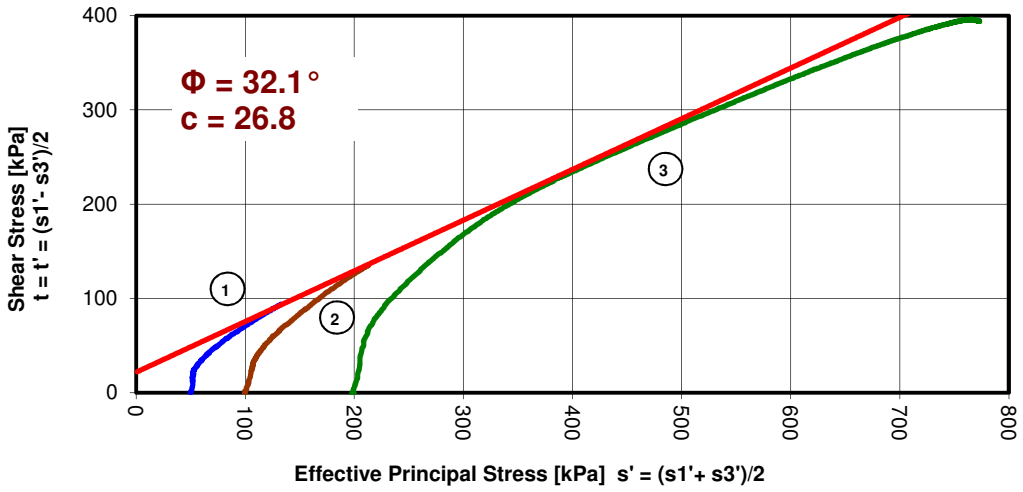


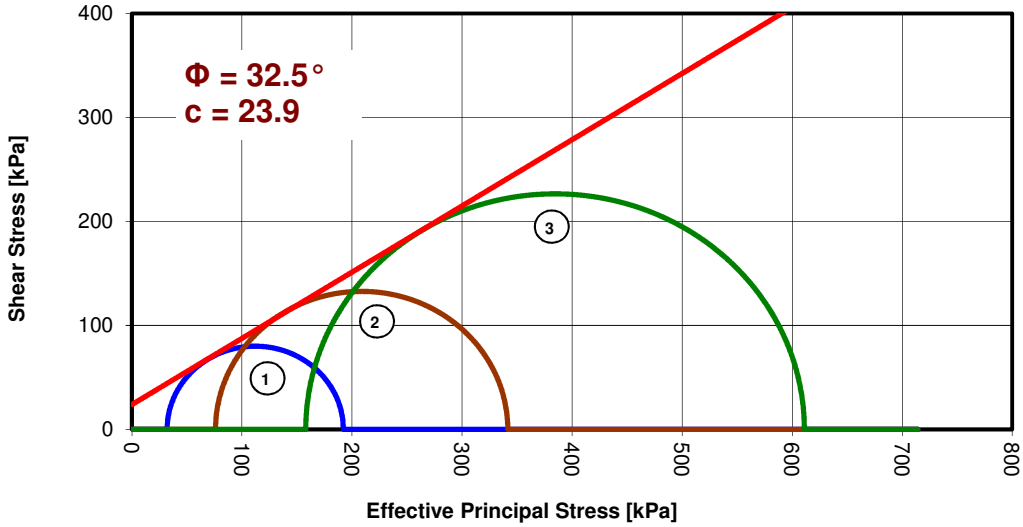




Date Printed	Figure Number	Sheet Number
26/02/2019	F.3.5.2	31

	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST with measurement of pore water pressure	Project No.	G180030U
		Hole	BH24a
		Sample No.	17
Project Name	Scrabster Harbour Trust	Test type	CUM





Mode of failure:

Compound

Date Printed	Figure Number	Sheet Number
26/02/2019	F.3.5.2	32

SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure

Project Name	Scrabster Harbour Trust		Sample Type	C
Specimen Description	Very stiff dark grey brown slightly gravelly slightly sandy CLAY. Gravel is fine to medium angular to rounded		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 7		
Test type	CU	assumed ☑ messured ☐	Specific gravity	2.70
			Date started	12/02/2019

Project No.	G180030U
Borehole No.	BH24a
Sample No.	19

Specimen Reference

INITIAL CONDITIONS

Sample depth	[m]	10.85		
Specimen depth	[mm]	90		
Diameter	[mm]	100.60		
Length	[mm]	194.14		
Moisture content	[%]	9.9		
Bulk density	[Mg/m^3]	2.33		
Dry density	[Mg/m^3]	2.12		
Voids ratio		0.27		
Degree of saturation	[%]	97.74		

SATURATION STAGE

Final cell pressure	[kPa]	500		
Final pore pressure	[kPa]	487		
Pres. Increments/Differential pres.	[kPa]	50;100 / 20-10		
B value achieved	[%]	98		
Duration	[days]	4		

CONSOLIDATION STAGE

Cell pressure	[kPa]	500		
Back pressure	[kPa]	300		
Effective pressure	[kPa]	200		
Final pore pressure	[kPa]	300		
Final pore pressure dissipation	[%]	100		
Duration	[days]	1		

COMPRESSION STAGE

Cell Pressure	[kPa]	500		
Initial pore pressure	[kPa]	300		
Initial effective stress	[kPa]	200		
Rate of strain	[mm/min]	0.0250		
Duration	[days]	1		

Remarks

	Date Printed	Figure Number	Sheet Number
	21/02/2019	F.3.5.2	33

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH24a
		Sample No.	19
Project Name	Scrabster Harbour Trust	Test type	CU

Conditions at failure

Assumed failure criterion		Maximum deviator stress		
Pore pressure	[kPa]	123		
Minor effective principal stress	[kPa]	377		
Deviator stress	[kPa]	956		
Major effective principal stress	[kPa]	1333		
Effective principal stress ratio		3.5		
Axial strain	[%]	13.6		
Volumetric strain	[%]	0.0		
Corrections to dev. stress M/Sd	[kPa]	2.3 / 3.5		
Duration	[days]	1		

EFFECTIVE STRESS PARAMETERS

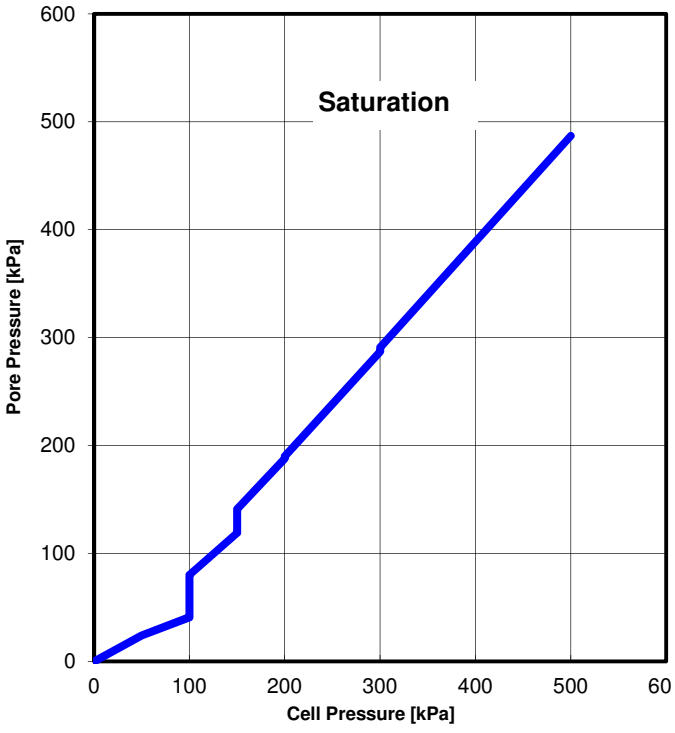
Cohesion c'	[kPa]	n/a
Angle of shearing resistance ϕ'	degrees	n/a

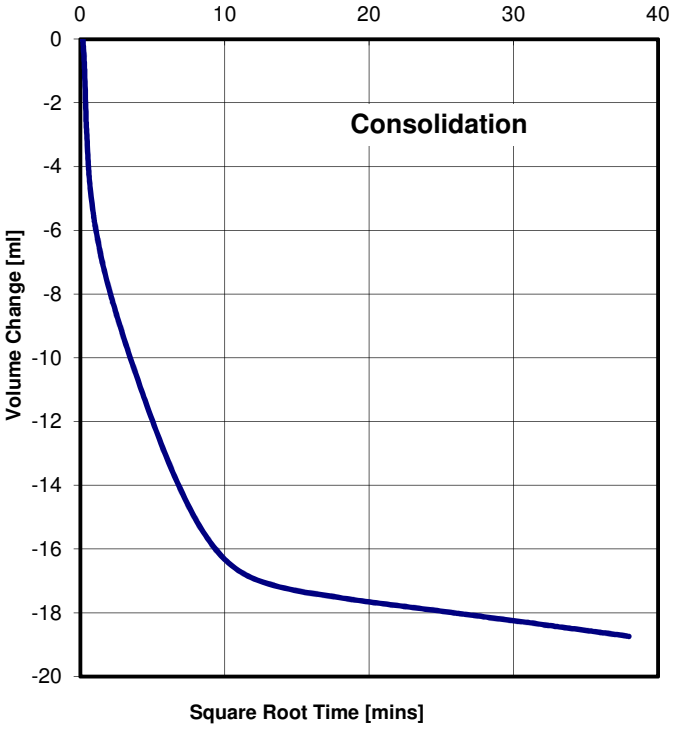
FINAL CONDITIONS

Moisture content	[%]	9.6		
Bulk density	[Mg/m^3]	2.36		

OTHER PARAMETERS

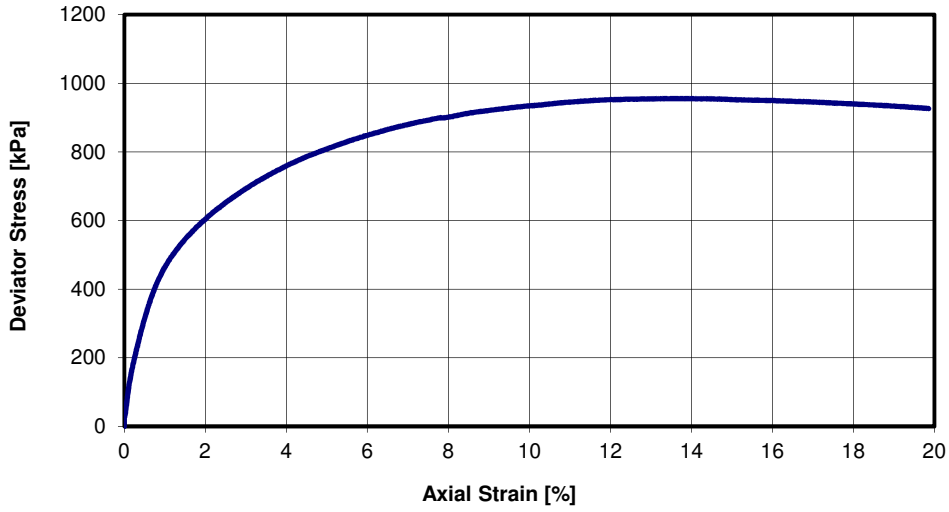
Secant modulus Eu 50	[MPa]	44.75		
Strain at ε_{50}	[%]	1.07		

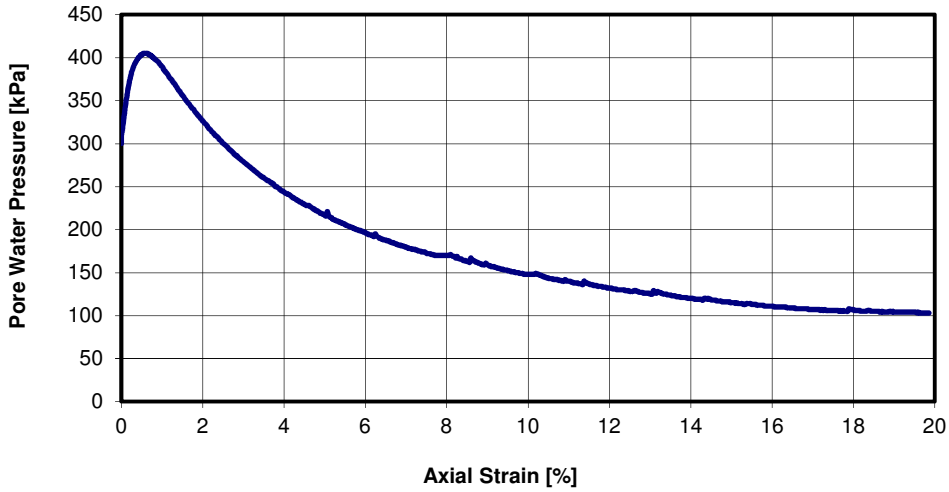


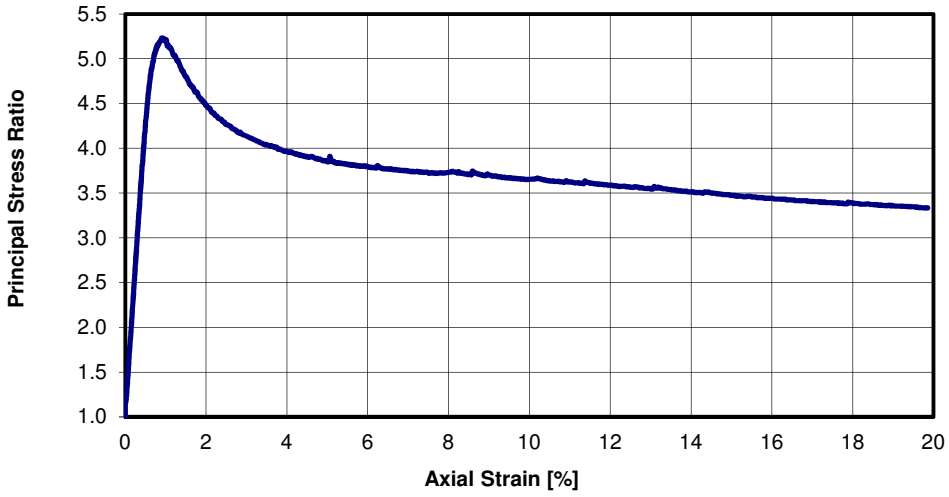


Date Printed	Figure Number	Sheet Number
21/02/2019	F.3.5.2	34

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH24a
		Sample No.	19
Project Name	Scrabster Harbour Trust	Test type	CU

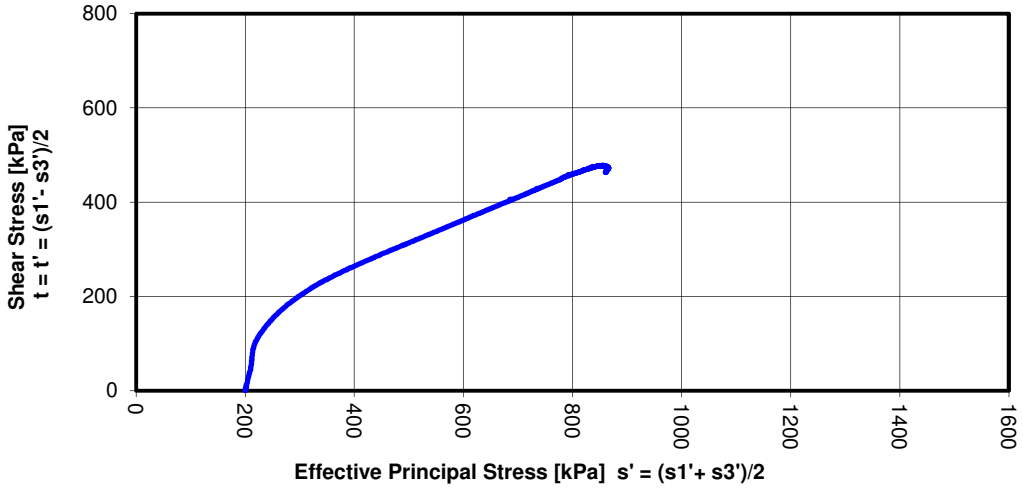


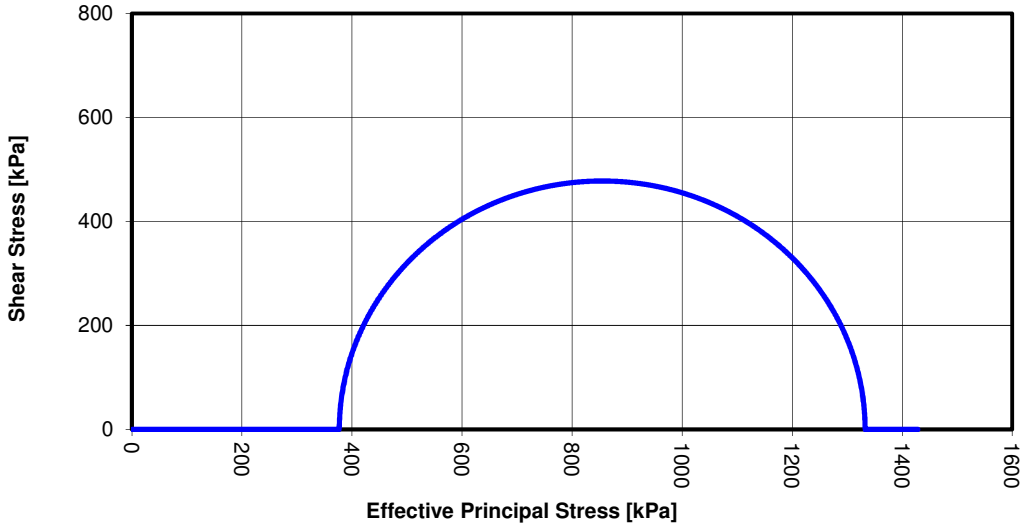




Date Printed	Figure Number	Sheet Number
21/02/2019	F.3.5.2	35

	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : SINGLE SPECIMEN with measurement of pore water pressure	Project No.	G180030U
		Hole	BH24a
		Sample No.	19
Project Name	Scrabster Harbour Trust	Test type	CU





Mode of failure:

Compound

Date Printed	Figure Number	Sheet Number
21/02/2019	F.3.5.2	36

SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST
with measurement of pore water pressure

Project Name	Scrabster Harbour Trust		Sample Type	C
Specimen Description	Very stiff dark grey brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse angular to rounded		Sample preparation	UNDISTURBED
Test Method	Specimen set-up	BS 1377:Part 8: 1990 Clause 4	Sample orientation	Vertical
	Saturation	BS 1377:Part 8: 1990 Clause 5.3		
	Consolidation-Isotropic	BS 1377:Part 8: 1990 Clause 6	Drainage conditions	Both ends and sides
	Shearing	BS 1377:Part 8: 1990 Clause 7		
Test type	CUM	assumed ☑ measured ☐	Specific gravity	2.70
			Date started	13/02/2019

Project No.	G180030U
Borehole No.	BH24a
Sample No.	22

Specimen Reference

INITIAL CONDITIONS

Sample depth	[m]	14.15		
Specimen depth	[mm]	90		
Diameter	[mm]	100.10		
Length	[mm]	193.18		
Moisture content	[%]	10.6		
Bulk density	[Mg/m^3]	2.30		
Dry density	[Mg/m^3]	2.08		
Voids ratio		0.30		
Degree of saturation	[%]	97		

SATURATION STAGE

Final cell pressure	[kPa]	399		
Final pore pressure	[kPa]	391		
Pres. Increments/Differential pres.	[kPa]	50;100 / 20-10		
B value achieved	[%]	99		
Duration	[days]	4		

CONSOLIDATION STAGE

Cell pressure	[kPa]	400	500	700
Back pressure	[kPa]	300	300	300
Effective pressure	[kPa]	100	200	400
Final pore pressure	[kPa]	300	300	300
Final pore pressure dissipation	[%]	100	100	100
Duration	[days]	1	1	1

COMPRESSION STAGE

Cell Pressure	[kPa]	400	500	700
Initial pore pressure	[kPa]	300	300	300
Initial effective stress	[kPa]	100	200	400
Rate of strain	[mm/min]	0.0400	0.0200	0.0150
Duration	[days]	1	1	2

Remarks

	Date Printed	Figure Number	Sheet Number
	04/03/2019	F.3.5.2	37

FUGRO	**SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST with measurement of pore water pressure**	Project No.	G180030U
		Hole	BH24a
		Sample No.	22
Project Name	Scrabster Harbour Trust	Test type	CUM

Conditions at failure		**1**	**2**	**3**
Assumed failure criterion		Maximum effective principal stress ratio		
Pore pressure	[kPa]	353	354	431
Minor effective principal stress	[kPa]	47	146	269
Deviator stress	[kPa]	264	467	701
Major effective principal stress	[kPa]	311	613	970
Effective principal stress ratio		6.6	4.2	3.6
Axial strain	[%]	0.8	0.8	1.0
Volumetric strain	[%]	0.0	0.0	0.0
Corrections to dev. stress M/Sd	[kPa]	0.2 / 3.5	0.4 / 3.5	0.7 / 3.5
Duration	[days]	1	1	2

EFFECTIVE STRESS PARAMETERS

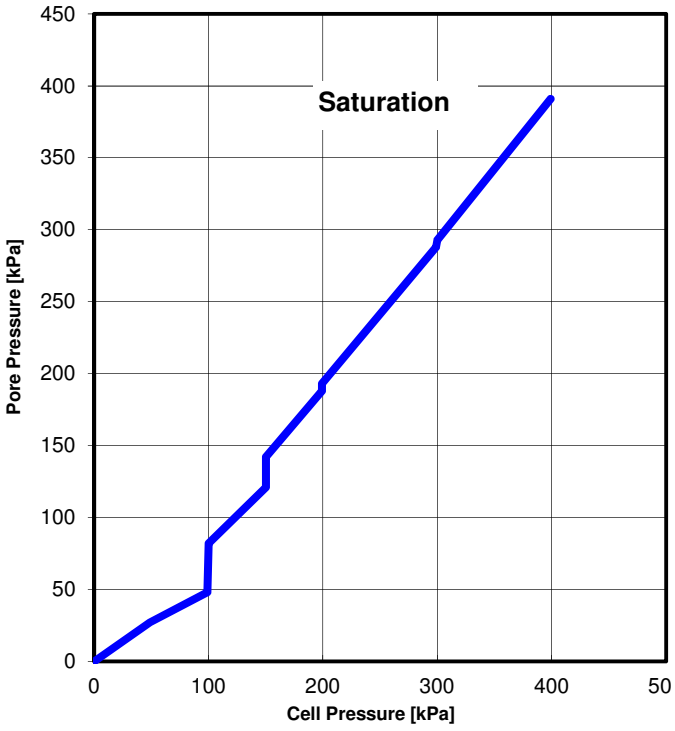
Cohesion c'	[kPa]	**50.6**
Angle of shearing resistance ϕ'	degrees	**29.7**

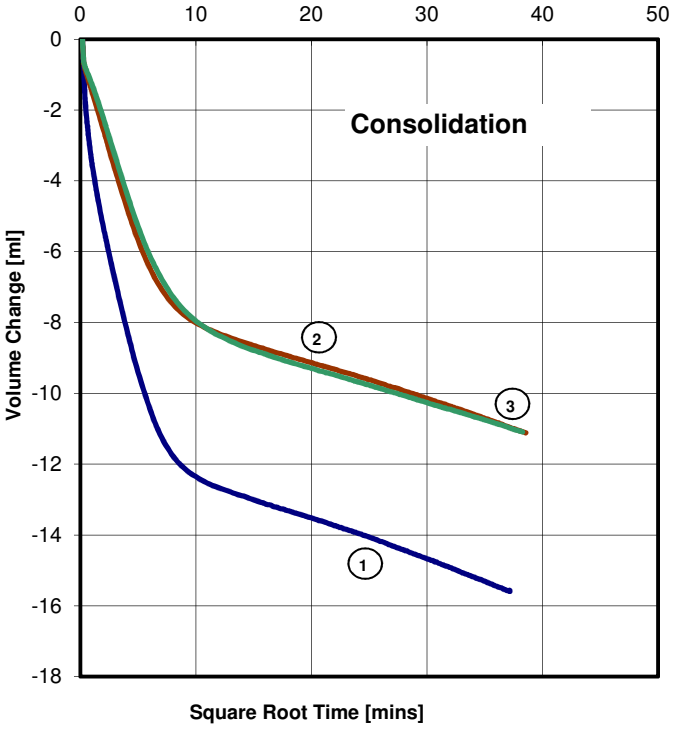
FINAL CONDITIONS

Moisture content	[%]			10.3
Bulk density	[Mg/m^3]			2.37

OTHER PARAMETERS

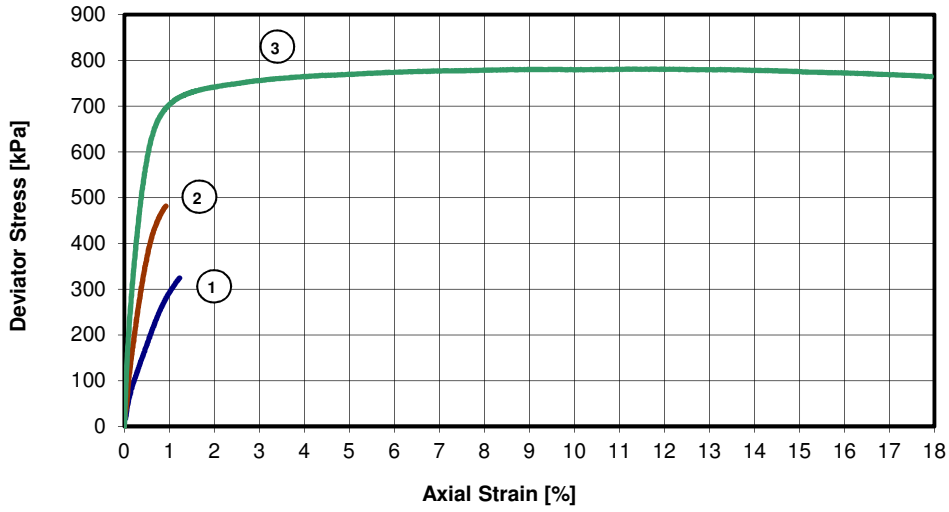
Secant modulus Eu 50	[MPa]	37.0	84.2	152.6
Strain at ε_{50}	[%]	0.44	0.29	0.26

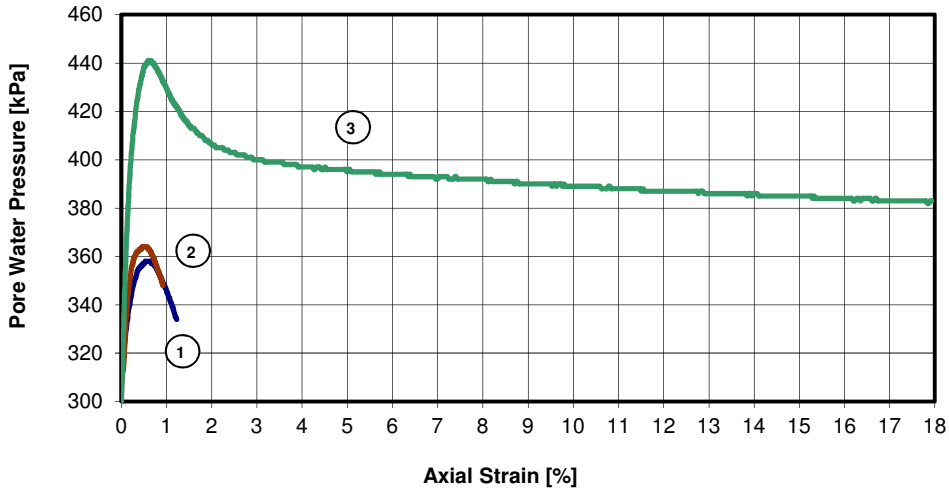


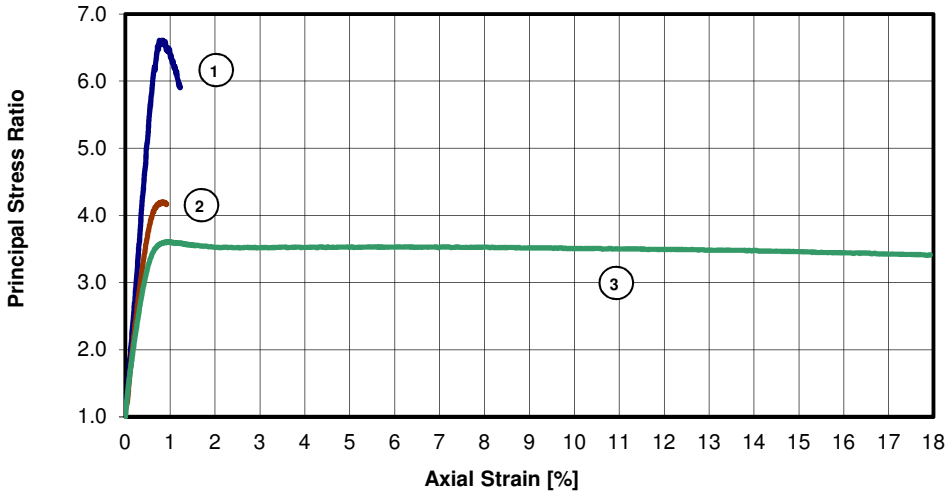


Date Printed	Figure Number	Sheet Number
04/03/2019	F.3.5.2	38

	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST with measurement of pore water pressure	Project No.	G180030U
		Hole	BH24a
		Sample No.	22
Project Name	Scrabster Harbour Trust	Test type	CUM

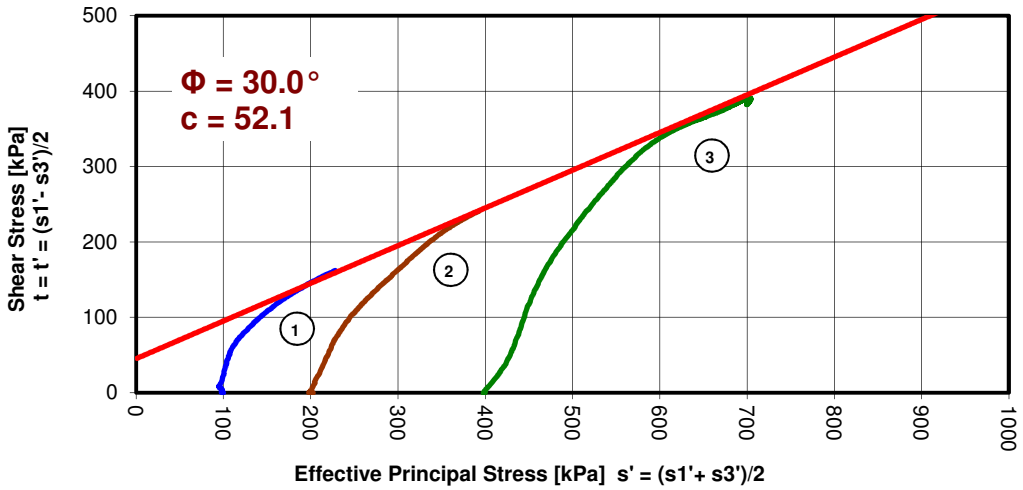


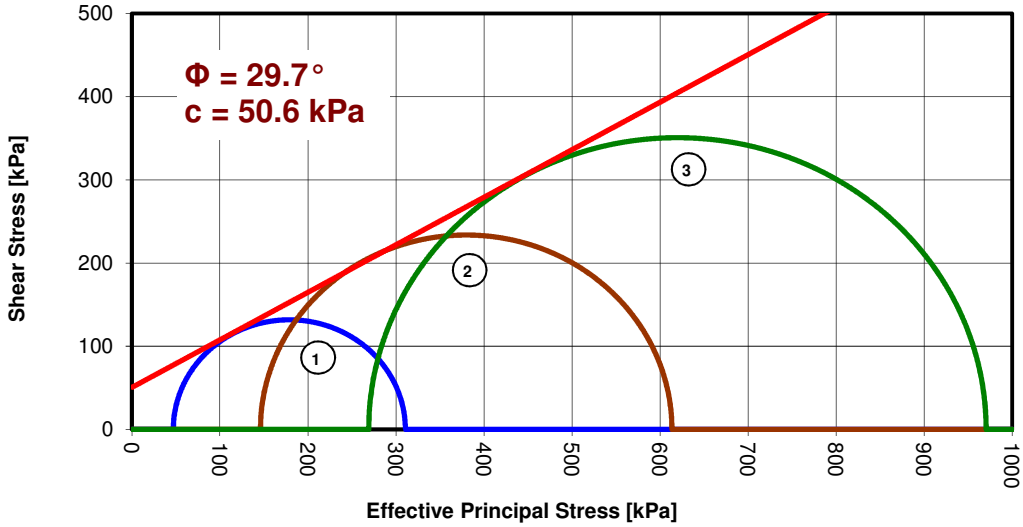




Date Printed	Figure Number	Sheet Number
04/03/2019	F.3.5.2	39

	SUMMARY OF ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST : MULTISTAGE TEST with measurement of pore water pressure	Project No.	G180030U
		Hole	BH24a
		Sample No.	22
Project Name	Scrabster Harbour Trust	Test type	CUM





Mode of failure:

Plastic

1

2 3

Date Printed	Figure Number	Sheet Number
04/03/2019	F.3.5.2	40

DETERMINATION OF THE SHEAR STRENGTH BY DIRECT SHEAR

Small Shearbox Apparatus : BS 1377 : Part 7 : 1990. Method 4.5.4

Hole No. BH03 Sample No. 14 Sample Type B Depth (m) 3.50

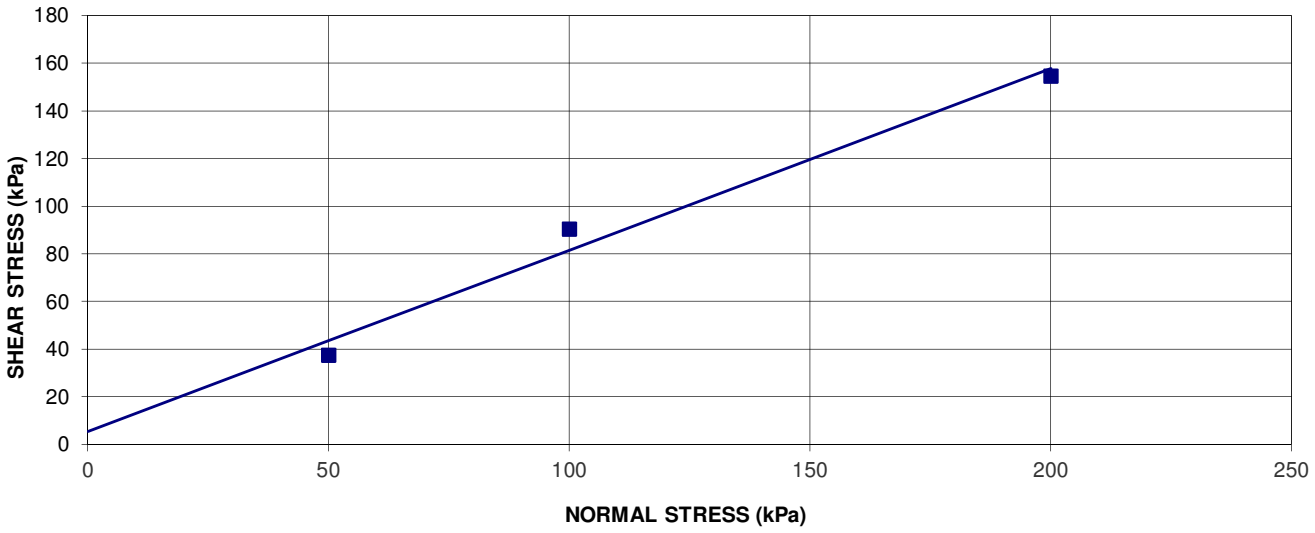
Specimen Details

Test Date: 03/03/2019 Specimen Depth (m)
Sample Orientation: Not Applicable
Preparation Method: Remoulded by tamping

Soil Description: Brown grey silty gravelly SAND

			Sample 1	Sample 2	Sample 3	Sample 4
Initial Properties	Sample Height	mm	27.1	27.4	27.3	
	Sample Width	mm	59.8	59.9	59.8	
	Sample Length	mm	59.8	59.7	59.8	
	Moisture Content	%	25	25	25	
	Bulk Density	Mg/m³	1.97	1.95	1.95	
	Dry Density	Mg/m³	1.57	1.56	1.55	
	Particle Density	Mg/m³	2.70 (Assumed)			
	Degree of Saturation	%	94.8%	93.5%	92.9%	
	Voids Ratio		0.7216	0.7315	0.7365	
	Test Conditions		Submerged			
Consolid-ation	Applied Normal Stress	kPa	50	100	200	
	Consolidated Height	mm	26.4	26.7	25.8	
	Consolidated Dry Density	Mg/m ³	1.61	1.60	1.65	
Shearing	Rate of Displacement	mm/min	0.025	0.025	0.025	
	Maximum Shear Stress (MS)	kPa	38	91	155	
	Horizontal Displacement at MS	mm	3.0	2.4	4.5	

Peak Strength	Effective cohesion (c')	6 kPa	Eff. angle of friction (φ')	37.3 °

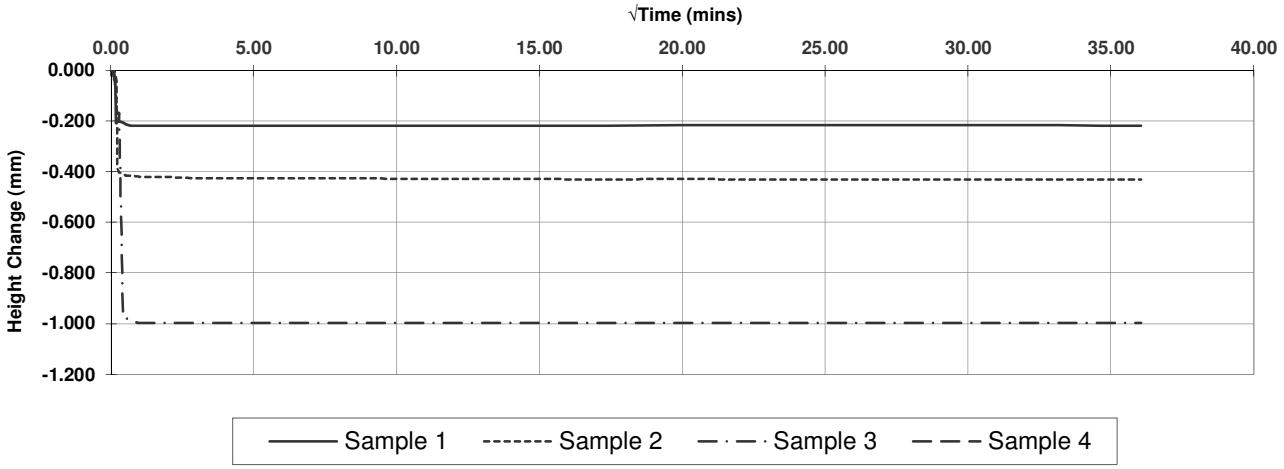


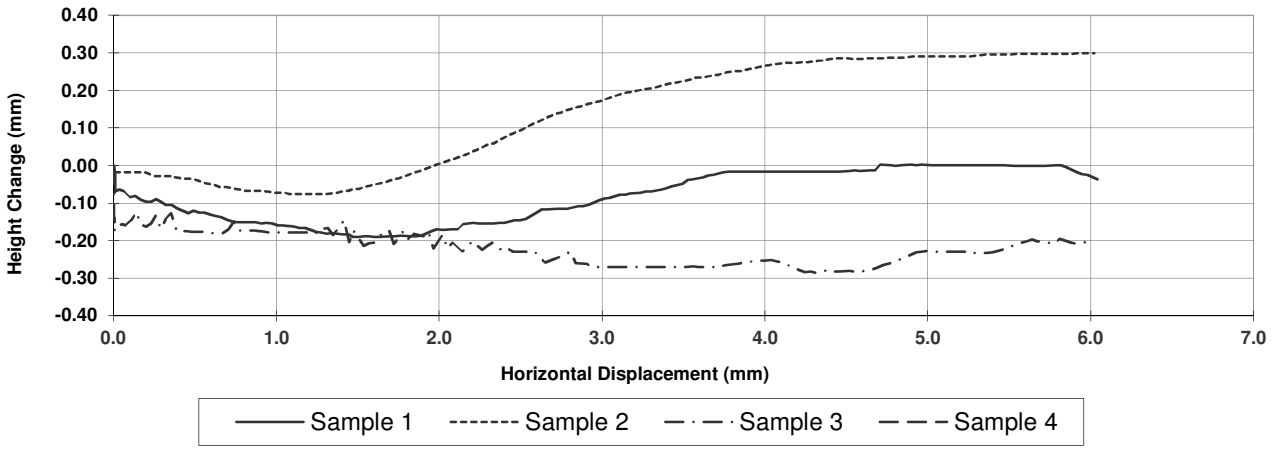
Remarks	

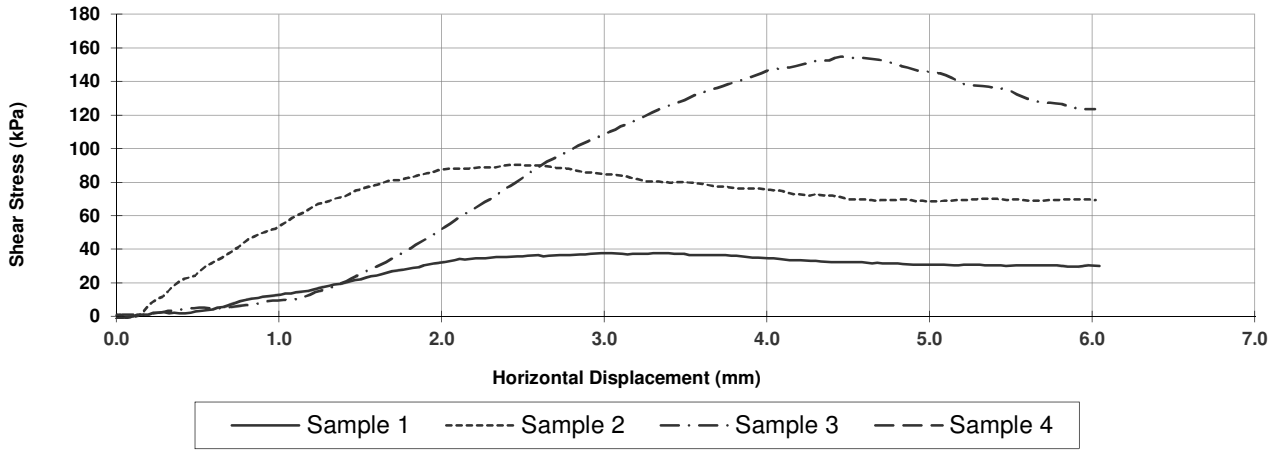
DETERMINATION OF THE SHEAR STRENGTH BY DIRECT SHEAR

Small Shearbox Apparatus : BS 1377 : Part 7 : 1990. Method 4.5.4

Hole No.	BH03	Sample No.	14	Sample Type	B	Depth (m)	3.50







Remarks	

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR

Small Shearbox Apparatus : BS 1377 : Part 7 : 1990. Method 4.5.5

Hole No. BH20 Sample No. 5 Sample Type B Depth (m) 0.50

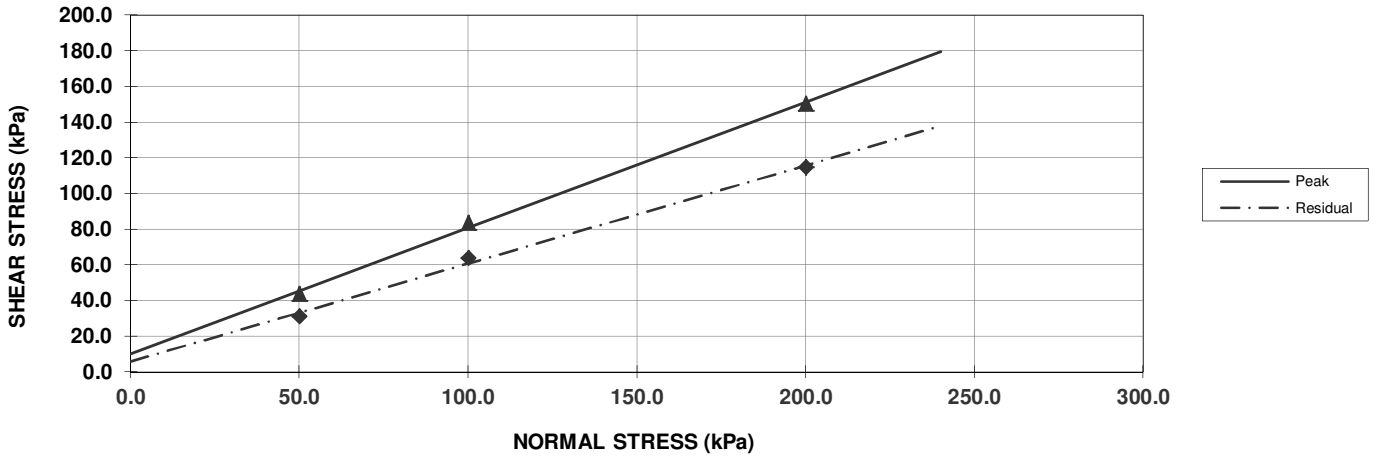
Specimen Details

Test Date: 04/03/2019 Specimen Depth (m)
Sample Orientation: Not Applicable
Preparation Method: Remoulded by tamping

Soil Description: Brown grey slightly gravelly SAND

			Sample 1	Sample 2	Sample 3	Sample 4
Properties	Sample Height	mm	24.0	24.0	24.2	
	Sample Width	mm	63.6	63.6	63.5	
	Sample Length	mm	63.5	63.6	63.6	
	Moisture Content	%	28	28	28	
	Bulk Density	Mg/m ^{3}	1.85	1.84	1.82	
	Dry Density	Mg/m ^{3}	1.45	1.44	1.43	
	Particle Density	Mg/m ^{3}	2.70 (Assumed)			
	Degree of Saturation	%	86	86	84	
	Voids Ratio		0.8660	0.8689	0.8902	
	Test Conditions		Submerged			
Shearing	Applied Normal Stress	kPa	50	100	200	
	Rate of Displacement - Peak	mm/min	0.060	0.060	0.060	
	Method of Reversal		Rapid multi - reversals by hand			
	Rate of Displacement - Residual	mm/min	0.060	0.060	0.060	
	Maximum Shear Stress (MS)	kPa	44	84	151	
	Horizontal Displacement at MS.	mm	1.8	2.1	2.3	
	Residual Shear Stress	kPa	31	64	115	
	Final Cumulative Displacement	mm	18.1	18.0	18.1	
	Number of Traverses Performed		2	2	2	

Peak Strength	Effective cohesion (c')	10 kPa	Eff. angle of friction (φ')	35.2	°
Residual Strength	Effective cohesion (c')	6 kPa	Eff. angle of friction (φ')	28.9	°



Remarks	

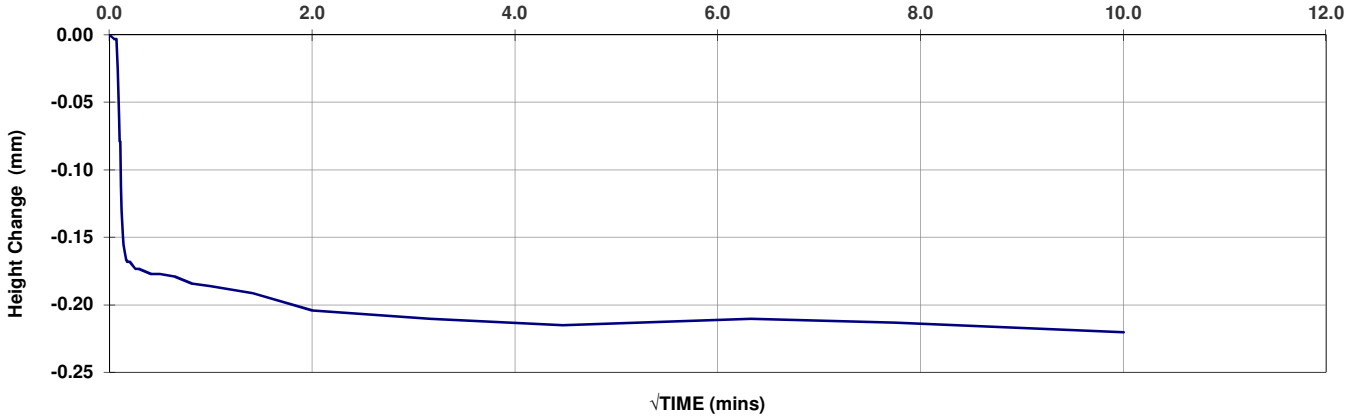
DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR

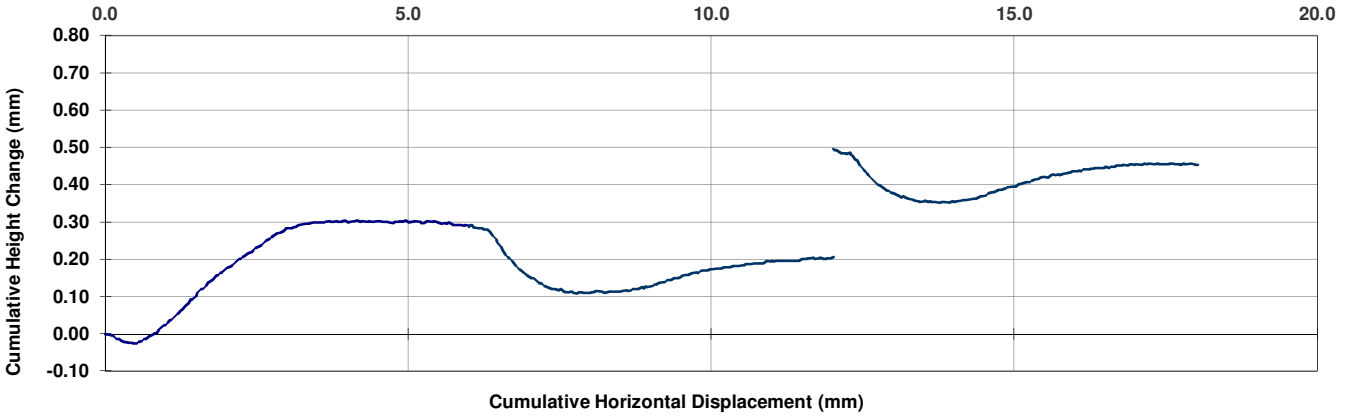
Small Shearbox Apparatus : BS 1377 : Part 7 : 1990. Method 4.5.5

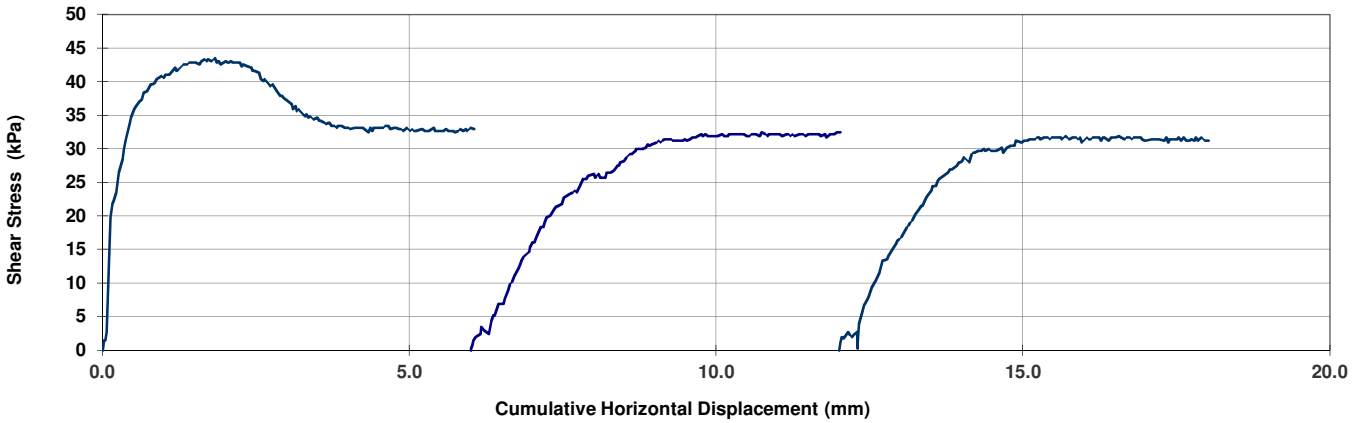
Hole No.	BH20	Sample No.	5	Sample Type	B	Depth (m)	0.50

Sample 1

Soil Description: Brown grey slightly gravelly SAND







Remarks	

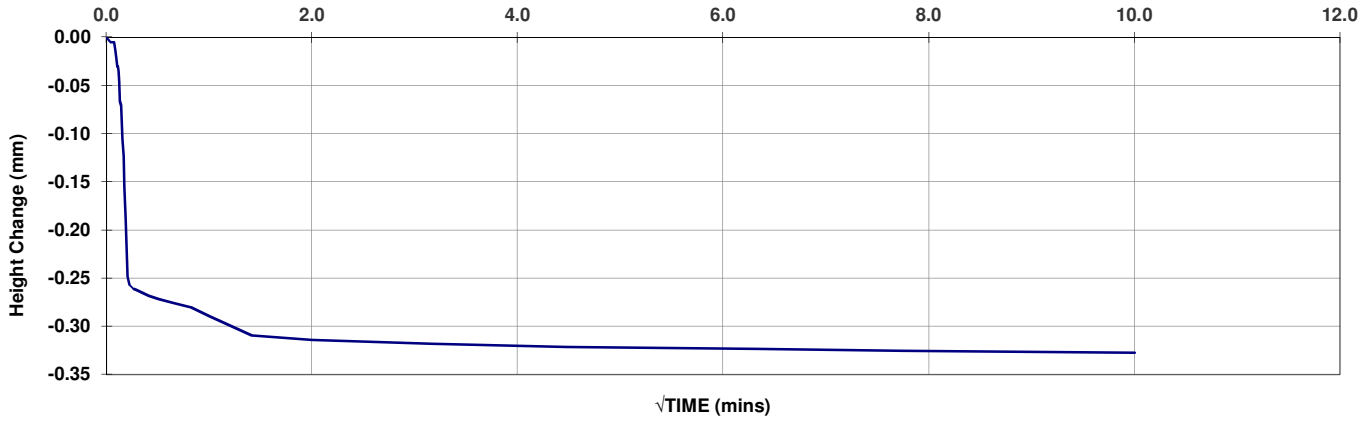
DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR

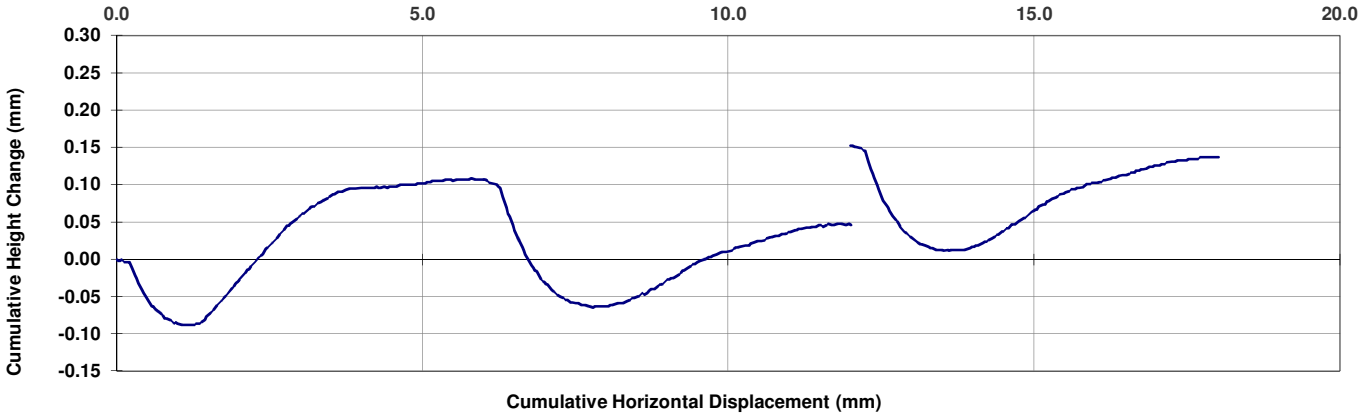
Small Shearbox Apparatus : BS 1377 : Part 7 : 1990. Method 4.5.5

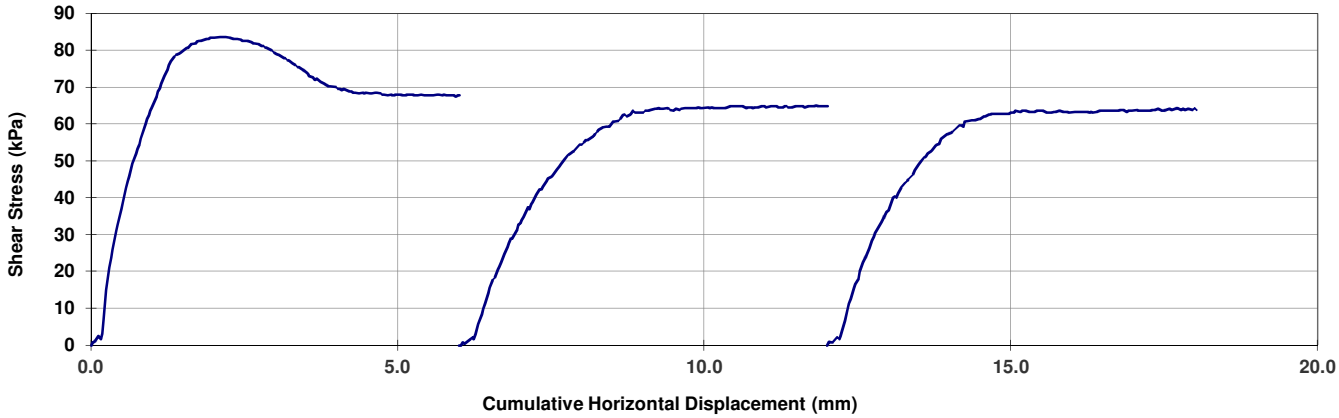
Hole No.	BH20	Sample No.	5	Sample Type	B	Depth (m)	0.50

Sample 2

Soil Description: Brown grey slightly gravelly SAND







Remarks	

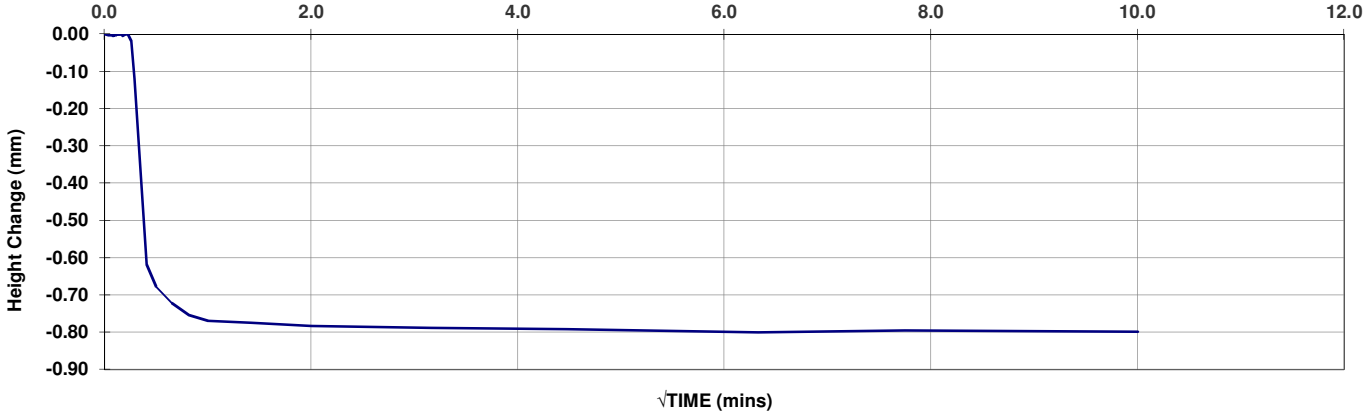
DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR

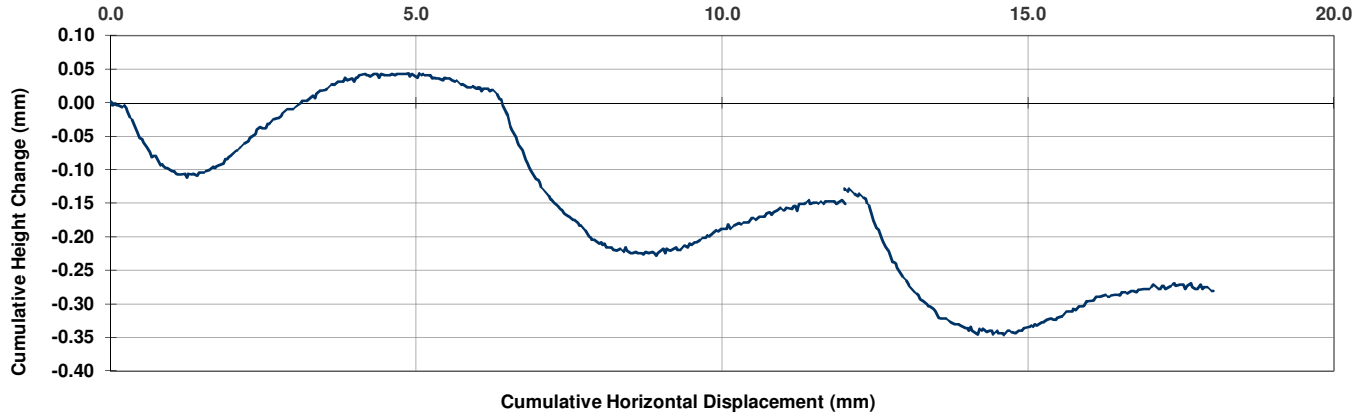
Small Shearbox Apparatus : BS 1377 : Part 7 : 1990. Method 4.5.5

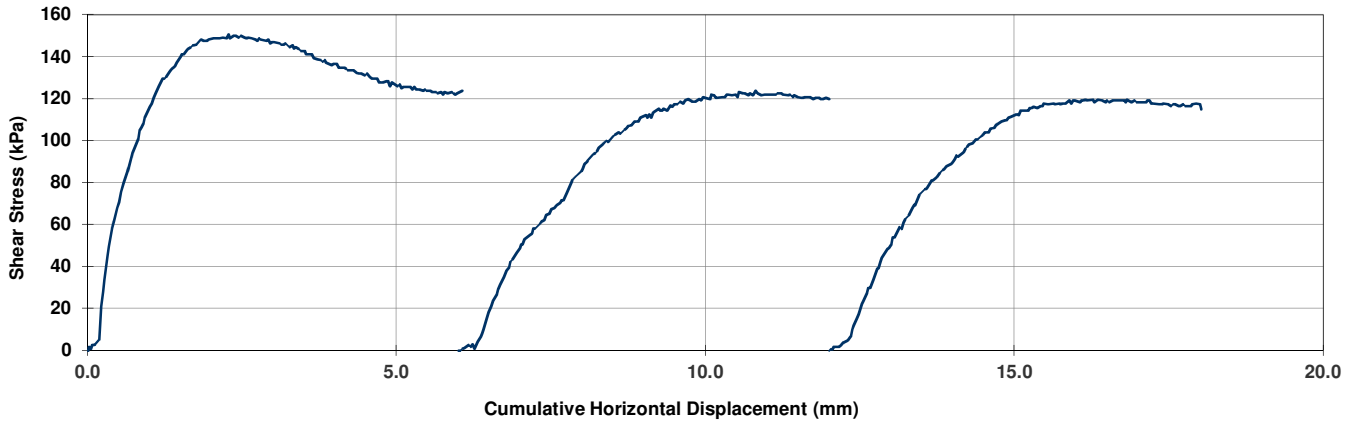
Hole No.	BH20	Sample No.	5	Sample Type	B	Depth (m)	0.50

Sample 3

Soil Description: Brown grey slightly gravelly SAND







Remarks	

DETERMINATION OF THE SHEAR STRENGTH BY DIRECT SHEAR

Small Shearbox Apparatus : BS 1377 : Part 7 : 1990. Method 4.5.4

Hole No. BH21 Sample No. 15 Sample Type B Depth (m) 4.00

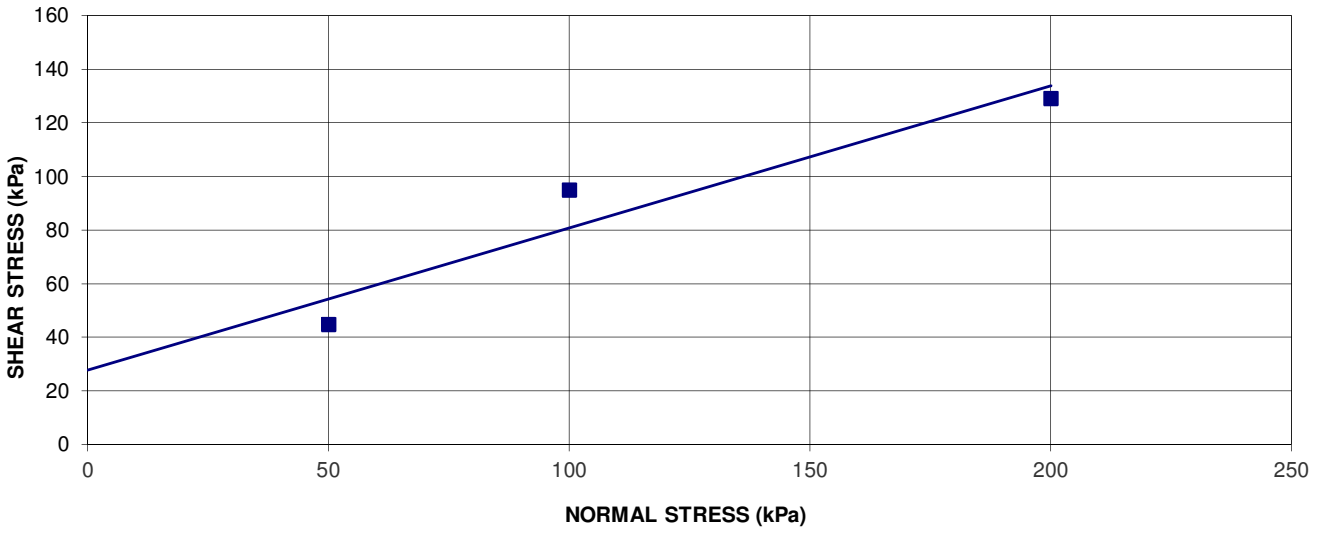
Specimen Details

Test Date: 27/02/2019 Specimen Depth (m)
Sample Orientation: Not Applicable
Preparation Method: Remoulded by tamping

Soil Description: Brown grey silty SAND

			Sample 1	Sample 2	Sample 3	Sample 4
Initial Properties	Sample Height	mm	27.4	27.1	27.0	
	Sample Width	mm	59.8	59.9	59.8	
	Sample Length	mm	59.8	59.7	59.8	
	Moisture Content	%	25	25	25	
	Bulk Density	Mg/m³	1.80	1.82	1.82	
	Dry Density	Mg/m³	1.44	1.45	1.46	
	Particle Density	Mg/m³	2.70 (Assumed)			
	Degree of Saturation	%	77.2%	79.0%	79.2%	
	Voids Ratio		0.8760	0.8557	0.8540	
	Test Conditions		Submerged			
Consolid-ation	Applied Normal Stress	kPa	50	100	200	
	Consolidated Height	mm	27.1	26.2	25.6	
	Consolidated Dry Density	Mg/m ³	1.46	1.51	1.54	
Shearing	Rate of Displacement	mm/min	0.025	0.025	0.025	
	Maximum Shear Stress (MS)	kPa	45	95	129	
	Horizontal Displacement at MS	mm	4.1	2.2	4.8	

Peak Strength	Effective cohesion (c')	28 kPa	Eff. angle of friction (φ')	27.9 °

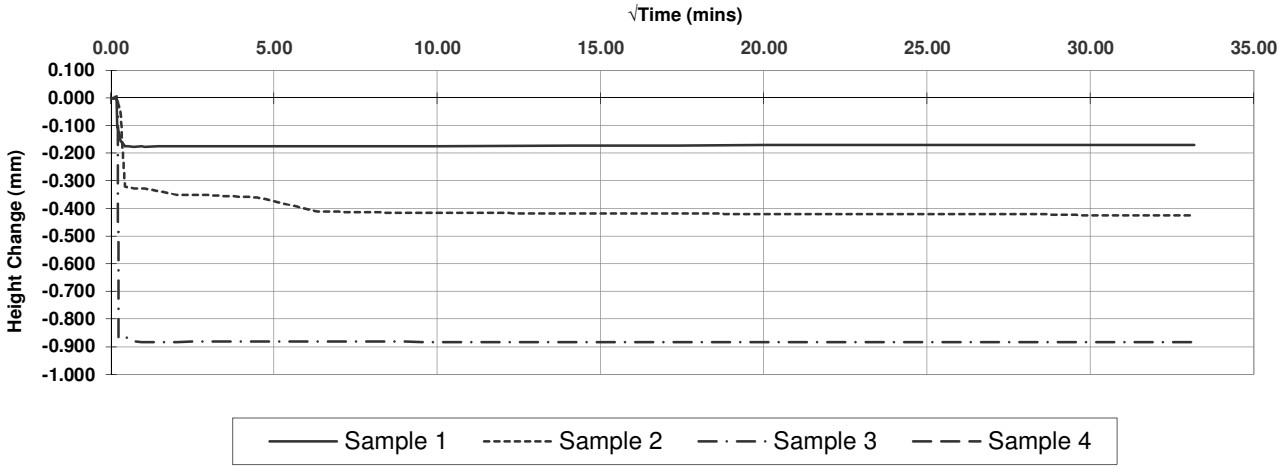


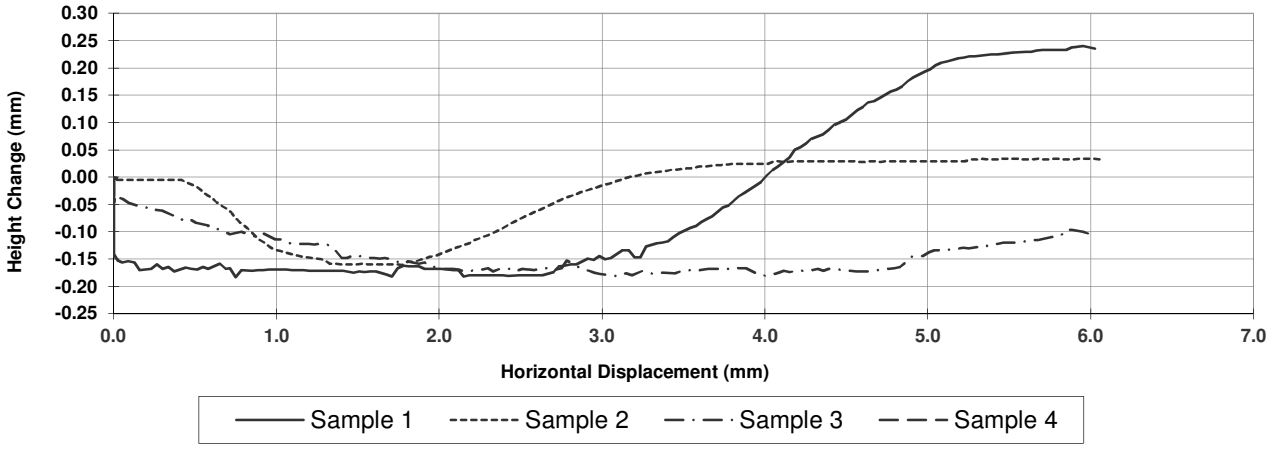
Remarks	

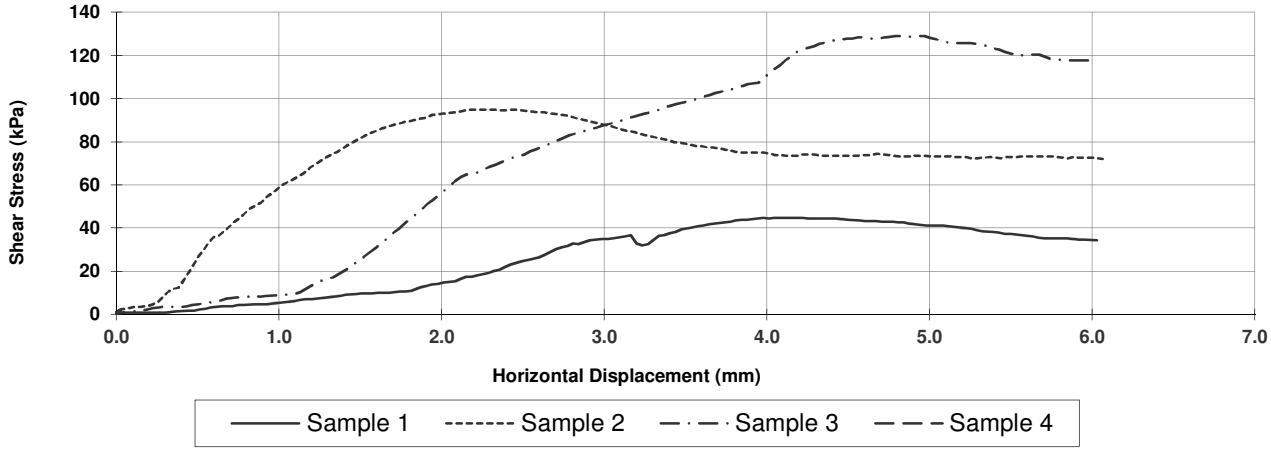
DETERMINATION OF THE SHEAR STRENGTH BY DIRECT SHEAR

Small Shearbox Apparatus : BS 1377 : Part 7 : 1990. Method 4.5.4

Hole No.	BH21	Sample No.	15	Sample Type	B	Depth (m)	4.00







Remarks	

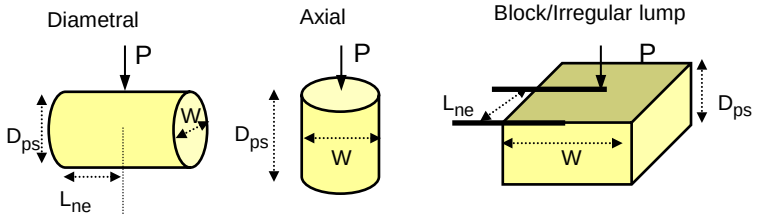
Point Load Strength Index Tests
Summary of Results

Project Name: St. Ola Pier Refurbishment - Site Investigation (Marine)

Project No.: G180030U

Hole	Sample		Specimen		Rock Type	Test Type		Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks
	Depth m	Ref.	Type	Ref.	Depth m	Type (D, A, I, B)	Direction (L, P or U)	Lne mm	W mm	Dps mm	Dps' mm	kN	mm	Is MPa	Is(50) MPa	
BH01	16.50	27	C		16.54	Grey SANDSTONE	D	U	50.0	101.0	101.0	81.0	6.33	90.4	0.8	1.0	
BH01	16.50	27	C		16.54	Grey SANDSTONE	A	U		101.0	55.0	48.0	2.61	78.6	0.4	0.5	
BH02	8.00	29	B		8.00	Grey SILTSTONE	I	U	56.0	78.0	49.0	34.0	12.23	58.1	3.6	3.9	
BH02	22.19	26	C		22.43	Grey SANDSTONE	A	U		101.0	53.0	44.0	6.18	75.2	1.1	1.3	
BH02	22.50	30	B		22.50	Grey SANDSTONE	D	U	46.0	101.0	101.0	94.0	4.08	97.4	0.4	0.6	
BH03	24.02	35	B		24.02	Grey SANDSTONE	A	U		101.0	52.0	44.0	0.59	75.2	0.1	0.1	
BH04	22.22	1	C	1	22.25	Grey SANDSTONE	D	L	52.0	101.0	101.0	96.0	0.85	98.5	0.1	0.1	
BH04	22.22	1	C	2	22.25	Grey SANDSTONE	A	P		101.0	32.0	27.0	0.82	58.9	0.2	0.3	
BH04	22.22	1	C	3	22.29	Grey SANDSTONE	A	P		101.0	70.0	57.0	1.74	85.6	0.2	0.3	
BH04	22.22	1	C	4	22.29	Grey SANDSTONE	I	L	49.0	73.0	54.0	50.0	0.64	68.2	0.1	0.2	
BH09	8.40	23	C	1	8.40	Brown SILTSTONE	D	L	164.0	102.0	102.0	91.0	21.28	96.3	2.3	3.1	
BH09	8.40	23	C	2	8.41	Brown SILTSTONE	A	P		102.0	42.0	27.0	24.32	59.2	6.9	7.5	
BH21	20.13	30	C	1	20.13	Brown MUDSTONE	D	U	79.0	101.0	101.0	90.0	0.36	95.3	<0.1	0.1	

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise.
Size factor, F = (De/50)0.45 for all tests.

Date Printed	Figure Number	Sheet
28/02/2019	F.3.7	1

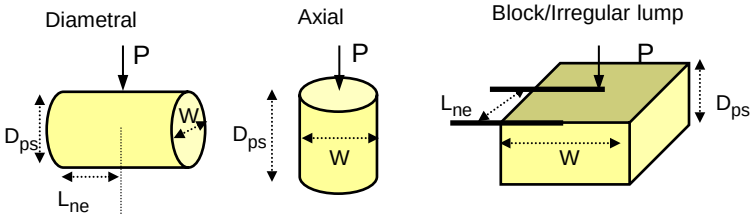
Point Load Strength Index Tests
Summary of Results

Project Name: St. Ola Pier Refurbishment - Site Investigation (Marine)

Project No.: G180030U

Hole	Sample			Specimen		Rock Type	Test Type		Dimensions				Force P	Equivalent diameter, De	Point Load Strength Index		Remarks
	Depth m	Ref.	Type	Ref.	Depth m		Type (D, A, I, B)	Direction (L, P or U)	Lne mm	W mm	Dps mm	Dps' mm	kN	mm	Is MPa	Is(50) MPa	
BH21	20.13	30	C	2	20.17	Brown MUDSTONE	A	U		101.0	40.0	35.0	0.29	67.1	0.1	0.1	
BH21	20.13	30	C	3	20.25	Brown MUDSTONE	A	U		101.0	46.0	40.0	0.22	71.7	<0.1	0.1	
BH21	20.13	30	C	4	20.25	Brown MUDSTONE	I	U	33.0	46.0	38.0	27.0	0.26	39.8	0.2	0.2	
BH21	20.13	30	C	5	20.25	Brown MUDSTONE	I	U	24.0	28.0	26.0	21.0	0.19	27.4	0.3	0.2	
BH22	20.59	27	C	1	20.61	Grey SANDSTONE	D	U	28.0	54.0	54.0	46.0	5.25	49.8	2.1	2.1	
BH22	20.59	27	C	2	20.61	Grey SANDSTONE	A	U		101.0	89.0	67.0	8.14	92.8	0.9	1.3	
BH23	20.05	31	C	1	20.08	Brown SANDSTONE	D	U	48.0	100.0	100.0	90.0	1.64	94.9	0.2	0.2	
BH23	20.05	31	C	2	20.05	Brown SANDSTONE	A	U		100.0	30.0	23.0	0.39	54.1	0.1	0.1	
BH23	20.05	31	C	3	20.08	Brown SANDSTONE	I	U	51.0	100.0	59.0	48.0	4.41	78.2	0.7	0.9	
BH24a	16.56	25	C	1	16.56	Brown SANDSTONE	A	P		100.0	57.0	49.0	1.05	79.0	0.2	0.2	
BH24a	16.56	25	C	2	16.56	Brown SANDSTONE	I	L	47.0	57.0	44.0	40.0	0.11	53.9	<0.1	<0.1	
BH24a	16.56	25	C	3	16.60	Brown SANDSTONE	I	P	27.0	41.0	31.0	23.0	0.66	34.7	0.6	0.5	

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
L - parallel to planes of weakness
P - perpendicular to planes of weakness
U - unknown or random
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure (see ISRM note 6)
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P



Test performed in accordance with ISRM Suggested Methods : 2007, unless noted otherwise.
Size factor, F = (De/50)0.45 for all tests.

Date Printed	Figure Number	Sheet
28/02/2019	F.3.7	2

UNIAXIAL COMPRESSION TEST ON ROCK - SUMMARY OF RESULTS

Project Name: St. Ola Pier Refurbishment - Site Investigation (Marine)

Project No.: G180030U

Hole No.	Sample			Description	Specimen Dimensions [2]			Bulk Density [2]	Water Content [1]	Uniaxial Compression [3]				Remarks
	Ref	Top (m)	Type		Dia. mm	Length mm	L/D	Mg/m3	%	Condition	Stress Rate MPa/s	Mode of failure	UCS MPa	
BH02	24	19.70	C	Grey SANDSTONE, medium strong	54.1	118.7	2.2	2.54	4.5	as received	0.1153	MS	48.2	
BH02	25	20.30	C	Grey SANDSTONE, weak	54.1	116.3	2.1	2.49	4.9	as received	0.0449	S	22.7	
BH03	26	21.24	C	Grey SANDSTONE, medium strong	101.2	200.9	2.0	2.54	3.8	as received	0.0768	AC	33.5	
BH03	27	21.94	C	Grey SANDSTONE, medium strong	54.0	114.2	2.1	2.54	4.2	as received	0.0715	MS	36.6	
BH09	24	9.50	C	Grey SILTSTONE with pyrite, strong	54.3	122.7	2.3	2.80	0.8	as received	0.1558	AC	72.9	
BH23	32	20.50	C	Brown SANDSTONE, weak	99.7	207.2	2.1	2.44	6.3	as received	0.0290	MS	13.2	
BH23	33	21.30	C	Brown SANDSTONE, weak	99.8	208.7	2.1	2.42	6.3	as received	0.0426	MS	22.8	

Notes

1 ISRM p87 test 1, water content at 105 ± 3 oC, specimen as tested for UCS

2 ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density

3 ISRM p153 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials

above notes apply unless annotated otherwise in the remarks

Mode of failure :

S - Single shear MS - multiple shear

AC - Axial cleavage F - Fragmented

Test Specification	Date Printed	Figure Number	
International Society for Rock Mechanics, The complete ISRM suggested methods for Rock Characterization Testing and Monitoring, 1976-2006	28/02/2019	F.3.8	

DIRECT SHEAR STRENGTH OF ROCK DISCONTINUITIES

ISRM SUGGESTED METHODS

Hole No. BH02 Sample No. 28 Sample Type C Depth (m) 23.38

Specimen Details

Test Date:	14/02/2019
Source of specimen:	Core
Discontinuity Type:	Saw Cut
Encapsulating Material:	Cement
Soil Description	Grey SANDSTONE

Initial Condition	Water Content				%	5.67
	Bulk Density				Mg/m^3	2.47
	Dry Density				Mg/m^3	2.34
	Height				mm	101.00
	Diameter				mm	101.00
	Particle Density				Mg/m^3	2.70
	Degree of Saturation				%	100
	Voids Ratio					0.15
	Moisture Condition during test					As Received
Joint Roughness Coefficient			Pre Test		Post Test	
	Upper Surface of Discontinuity					
	Lower Surface of Discontinuity					
Consolidation Stage	t_{100} (mins)	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
		01:00	02:00	01:30		
Shearing stage		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
	Normal Stress (kPa)	100	200	400		
	Shear Stress (kPa)	153.5	249.6	411.9		
	Residual Stress (kPa)					
	Normal Displacement (mm)	0.0	0.1	0.1		
	Shear Displacement (mm)	6.6	7.4	7.0		

Cohesion (kPa)				**Apparent Friction Angle (˚)**			
Normal Stress less than	200	kPa	57	Normal Stress less than	200	kPa	44
Normal Stress greater than	200	kPa	87	Normal Stress greater than	200	kPa	39

Residual Friction Angle (˚)	-

Remarks	

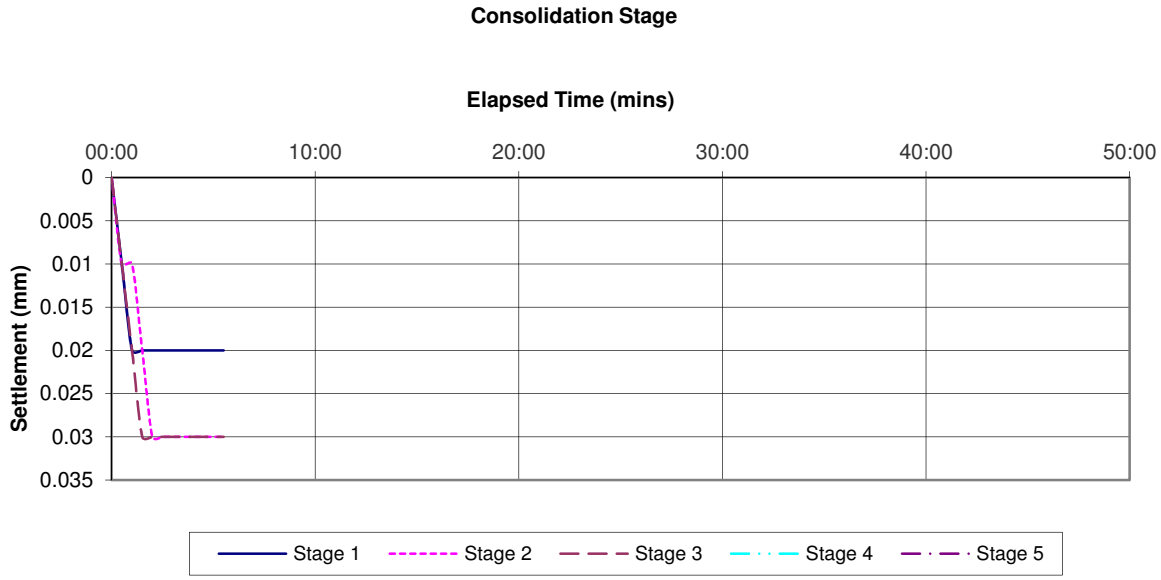
DIRECT SHEAR STRENGTH OF ROCK DISCONTINUITIES

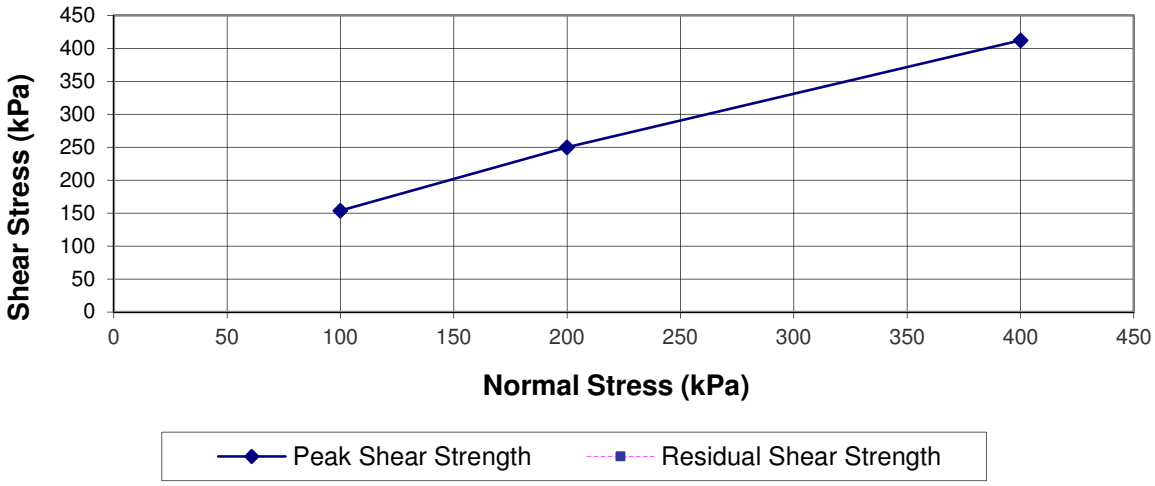
ISRM SUGGESTED METHODS

Hole No.	BH02	Sample No.	28	Sample Type	C	Depth (m)	23.38

Specimen Details

Test Date:	14/02/2019
Source of specimen:	Core
Discontinuity Type:	Saw Cut
Encapsulating Material:	Cement
Soil Description	Grey SANDSTONE





Remarks	

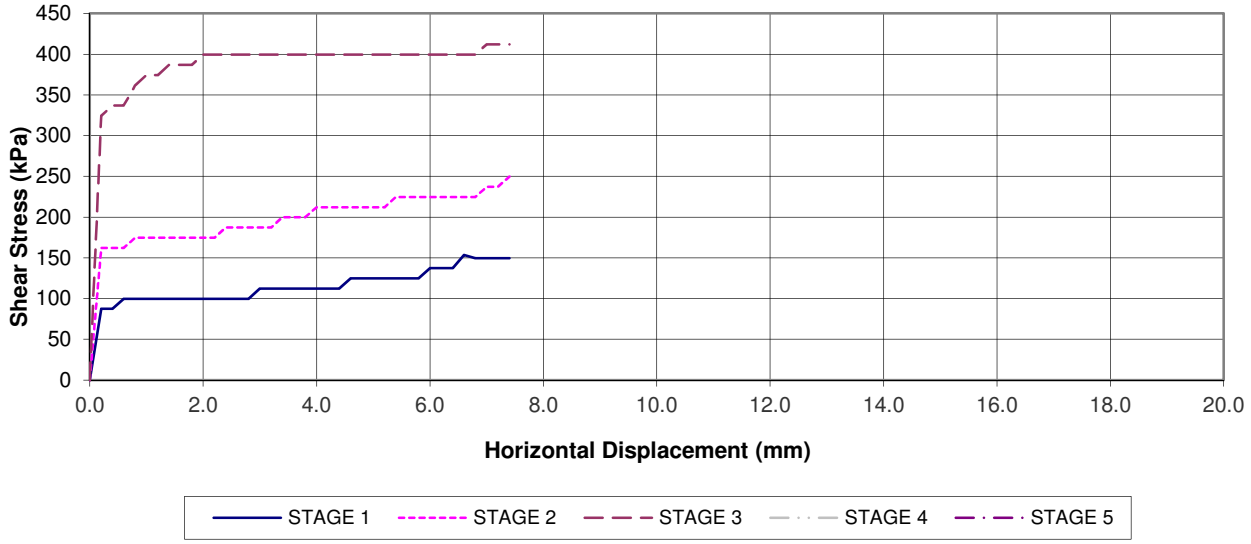
DIRECT SHEAR STRENGTH OF ROCK DISCONTINUITIES

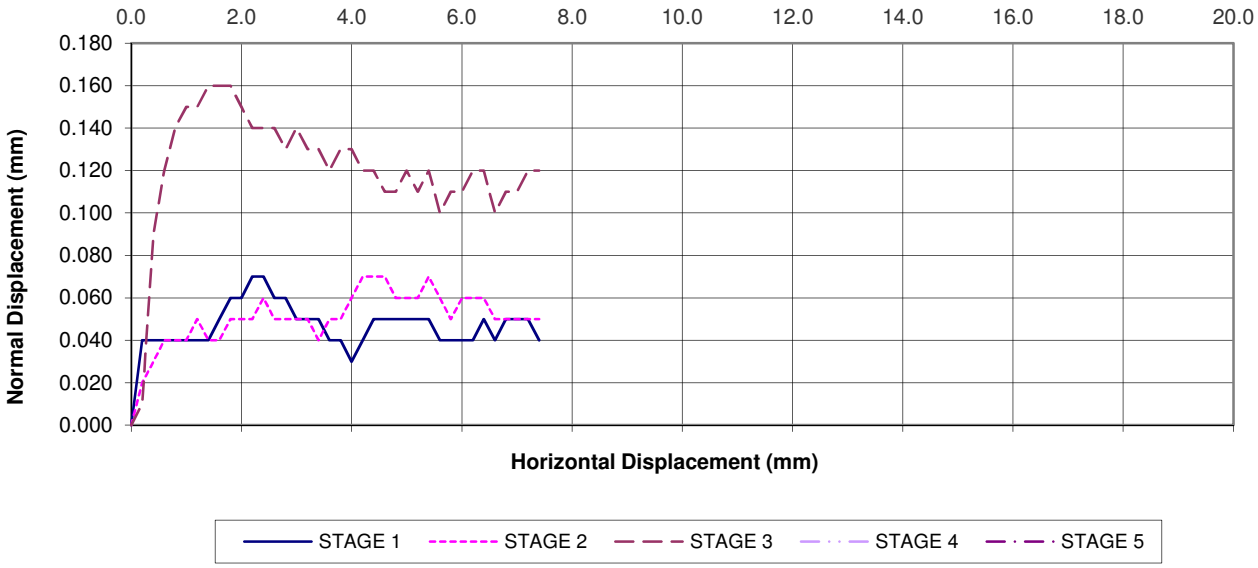
ISRM SUGGESTED METHODS

Hole No.	BH02	Sample No.	28	Sample Type	C	Depth (m)	23.38

Specimen Details

Test Date:	14/02/2019
Source of specimen:	Core
Discontinuity Type:	Saw Cut
Encapsulating Material:	Cement
Soil Description	Grey SANDSTONE





Remarks	

DIRECT SHEAR STRENGTH OF ROCK DISCONTINUITIES

ISRM SUGGESTED METHODS

Hole No.	BH03	Sample No.	34	Sample Type	C	Depth (m)	23.00

Specimen Details

Test Date:	12/02/2019
Source of specimen:	Core
Discontinuity Type:	Saw Cut
Encapsulating Material:	Cement
Soil Description	Brown grey SANDSTONE

Initial Condition	Water Content				%	6.08
	Bulk Density				Mg/m^3	2.43
	Dry Density				Mg/m^3	2.29
	Height				mm	102.00
	Diameter				mm	102.00
	Particle Density				Mg/m^3	2.70
	Degree of Saturation				%	92
	Voids Ratio					0.18
	Moisture Condition during test					As Received
Joint Roughness Coefficient			Pre Test		Post Test	
	Upper Surface of Discontinuity					
	Lower Surface of Discontinuity					
Consolidation Stage	t_{100} (mins)	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
		00:30	01:00	01:30		
Shearing stage		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
	Normal Stress (kPa)	100	200	400		
	Shear Stress (kPa)	146.9	220.3	403.9		
	Residual Stress (kPa)					
	Normal Displacement (mm)	-0.1	0.1	0.1		
	Shear Displacement (mm)	6.4	5.8	6.2		

Cohesion (kPa)				**Apparent Friction Angle (˚)**			
Normal Stress less than	200	kPa	73	Normal Stress less than	200	kPa	36
Normal Stress greater than	200	kPa	37	Normal Stress greater than	200	kPa	43

Residual Friction Angle (˚)	-

Remarks	

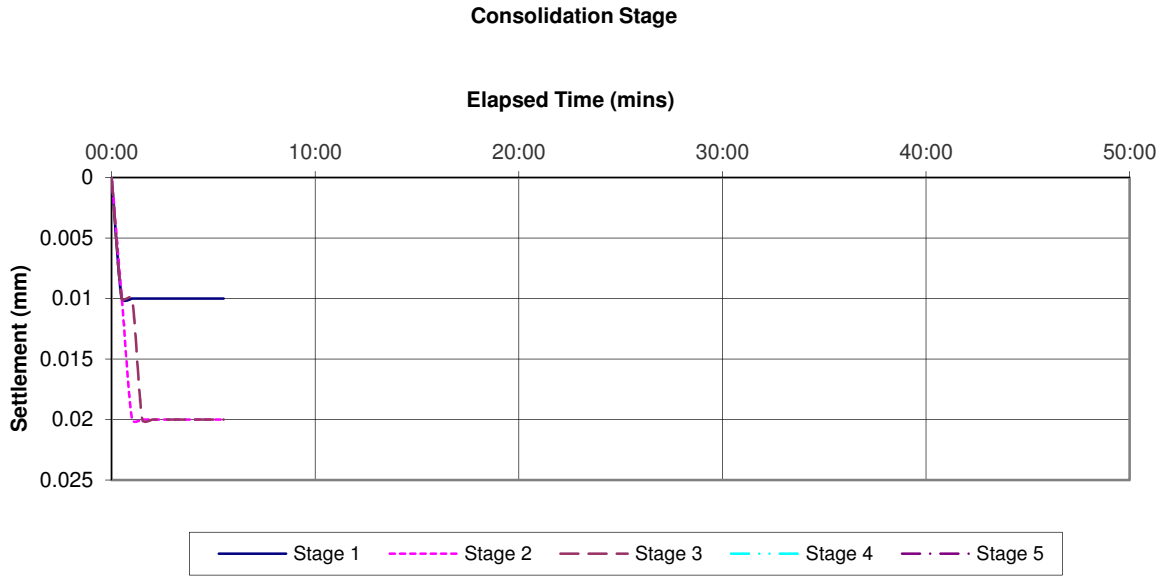
DIRECT SHEAR STRENGTH OF ROCK DISCONTINUITIES

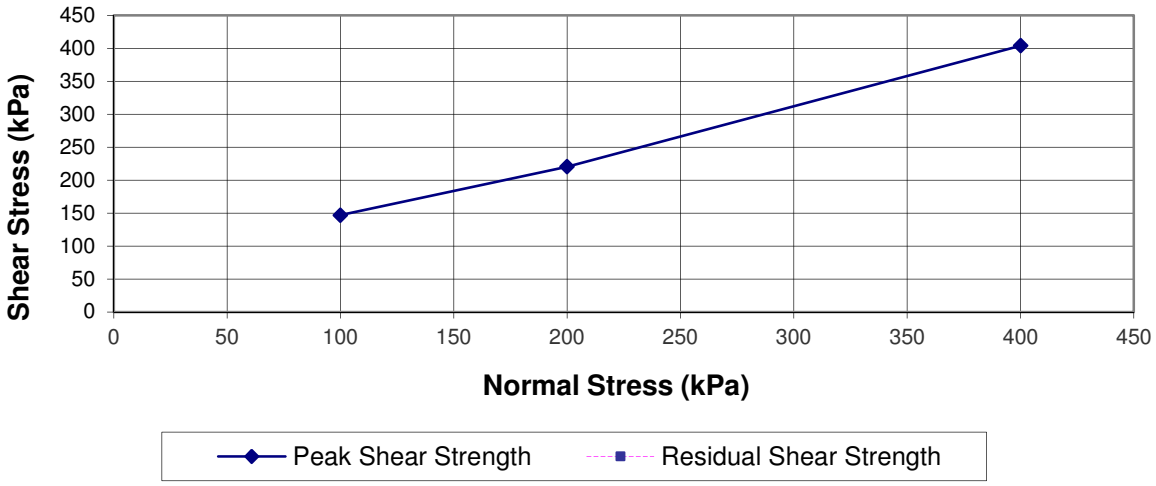
ISRM SUGGESTED METHODS

Hole No.	BH03	Sample No.	34	Sample Type	C	Depth (m)	23.00

Specimen Details

Test Date:	12/02/2019
Source of specimen:	Core
Discontinuity Type:	Saw Cut
Encapsulating Material:	Cement
Soil Description	Brown grey SANDSTONE





Remarks	

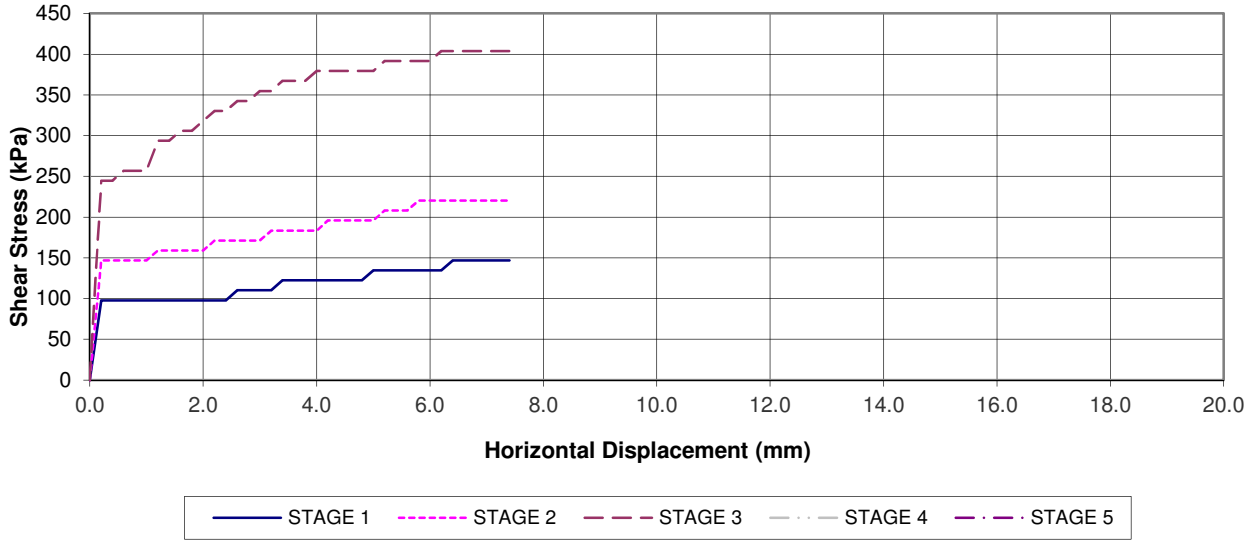
DIRECT SHEAR STRENGTH OF ROCK DISCONTINUITIES

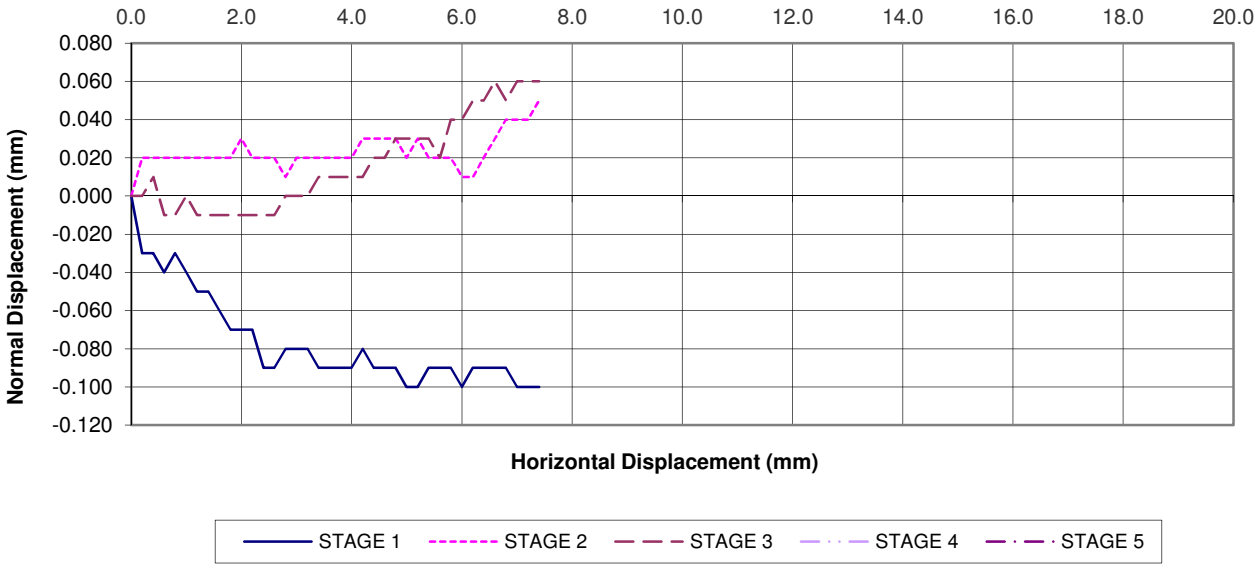
ISRM SUGGESTED METHODS

Hole No.	BH03	Sample No.	34	Sample Type	C	Depth (m)	23.00

Specimen Details

Test Date:	12/02/2019
Source of specimen:	Core
Discontinuity Type:	Saw Cut
Encapsulating Material:	Cement
Soil Description	Brown grey SANDSTONE





Remarks	

DIRECT SHEAR STRENGTH OF ROCK DISCONTINUITIES

ISRM SUGGESTED METHODS

Hole No.	BH04	Sample No.	35	Sample Type	C	Depth (m)	20.08

Specimen Details

Test Date:	12/02/2019
Source of specimen:	Core
Discontinuity Type:	Saw Cut
Encapsulating Material:	Cement
Soil Description	Grey brown SANDSTONE

Initial Condition	Water Content				%	6.19
	Bulk Density				Mg/m^3	2.45
	Dry Density				Mg/m^3	2.30
	Height				mm	100.00
	Diameter				mm	100.00
	Particle Density				Mg/m^3	2.70
	Degree of Saturation				%	96
	Voids Ratio					0.17
	Moisture Condition during test					As Received
Joint Roughness Coefficient			Pre Test		Post Test	
	Upper Surface of Discontinuity					
	Lower Surface of Discontinuity					
Consolidation Stage	t_{100} (mins)	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
		00:30	01:00	01:00		
Shearing stage		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
	Normal Stress (kPa)	100	200	400		
	Shear Stress (kPa)	152.8	229.2	407.4		
	Residual Stress (kPa)					
	Normal Displacement (mm)	0.0	0.1	0.1		
	Shear Displacement (mm)	7.0	6.2	6.0		

Cohesion (kPa)				**Apparent Friction Angle (˚)**			
Normal Stress less than	200	kPa	76	Normal Stress less than	200	kPa	37
Normal Stress greater than	200	kPa	51	Normal Stress greater than	200	kPa	42

Residual Friction Angle (˚)	-

Remarks	

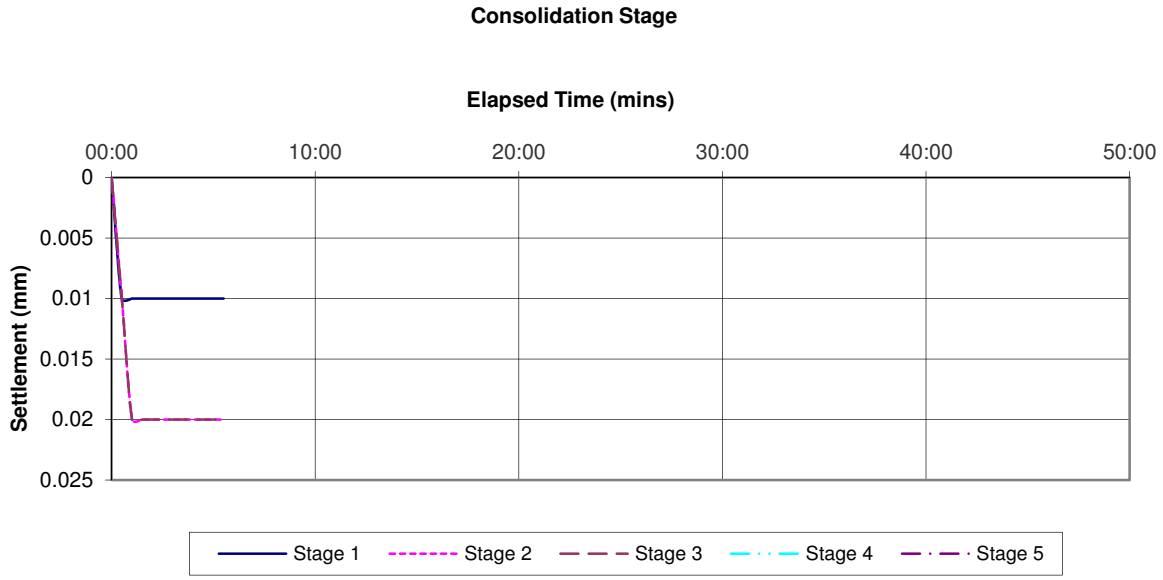
DIRECT SHEAR STRENGTH OF ROCK DISCONTINUITIES

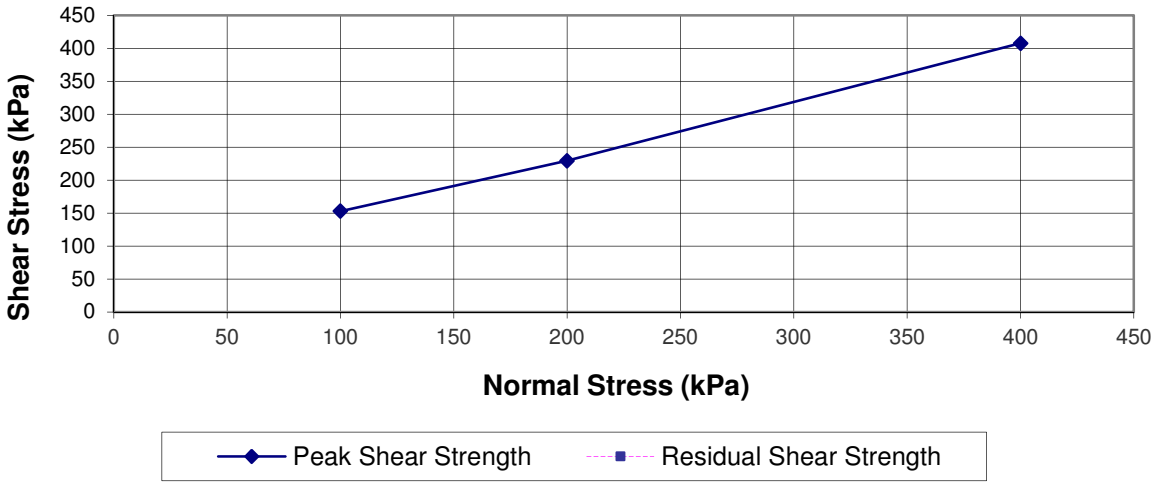
ISRM SUGGESTED METHODS

Hole No.	BH04	Sample No.	35	Sample Type	C	Depth (m)	20.08

Specimen Details

Test Date:	12/02/2019
Source of specimen:	Core
Discontinuity Type:	Saw Cut
Encapsulating Material:	Cement
Soil Description	Grey brown SANDSTONE





Remarks	

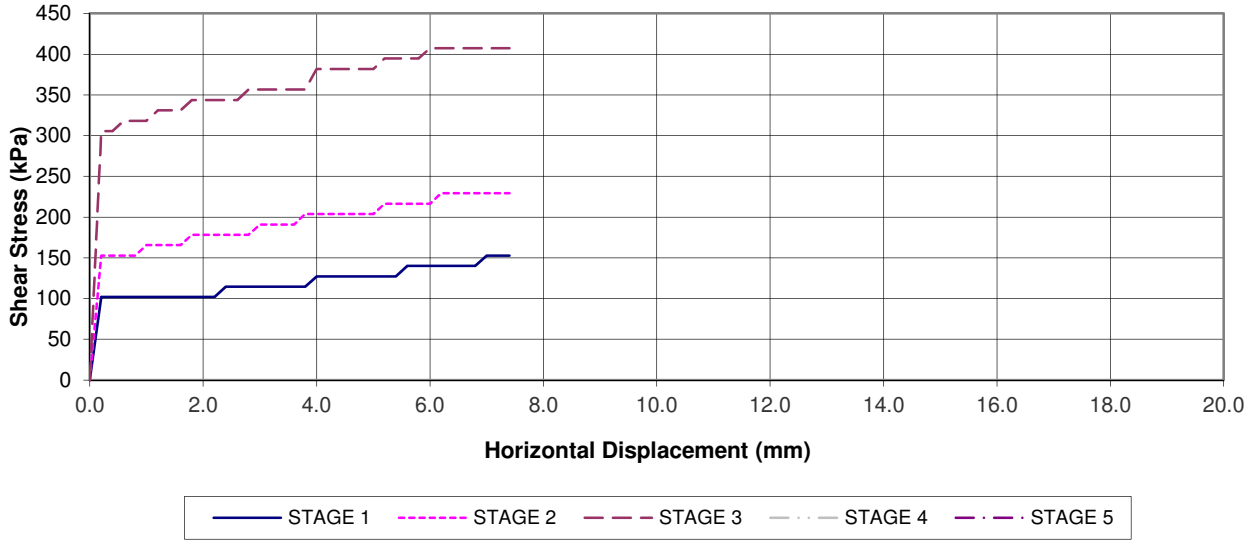
DIRECT SHEAR STRENGTH OF ROCK DISCONTINUITIES

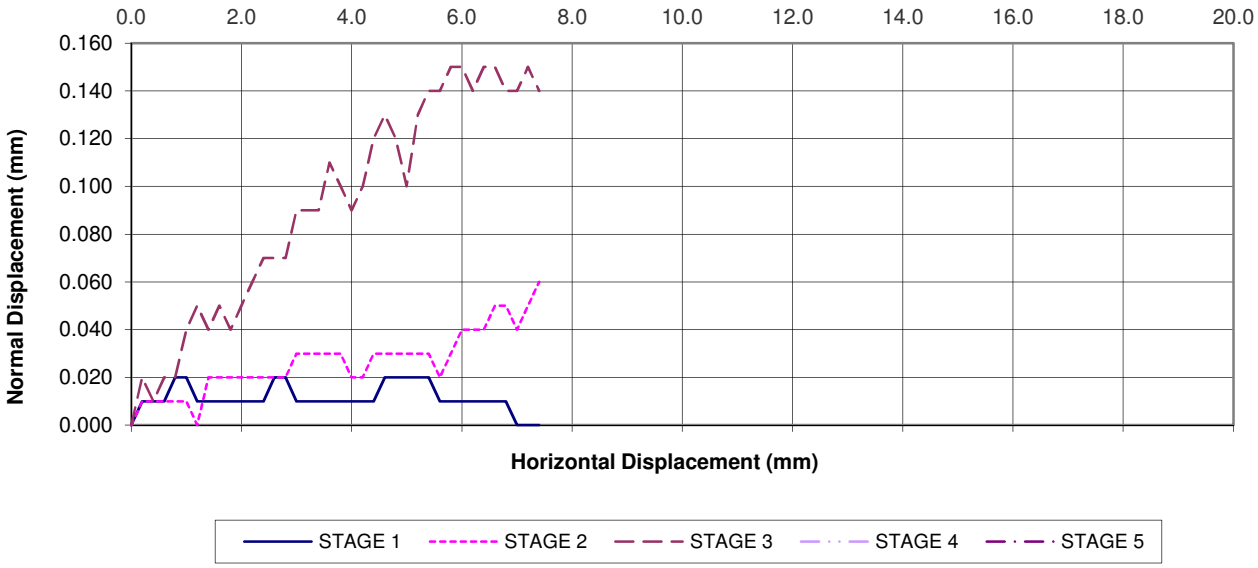
ISRM SUGGESTED METHODS

Hole No.	BH04	Sample No.	35	Sample Type	C	Depth (m)	20.08

Specimen Details

Test Date:	12/02/2019
Source of specimen:	Core
Discontinuity Type:	Saw Cut
Encapsulating Material:	Cement
Soil Description	Grey brown SANDSTONE





Remarks	

DIRECT SHEAR STRENGTH OF ROCK DISCONTINUITIES

ISRM SUGGESTED METHODS

Hole No.	BH22	Sample No.	30	Sample Type	C	Depth (m)	20.90

Specimen Details

Test Date:	14/02/2019
Source of specimen:	0
Discontinuity Type:	Saw Cut
Encapsulating Material:	0
Soil Description	Grey SANDSTONE

Initial Condition	Water Content				%	7.20
	Bulk Density				Mg/m^3	2.39
	Dry Density				Mg/m^3	2.23
	Height				mm	100.00
	Diameter				mm	100.00
	Particle Density				Mg/m^3	2.70
	Degree of Saturation				%	92
	Voids Ratio					0.21
	Moisture Condition during test					As Received
Joint Roughness Coefficient		Pre Test			Post Test	
	Upper Surface of Discontinuity					
	Lower Surface of Discontinuity					
Consolidation Stage	t_{100} (mins)	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
		00:30	00:30	01:00		
Shearing stage		Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
	Normal Stress (kPa)	100	200	400		
	Shear Stress (kPa)	140.1	229.2	382.0		
	Residual Stress (kPa)					
	Normal Displacement (mm)	0.0	0.0	0.0		
	Shear Displacement (mm)	6.2	6.6	7.2		

Cohesion (kPa)				**Apparent Friction Angle (˚)**			
Normal Stress less than	200	kPa	51	Normal Stress less than	200	kPa	42
Normal Stress greater than	200	kPa	76	Normal Stress greater than	200	kPa	37

Residual Friction Angle (˚)	-

Remarks	

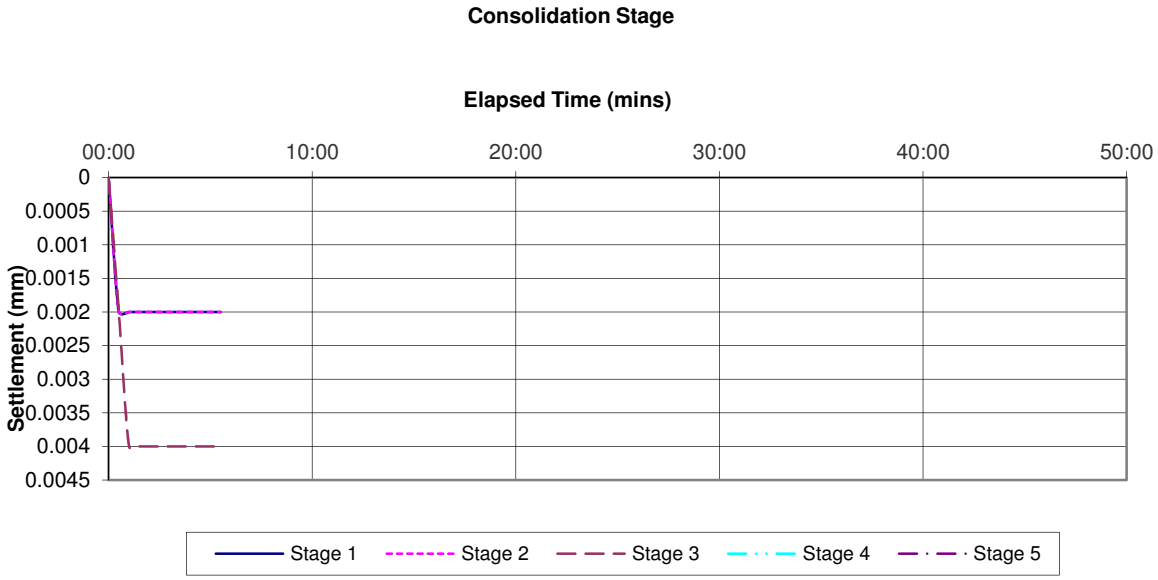
DIRECT SHEAR STRENGTH OF ROCK DISCONTINUITIES

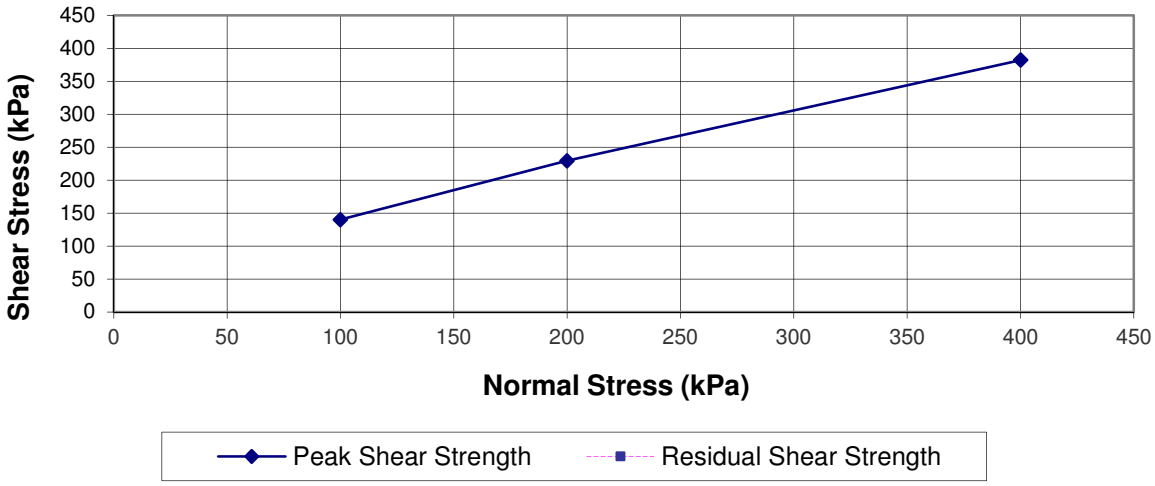
ISRM SUGGESTED METHODS

Hole No.	BH22	Sample No.	30	Sample Type	C	Depth (m)	20.90

Specimen Details

Test Date:	14/02/2019
Source of specimen:	0
Discontinuity Type:	Saw Cut
Encapsulating Material:	0
Soil Description	Grey SANDSTONE





Remarks	

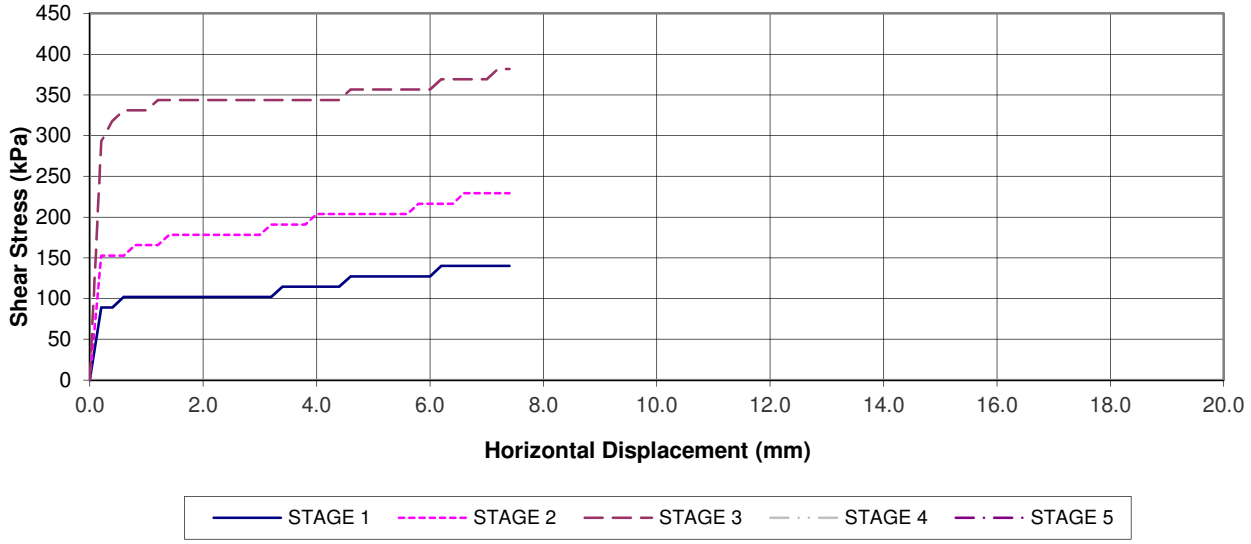
DIRECT SHEAR STRENGTH OF ROCK DISCONTINUITIES

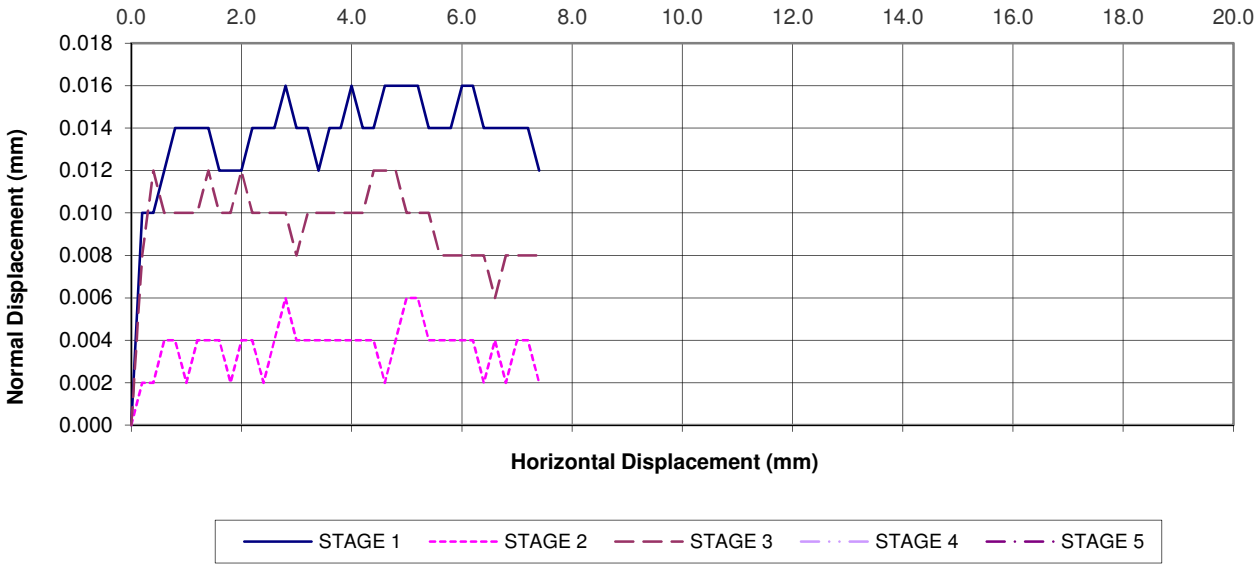
ISRM SUGGESTED METHODS

Hole No.	BH22	Sample No.	30	Sample Type	C	Depth (m)	20.90

Specimen Details

Test Date:	14/02/2019
Source of specimen:	0
Discontinuity Type:	Saw Cut
Encapsulating Material:	0
Soil Description	Grey SANDSTONE





Remarks	

G. GEOENVIRONMENTAL LABORATORY TEST RESULTS

G.1 GUIDANCE NOTES

Notes on Chemical Analysis for Contaminated Land Assessment	Figure G.1 (3 pages)

G.2 SCHEDULES AND ANALYTICAL SUITES

Schedule of Contamination Tests – Soil Samples	Figure G.2.1 (3 pages)
Contamination Test Suites – Soil Samples	Figure G.2.2 (3 pages)

G.3 TEST CERTIFICATES

CLS Test Certificates of Analysis for Testing on Soil Samples	783470-2, 785487-2, 785568-2, 785646-2 and 785882-1

NOTES ON CHEMICAL ANALYSIS FOR CONTAMINATED LAND ASSESSMENT

1 SAMPLING, SAMPLE PRESERVATION, TRANSPORT AND STORAGE

Sampling of soils for environmental chemical analysis is undertaken to the standards set out in BS 10175:2011+A1:2013, sampling of groundwater is undertaken as per BS EN ISO 22475-1:2006 and BS ISO 5667-11:2009, sampling of surface waters as per BS EN ISO 5667-1:2006 and BS ISO 5667-6:2014, and sampling of ground gases for environmental testing as per CIRIA Guidance C665.

The sample container types used are dictated by the requirements of chemical testing as set out in the project specification and as provided by the selected environmental testing laboratory. Sample containers are filled as instructed by laboratory guidelines, ensuring minimisation of sample headspace.

Where sample volumes are limited by the sampling technique (e.g. dynamic sampling) certain sample container types may be prioritised to achieve the most comprehensive testing possible.

Samples on site are preserved by control of temperature to between 2 and 4 degrees Celsius unless otherwise stated. Samples are despatched to the analytical laboratory on the day of sampling under Chain of Custody (CoC) in temperature controlled cool-boxes. Sample temperature is measured on receipt at the designated analytical laboratory. Temperature control is maintained at the analytical laboratory prior to receipt of testing instructions, preparation and analysis.

Where testing instructions are to be provided by the Engineer/Client blank testing schedules are provided as standard within 1 to 2 working days of sampling.

2 SCHEDULED TESTING

The requested chemical analyses scheduled on available samples given on the relevant CoC.

The schedule lists the date of sampling, CoC number under which the samples were transported, tests requested and laboratory certificate reference for all samples.

3 LABORATORY ANALYTICAL METHODOLOGIES AND ACCREDITATION

Analytical laboratories used by FGSL are accredited by UKAS (United Kingdom Accreditation Service). Dependent on Limits of Detection being achievable as requested at the time of scheduling, chemical analyses on soils, waters and gases will, where possible, be accredited by MCERTS (Monitoring Certification Scheme). MCERTS is the Environment Agency's performance standard for laboratories undertaking chemical testing. The accreditation applicable for individual tests is presented on the analytical laboratory test certificates in this report.

A summary of the methodologies used by the analytical laboratory in carrying out the requested analyses is presented on the summary pages of the analytical laboratory test certificates. Further information may be obtained on the test methodologies by contacting the laboratory concerned.

Where marine sediment samples are tested, principally as part of a dredging licence application, specific laboratory accreditation testing is required, as detailed in the relevant guidance documents from the licensing agency. Details of these tests are given in relevant guidance documents reproduced in the appendix with the results.

4 DEVIATING SAMPLES

UKAS is the accreditation body responsible for auditing laboratories to both ISO 17025 and MCERTS in the UK. All UKAS accredited laboratories are required to operate appropriate procedures for the handling of deviating samples.

Deviating (or non-conforming) samples are defined as those which may have been compromised in some way during sampling, transportation, storage or analysis, and which may cause the integrity of the analytical data to be in doubt.

Examples of deviating samples that can occur from sampling, transportation and storage issues include:

- Incorrect sample containers for analyses requested, for example, no separate volatile container supplied or samples for organics analysis supplied in plastic containers;
- Headspace present in containers for volatile compounds or Biological Oxygen Demand (BOD) analyses;
- No sampling date supplied (mandatory for MCERTS);
- No sampling time supplied (applicable for certain water parameters);
- Temperature exceeded;
- Holding time for the analysis exceeded.

NOTES ON CHEMICAL ANALYSIS FOR CONTAMINATED LAND ASSESSMENT

Where deviating samples are subsequently analysed, UKAS requires that the competent laboratory "shall include a disclaimer in the report, clearly stating that the sample was deviating and that, as a result, the test result(s) may be invalid". It is also a condition of MCERTS that the whole results certificate is included in reports sent to the Client, including all supporting information. and not just the results sheets. Each analytical report therefore contains a page detailing the deviating samples and the reasons for the non-conformity.

FGSL undertakes to sample, record, transport and store samples in such a way that deviating samples should not occur unless for reasons outside of FGSL's control.

5 WASTE ACCEPTANCE CRITERIA TESTING

Where samples have been scheduled for Waste Acceptance Criteria (WAC) testing to BS EN 12457, Part 3, analysis is undertaken for one of the Full, Hazardous or Inert WAC suites, as specified and as detailed below.

Full WAC Suite: The solid material from each sample is tested for: total organic carbon (TOC); loss on ignition (LOI); benzene, toluene, ethylbenzene and xylene (BTEX): Polychlorinated biphenyls (PCB's); Total petroleum hydrocarbons (TPH (C10 – C40)); Polycyclic aromatic hydrocarbons (PAHs); pH value; and acid neutralisation capacity. Two leachate specimens for each sample are prepared at liquid to solid ratios of 2:1 and then 8:1 and both are analysed for arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium, zinc, chloride, fluoride, sulphate, total dissolved solids, phenol index and dissolved organic carbon.

Hazardous WAC Suite: The solid material from each sample is tested for total organic carbon, loss on ignition and acid neutralisation capacity. Two leachate specimens for each sample are prepared at liquid to solid ratios of 2:1 and then 8:1 and both are analysed for arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium, zinc, chloride, fluoride, sulphate, total dissolved solids and dissolved organic carbon.

Inert WAC Suite: The solid material from each sample for total organic carbon, BTEX, PCB's, TPH (C10 – C40) and PAH. Two leachate specimens for each sample are prepared at liquid to solid ratios of 2:1 and then 8:1 and both analysed for arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium, zinc, chloride, fluoride, sulphate, total dissolved solids, phenol index and dissolved organic carbon.

Results – calculation: The results of the testing of the 2:1 and 8:1 leachate specimens are then calculated to give a liquid to solid ratio of 10:1 result in mg/kg. These 10:1 results, and the results of the solid determinations, can be compared to the values set out in the guidance produced by the Environment Agency (2005) to assist with appropriate disposal to landfill, under Landfill Directive (1999/31/EC).

6 CHEMICAL ANALYSIS ON LEACHATES PREPARED FROM SOIL SAMPLES

Where artificially produced leachate specimens are requested from soil samples the leachate preparation technique is in accordance with British Standard BS EN 12457, as detailed on the Schedules.

The following is a summary of the different leaching preparations available:

- BS EN 12457-1: One stage test carried out at a liquid to solid ratio of 2:1;
- BS EN 12457-2: One stage test carried out at a liquid to solid ratio of 10:1;
- BS EN 12457-3: Two stage test carried out at a liquid to solid ratio of 2:1 followed by 8:1, giving a cumulative liquid to solid ratio of 10:1.

The resultant leachate specimens are then tested for the list of parameters as scheduled.

7 AGS DATA FOR CHEMISTRY TESTING

Chemical testing results are provided in AGS 3.1 or AGS 4.0 format where requested. It should be noted that where laboratory methodologies differ, or determinants tested do not appear on the AGS code list for chemical test names, a new and unique code may be used for an individual test.

NOTES ON CHEMICAL ANALYSIS FOR CONTAMINATED LAND ASSESSMENT

REFERENCES

General Refs

BS 10175:2011+A1:2013 Investigation of potentially contaminated sites. Code of practice. British Standards Institute (BSI), March 2011. ISBN 978 0 580 68198 1.

Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste.

Environment Agency (2005) Guidance on Sampling and Testing of Wastes to meet Landfill Waste Acceptance Procedures., Version 1. April 2005.

Leaching tests

BS EN 12457-1:2002. Characterisation of waste. Leaching. Compliance test for leaching of granular waste materials and sludges. One stage batch test at a liquid to solid ratio of 2 l/kg for materials with high solid content and with particle size below 4 mm (without or with size reduction). BSI, London (2002).

BS EN 12457-2:2002. Characterisation of waste. Leaching. Compliance test for leaching of granular waste materials and sludges. One stage batch test at a liquid to solid ratio of 10 l/kg for materials with particle size below 4 mm (without or with size reduction). BSI, London (2002).

BS EN 12457-3:2002. Characterisation of waste. Leaching. Compliance test for leaching of granular waste materials and sludges. Two stage batch test at a liquid to solid ratio of 2 l/kg and 8 l/kg for materials with a high solid content and with a particle size below 4 mm (without or with size reduction). BSI, London (2002).

Guidance on Groundwater Sampling

BS EN ISO 22475-1. Geotechnical investigation and testing – sampling methods and groundwater measurements – Part 1: Technical principles for execution. BSI, Milton Keynes (2006).

BS ISO 5667-11:2009. Water Quality. Sampling. Guidance on sampling of groundwaters. BSI, Milton Keynes (2009).

Guidance on Sampling of Surface Waters/Rivers

BS EN ISO 5667-1:2006. Water quality. Sampling. Guidance on the design of sampling programmes and sampling techniques. BSI, Milton Keynes (2006).

BS ISO 5667-6:2014. Water quality. Sampling. Guidance on sampling of rivers and streams. BSI, Milton Keynes (2014).

Guidance on Sampling of Gases

Wilson, S. et al. (2007). Assessing risks posed by hazardous ground gases, C665, CIRIA, London.

Marine Sediments

See guidance documents from Centre for Environment Fisheries and Aquaculture Science (Cefas), Marine Scotland or Natural Resources Wales, as appropriate

SCHEDULE OF CONTAMINATION TESTS – SOIL SAMPLES

Sampling								Analysis				Results
C of C No.	Date of Sampling	Hole No.	Depth Top (m)	Depth Bottom (m)	Type	No.	Matrix (S/W/O)	Suite K: Marine Scotland Disposal Testing (Clause 15.3)	Waste Classification testing (Clause 15.4)	Full WAC (Clause 15.5)	Special Waste Leachate Suite (Clause 15.7)	Certificate No.
180811	08/11/2018	BH01	0.00	1.00	ES	1	S	1		1		783470
180811	08/11/2018	BH01	2.50	3.50	ES	9	S	1			1	783470
180811	08/11/2018	BH01	5.50	6.00	ES	16	S	1	1			783470
180811	06/11/2018	BH02	0.00	0.50	ES	1	S				1	783470
180811	06/11/2018	BH02	1.50	2.50	ES	5	S		1			783470
180811	06/11/2018	BH02	4.50	5.50	ES	12	S			1		783470
23901	09/11/2018	BH03	0.00	0.50	ES	1	S	1	1		1	785487
23901	09/11/2018	BH03	0.50	1.00	ES	4	S	1				785487
23901	09/11/2018	BH03	1.50	2.00	ES	7	S	1				785487
23901	09/11/2018	BH03	2.50	3.00	ES	11	S	1				785487
180811	04/11/2018	BH04	0.00	0.50	ES	1	S		1			783470
181611	11/11/2018	BH05	0.00	1.00	ES	1	S	1	1			785646
181611	11/11/2018	BH05	1.00	1.50	ES	4	S	1				785646
181611	11/11/2018	BH05	1.50	2.50	ES	6	S		1		1	785646
23901	11/11/2018	BH05	2.50	3.00	ES	9	S	1				785487
23901	11/11/2018	BH05	3.50	4.00	ES	13	S		1			785487
180811	06/11/2018	BH07	0.00	0.50	ES	1	S	1	1			783470
180811	06/11/2018	BH07	1.00	1.50	ES	4	S	1				783470

SCHEDULE OF CONTAMINATION TESTS – SOIL SAMPLES

Sampling								Analysis				Results
C of C No.	Date of Sampling	Hole No.	Depth Top (m)	Depth Bottom (m)	Type	No.	Matrix (S/W/O)	Suite K: Marine Scotland Disposal Testing (Clause 15.3)	Waste Classification testing (Clause 15.4)	Full WAC (Clause 15.5)	Special Waste Leachate Suite (Clause 15.7)	Certificate No.
180811	06/11/2018	BH07	2.50	3.50	ES	8	S	1				783470
180811	06/11/2018	BH08	1.50	2.00	ES	6	S				1	783470
180811	06/11/2018	BH08	3.00	3.50	ES	10	S		1			783470
180811	06/11/2018	BH08	4.50	5.00	ES	14	S			1		783470
23901	10/11/2018	BH11	0.00	1.00	ES	1	S	1				785487
23901	10/11/2018	BH11	1.50	2.50	ES	5	S	1	1		1	785487
23901	10/11/2018	BH11	2.50	3.50	ES	8	S	1				785487
181611	12/11/2018	BH20	0.00	0.50	ES	1	S	1	1			785646
181611	12/11/2018	BH20	0.50	1.00	ES	4	S	1				785646
181611	12/11/2018	BH20	1.50	2.00	ES	8	S	1				785646
BH23_BH21_BH09	13/11/2018	BH21	0.00	0.50	ES	1	S		1			785568
BH23_BH21_BH09	13/11/2018	BH21	1.50	2.00	ES	6	S			1	1	785568
181611	13/11/2018	BH22	0.00	1.00	ES	1	S		1			785646
181611	13/11/2018	BH22	3.00	3.50	ES	8	S			1	1	785646
BH23_BH21_BH09	14/11/2018	BH23	0.00	0.50	ES	1	S	1				785568
BH23_BH21_BH09	14/11/2018	BH23	0.50	1.00	ES	4	S	1				785568
BH23_BH21_BH09	14/11/2018	BH23	1.50	2.00	ES	7	S	1				785568
181611	11/11/2018	BH24A	0.00	0.50	ES	1	S	1				785646

SCHEDULE OF CONTAMINATION TESTS – SOIL SAMPLES

Sampling								Analysis				Results
C of C No.	Date of Sampling	Hole No.	Depth Top (m)	Depth Bottom (m)	Type	No.	Matrix (S/W/O)	Suite K: Marine Scotland Disposal Testing (Clause 15.3)	Waste Classification testing (Clause 15.4)	Full WAC (Clause 15.5)	Special Waste Leachate Suite (Clause 15.7)	Certificate No.
181611	11/11/2018	BH24A	0.50	1.00	ES	4	S	1				785646
181611	11/11/2018	BH24A	1.50	2.00	ES	8	S		1		1	785646
BH30	16/11/2018	BH30	0.10	0.50	ES	2	S	1				785882
BH30	16/11/2018	BH30	0.60	1.15	ES	4	S	1	1			785882
							TOTALS	26	15	5	9	

Notes:

2 x Marine Scotland Recovery Suites

2 x Marine Scotland Blanks as QA/QC

CONTAMINATION TESTING SUITES – SOIL SAMPLES

Suite K: Chemical testing for contamination for sea disposal
Determinands: Arsenic (HF total digest), Cadmium (HF digest), Chromium, Copper (HF digest), Mercury (HF digest) , Nickel (HF digest), Lead (HF digest), Zinc (HF digest) Dibutyltin (DBT), Tributyltin (TBT) Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)Pyrene, Benzo(b)fluoranthene, Benzo(g,h,i)Perylene, Benzo(k)Fluoranthene, Dibenzo(a,h)Anthracene, Fluoranthene, Fluorene, Naphthalene, Phenanthrene, Pyrene, Indeno(1,2,3-c,d)Pyrene, Benzo(a)Anthracene, Chrysene, Total 16 nr. PAHs Particle Size Analysis (carried out by Geotechnical Lab) Total Organic Carbon Visual Inspection Dry Solids (at 105˚C) , Dry Solids (assisted air-drying at <30˚C) PCB Congener 28, PCB Congener 52, PCB Congener 101, PCB Congener 118, PCB Congener 138, PCB Congener 153, PCB Congener 180, Total 7 nr. PCB Congeners Total Hydrocarbon Content
Waste Classification Testing (Clause 15.4)
Determinands: Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium (Total and VI), Copper, Iron, Mercury, Nickel, Lead, Selenium, Vanadium, Zinc Polycyclic Aromatic Hydrocarbons 17 nr. PAHs: Naphthalene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(123cd)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthrene, Pyrene, Benzo(a)anthracene, Benzo(j)fluoranthene, Total PAH Total Petroleum Hydrocarbons (aromatic/aliphatic split): TPH - CWG (C5-35) Aliphatic/Aromatic Split (with CWG banding - Ali C5-6,>6-8,>8-10,>10-12,>12-16,>16-21,>21-35) (Aro - >C6-7,>7-8,>8-10,>C10-12,>12-16,>16-21,>21-35) BTEX Compounds (speciated) (by GC-MS) Asbestos Screen (fibre screen only), Asbestos Quantification Cyanide (Total), Sulphur, Sulphate (Total), Sulphate (Water Soluble), pH Value, Moisture Content, Soil Organic Matter Phenols – speciated (by HPLC): Catechol, Cresols, Naphthols, Phenol, Resorcinol, Trimethyl phenols, Xylenols, Total Phenols Volatile Organic Compounds (VOC's target list only), Semi-Volatile Organic Compounds excluding PAH (SVOC's target list) Polychlorinated biphenyls (PCBs) – WHO 12 congeners

TBT, DBT

Waste Acceptance Criteria Testing (Clause 15.5)

Determinands:

Total Organic Mater (Solid), Loss on Ignition (Solid)

BTEX (Solid)

Total 7 nr. PCB Congeners

Total Petroleum Hydrocarbons (C10-C40,Solid)

Total 16 nr. PAHs

pH (Solid)

Acid Neutralisation Capacity (pH4, Solid), Acid Neutralisation Capacity (pH7, Solid)

Arsenic (Leachate), Barium (Leachate) , Cadmium (Leachate) , Chromium (Leachate), Copper (Leachate), Mercury (Leachate), Molybdenum (Leachate), Nickel (Leachate), Lead (Leachate), Antimony (Leachate), Selenium (Leachate), Zinc (Leachate)

Chloride (Leachate), Fluoride (Leachate), Sulphate (Leachate)

Total Dissolved Solids (Leachate), Phenol Index (Leachate), Dissolved Organic Carbon (Leachate)

pH (Leachate)

Conductivity (Leachate)

Special laboratory testing (Clause 15.7)

Special Waste Leachate analysis to BS EN ISO 18772:2014 - L/S 10:1 and 24 hour contact time

Determinands:

pH (laboratory)

Major Ions: Calcium, Sodium, Magnesium, Potassium, Sulphate, Chloride

Metals and minor ions: Ammonia as N, Aluminium, Arsenic, Cadmium, Chromium (Total and VI) , Copper, Nickel, Lead, Zinc, Mercury, Vanadium, Boron, Selenium, Iron, Manganese, Nitrate as N, Nitrite as N, Orthophosphate as P, Cyanide, Barium, Beryllium

Polycyclic Aromatic Hydrocarbons (PAH) (17): Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(ghi)perylene, Benzo(j)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenzo(ah)anthracene, Fluoranthrene, Fluorene, Indeno(123cd)pyrene, Naphthalene, Phenanthrene, Pyrene, Total PAH

Total Petroleum Hydrocarbons (aromatic/aliphatic split): TPH - CWG (C5-35), Aliphatic/Aromatic Split (with CWG banding - Ali C5-6,>6-8,>8-10,>10-12,>12-16,>16-21,>21-35) (Aro ->C6-7,>7-8,>8-10,>C10-12,>12-16,>16-21,>21-35)

BTEX compounds

TBT

DBT

Volatile Organic Compounds excluding BTEX: VOCs target list only

Semi-Volatile Organic Compounds excluding PAHs: SVOCs target list

Polychlorinated biphenyls (PCBs) – WHO 12 congeners

Phenols - speciated: Catechol, Cresols, Naphthols, Phenol, Resorcinol, Trimethyl phenols, Xylenols, Total Phenols

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

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Concept Life Sciences

Certificate of Analysis

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Report Number: 783470-2

Date of Report: 17-Jan-2019

Customer: Fugro GeoServices
Fugro House
Hithercroft Road
Wallingford
Oxfordshire
OX10 9RB

Customer Contact: Ms Karen Blackmore

Customer Job Reference: G180030U
Customer Purchase Order: 74376KB-WAL
Customer Site Reference: St Ola Pier, Scrabster
Date Job Received at Concept: 15-Nov-2018
Date Analysis Started: 21-Nov-2018
Date Analysis Completed: 17-Jan-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aleksandra Pacula
Senior Customer Service Advisor

Issued by :
Aleksandra Pacula
Senior Customer Service Advisor

Waste Acceptance Criteria

Customer Sample Reference : BH08
Our Sample Reference : 783470 010
Project Site : St Ola Pier, Scrabster
Customer Reference : G180030U
Sample in Dish @ 105C : 51.4
Wet Sample in Dish Weight : 100
Top Depth : 4.50
Test Portion Mass (g) : 175
Bottom Depth : 5.00
Empty Dish Weight : 0
Hole ID : BH08
Date Sampled : 06-NOV-2018
Time Sampled : 12:00
AGS Type : ES
AGS Sample Reference : 14
Matrix Class : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
PCB EC7 (Sum)	Calc	0.007	mg/kg	M	<0.007	1.0		
Acid Neutralising Capacity (pH 4)	Titration	2	Mol/kg	N	<2			
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.080	mg/kg	U	(110) <0.080	6.0		
Loss on Ignition	Grav	0.1	%	N	**1.1**			10.0
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
pH	Probe			M	**8.7**		> 6.0	
Total Organic Carbon	OX/IR	0.1	%	N	**0.1**	3.0	5.0	6.0
Total Petroleum Hydrocarbons C10-C40 (Sum)	Calc	1	mg/kg	N	(13) <1	500.0		

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	**0.034**	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.034**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.32**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	**0.00026**	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**7600**	**800.0**	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.0072**	2.0	50.0	100.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**24**	500.0	800.0	1000.0
Fluoride	Calc (W)	0.50	mg/kg	N	**1.1**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	<0.0030	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.090**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.4	10.0	40.0
Phenols (Total-Mono)	Calc	1.0	mg/kg	N	<1.0	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
Sulphate	Calc (W)	5	mg/kg	N	**940**	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	1000	mg/kg	N	**16000**	**4000.0**	60000.0	100000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	**1.0**	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

*** Waste Sampling and Testing for Disposal at Landfill, EBPRI 11507B, Environment Agency (England and Wales) March 2013**

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Waste Acceptance Criteria

Customer Sample Reference : BH02
Our Sample Reference : 783470 013
Project Site : St Ola Pier, Scrabster
Customer Reference : G180030U
Hole ID : BH02
Top Depth : 4.50
Bottom Depth : 5.50
Sample in Dish @ 105C : 72.6
Empty Dish Weight : 0
Test Portion Mass (g) : 175
Wet Sample in Dish Weight : 100
Date Sampled : 06-NOV-2018
Time Sampled : 12:00
AGS Type : ES
AGS Sample Reference : 12
Matrix Class : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
PCB EC7 (Sum)	Calc	0.007	mg/kg	M	<0.007	1.0		
Acid Neutralising Capacity (pH 4)	Titration	2	Mol/kg	N	<2			
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.080	mg/kg	U	(110) <0.080	6.0		
Loss on Ignition	Grav	0.1	%	N	**0.9**			10.0
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
pH	Probe			M	**8.9**		> 6.0	
Total Organic Carbon	OX/IR	0.1	%	N	**0.1**	3.0	5.0	6.0
Total Petroleum Hydrocarbons C10-C40 (Sum)	Calc	1	mg/kg	N	(13) **3**	500.0		

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	**0.019**	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.024**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.37**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	**0.00021**	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**12000**	**800.0**	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	2.0	50.0	100.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**22**	500.0	800.0	1000.0
Fluoride	Calc (W)	0.50	mg/kg	N	**0.78**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	<0.0030	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.026**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	**0.014**	0.4	10.0	40.0
Phenols (Total-Mono)	Calc	1.0	mg/kg	N	<1.0	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
Sulphate	Calc (W)	5	mg/kg	N	**1600**	**1000.0**	20000.0	50000.0
Total Dissolved Solids	Calc	1000	mg/kg	N	**26000**	**4000.0**	60000.0	100000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	<0.020	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

*** Waste Sampling and Testing for Disposal at Landfill, EBPRI 11507B, Environment Agency (England and Wales) March 2013**

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Waste Acceptance Criteria

Customer Sample Reference : BH01
Our Sample Reference : 783470 014
Project Site : St Ola Pier, Scrabster
Customer Reference : G180030U
Wet Sample in Dish Weight : 100
Empty Dish Weight : 0
Sample in Dish @ 105C : 74.6
Test Portion Mass (g) : 175
Hole ID : BH01
Top Depth : 0.00
Bottom Depth : 1.00
Date Sampled : 08-NOV-2018
Time Sampled : 12:00
AGS Type : ES
AGS Sample Reference : 1
Matrix Class : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
PCB EC7 (Sum)	Calc	0.007	mg/kg	M	<0.007	1.0		
Acid Neutralising Capacity (pH 4)	Titration	2	Mol/kg	N	<2			
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
Loss on Ignition	Grav	0.1	%	N	**1.2**			10.0
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
pH	Probe			M	**8.7**		> 6.0	
Total Organic Carbon	OX/IR	0.1	%	N	**0.2**	3.0	5.0	6.0
Total Petroleum Hydrocarbons C10-C40 (Sum)	Calc	1	mg/kg	N	(13) **2**	500.0		

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	**0.015**	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.027**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.14**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	<0.00020	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**12000**	**800.0**	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.024**	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	2.0	50.0	100.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**29**	500.0	800.0	1000.0
Fluoride	Calc (W)	0.50	mg/kg	N	**1.6**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	<0.0030	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.18**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	**0.017**	0.4	10.0	40.0
Phenols (Total-Mono)	Calc	1.0	mg/kg	N	<1.0	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
Sulphate	Calc (W)	5	mg/kg	N	**1900**	**1000.0**	20000.0	50000.0
Total Dissolved Solids	Calc	1000	mg/kg	N	**27000**	**4000.0**	60000.0	100000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	<0.020	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

*** Waste Sampling and Testing for Disposal at Landfill, EBPRI 11507B, Environment Agency (England and Wales) March 2013**

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 010**	**783470 012**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH08**	**BH02**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**5.00**	**2.50**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH08**	**BH02**
				Top Depth	**0.00**	**0.00**	**3.00**	**4.50**	**1.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**14**	**5**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**7.1**	**27**	**25**	**26**	**28**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**783470 013**	**783470 014**	**783470 020**
				Customer Sample Reference	**BH02**	**BH01**	**BH01 (SOIL)**
				Test Sample	**AR**	**AR**	**AR**
				Bottom Depth	**5.50**	**1.00**	**6.00**
				Hole ID	**BH02**	**BH01**	**BH01**
				Top Depth	**4.50**	**0.00**	**5.50**
				Date Sampled	**06-NOV-2018**	**08-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**12**	**1**	**16**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**27**	**25**	**22**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 010**	**783470 012**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH08**	**BH02**
				Test Sample	**M40**	**M40**	**M40**	**M40**	**M40**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**5.00**	**2.50**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH08**	**BH02**
				Top Depth	**0.00**	**0.00**	**3.00**	**4.50**	**1.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**14**	**5**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Retained on 10mm sieve	Grav	0.1	%	N	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
MCERTS Preparation

Concept Reference	**783470 013**	**783470 014**	**783470 020**
Customer Sample Reference	**BH02**	**BH01**	**BH01 (SOIL)**
Test Sample	**M40**	**M40**	**M40**
Bottom Depth	**5.50**	**1.00**	**6.00**
Hole ID	**BH02**	**BH01**	**BH01**
Top Depth	**4.50**	**0.00**	**5.50**
Date Sampled	**06-NOV-2018**	**08-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**12**	**1**	**16**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Retained on 10mm sieve	Grav	0.1	%	N	<0.1	<0.1	<0.1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**A40**	**A40**	**A40**	**A40**	**A40**
Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol					
Asbestos ID	PLM			SU	N.D.	N.D.	N.D.	N.D.	N.D.
Sulphur (total)	ICP/OES	0.01	%	M	<0.01	<0.01	<0.01	<0.01	<0.01
(Acid Soluble) Sulphate	HCl Extraction/ICP/OES (TRL 447 T2)	0.01	%	M	**0.11**	**0.16**	**0.10**	**0.11**	**0.08**
(Water Soluble) Sulphate expressed as SO4	2:1 Extraction/ICP/OES (TRL 447 T1)	0.01	g/l	M	**0.18**	**0.16**	**0.20**	**0.23**	**0.13**
pH	Probe			M	**8.6**	**8.9**	**8.8**	**8.8**	**9.1**
Soil Organic Matter	Calc TOC/0.58	0.1	%	N	**0.3**	**0.3**	**0.2**	**0.3**	**0.3**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol					
Cyanide (Total)	Colorimetry	1	mg/kg	M	<1	<1	<1	<1	<1
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**7.1**	**27**	**25**	**28**	**22**
Dibutyl tin	GC/MS (Deriv.)	0.01	mg/kg	N	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(j)fluoranthene	GC/MS	0.1	mg/kg	N	<0.1	<0.1	<0.1	<0.1	<0.1
Tributyl tin	GC/MS (Deriv.)	0.01	mg/kg	N	<0.01	<0.01	<0.01	<0.01	<0.01

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Heavy Metals(9)

Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**A40**	**A40**	**A40**	**A40**	**A40**
Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol					
Boron (water-soluble)	ICP/OES	1	mg/kg	N	<1	<1	<1	<1	<1
Barium	ICP/OES	1	mg/kg	U	**210**	**110**	**160**	**130**	**160**
Beryllium	ICP/OES	2	mg/kg	U	<2	<2	<2	<2	<2
Chromium VI	ICP/OES	1	mg/kg	N	<1	<1	<1	<1	<1
Iron	ICP/OES	1	mg/kg	U	**3**	**2**	**24**	**330**	**6**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Heavy Metals(9)

Concept Reference	783470 001	783470 004	783470 009	783470 012	783470 020
Customer Sample Reference	BH04	BH07 (SOIL)	BH08	BH02	BH01 (SOIL)
Test Sample	M40	M40	M40	M40	M40
Bottom Depth	0.50	0.50	3.50	2.50	6.00
Hole ID	BH04	BH07	BH08	BH02	BH01
Top Depth	0.00	0.00	3.00	1.50	5.50
Date Sampled	04-NOV-2018	06-NOV-2018	06-NOV-2018	06-NOV-2018	08-NOV-2018
Time Sampled	12:00	12:00	12:00	12:00	12:00
AGS Type	ES	ES	ES	ES	ES
AGS Sample Reference	1	1	10	5	16
Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil

Determinand	Method	LOD	Units	Symbol					
Arsenic	ICP/OES	2	mg/kg	M	**6**	**3**	**6**	**5**	**6**
Cadmium	ICP/OES	1	mg/kg	M	<1	<1	<1	<1	<1
Chromium	ICP/OES	1	mg/kg	M	**17**	**11**	**16**	**16**	**15**
Copper	ICP/OES	1	mg/kg	M	**11**	**6**	**7**	**7**	**4**
Mercury	ICP/OES	1	mg/kg	M	<1	<1	<1	<1	<1
Nickel	ICP/OES	1	mg/kg	M	**12**	**8**	**13**	**13**	**11**
Lead	ICP/OES	1	mg/kg	M	**9**	**6**	**8**	**8**	**7**
Selenium	ICP/OES	3	mg/kg	M	<3	<3	<3	<3	<3
Vanadium	ICP/OES	1	mg/kg	M	**25**	**17**	**22**	**22**	**22**
Zinc	ICP/OES	1	mg/kg	M	**35**	**22**	**35**	**35**	**27**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
BTEX

Concept Reference	783470 010	783470 013	783470 014
Customer Sample Reference	BH08	BH02	BH01
Test Sample	M105	M105	M105
Bottom Depth	5.00	5.50	1.00
Hole ID	BH08	BH02	BH01
Top Depth	4.50	4.50	0.00
Date Sampled	06-NOV-2018	06-NOV-2018	08-NOV-2018
Time Sampled	12:00	12:00	12:00
AGS Type	ES	ES	ES
AGS Sample Reference	14	12	1
Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil

Determinand	Method	LOD	Units	Symbol			
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<20(110)	<10
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<20(110)	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<20(110)	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<20(110)	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<20(110)	<10

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
PCB EC7 and Total

				Concept Reference	**783470 010**	**783470 013**	**783470 014**
				Customer Sample Reference	**BH08**	**BH02**	**BH01**
				Test Sample	**AR**	**AR**	**AR**
				Bottom Depth	**5.00**	**5.50**	**1.00**
				Hole ID	**BH08**	**BH02**	**BH01**
				Top Depth	**4.50**	**4.50**	**0.00**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**14**	**12**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Polychlorinated biphenyl BZ#101	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1
Polychlorinated biphenyl BZ#118	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1
Polychlorinated biphenyl BZ#138	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1
Polychlorinated biphenyl BZ#153	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1
Polychlorinated biphenyl BZ#180	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1
Polychlorinated biphenyl BZ#28	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1
Polychlorinated biphenyl BZ#52	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Poly-Chlorinated Biphenyls (WHO 12)

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
				Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Polychlorinated biphenyl BZ#77	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#81	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#105	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#114	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#123	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#126	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#156	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#157	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#167	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#169	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#189	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Total and Speciated USEPA16 PAH

				Concept Reference	**783470 010**	**783470 013**	**783470 014**
				Customer Sample Reference	**BH08**	**BH02**	**BH01**
				Test Sample	**M105**	**M105**	**M105**
				Bottom Depth	**5.00**	**5.50**	**1.00**
				Hole ID	**BH08**	**BH02**	**BH01**
				Top Depth	**4.50**	**4.50**	**0.00**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**14**	**12**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1
Coronene	GC/MS	0.1	mg/kg	N	<0.1	<0.1	<0.1
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
				Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Total Petroleum Hydrocarbons

				Concept Reference	**783470 010**	**783470 013**	**783470 014**
				Customer Sample Reference	**BH08**	**BH02**	**BH01**
				Test Sample	**M105**	**M105**	**M105**
				Bottom Depth	**5.00**	**5.50**	**1.00**
				Hole ID	**BH08**	**BH02**	**BH01**
				Top Depth	**4.50**	**4.50**	**0.00**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**14**	**12**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Total Petroleum Hydrocarbons	GC/FID	1	mg/kg	M	<1[13]	**3**[13]	**2**[13]
Total Petroleum Hydrocarbons (C35-C40)	GC/FID	1	mg/kg	N	<1[13]	<1[13]	<1[13]

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
TPH UKCWG

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
				Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20(110)
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20(110)
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20(110)
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20(110)
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20(110)
Methyl tert-Butyl Ether	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20(110)
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS (Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100	<0.200(110)
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS (Head Space)(MCERTS)	0.10	mg/kg	N	<0.10	<0.10	<0.10	<0.10	<0.20(110)
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS (Head Space)(MCERTS)	0.10	mg/kg	N	**0.25**	<0.10	<0.10	<0.10	<0.20(110)
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GCxGC	1	mg/kg	M	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GCxGC	1	mg/kg	M	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GCxGC	1	mg/kg	M	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GCxGC	2	mg/kg	M	**11**	<2	<2	<2	<2
Total Petroleum Hydrocarbons (Aliphatic) total	Calc		mg/kg	N	**11(13)**	N.D.(13)	N.D.(13)	N.D.(13)	N.D.(13)
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS (Head Space)(MCERTS)	0.10	mg/kg	N	<0.10	<0.10	<0.10	<0.10	<0.20(110)
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS (Head Space)(MCERTS)	0.10	mg/kg	N	<0.10	<0.10	<0.10	<0.10	<0.20(110)
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS (Head Space)(MCERTS)	0.10	mg/kg	N	<0.10	<0.10	<0.10	<0.10	<0.20(110)
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GCxGC	2	mg/kg	M	<2	<2	<2	<2	<2
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GCxGC	1	mg/kg	M	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GCxGC	1	mg/kg	M	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GCxGC	1	mg/kg	M	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons (Aromatic) total	Calc		mg/kg	N	N.D.(13)	N.D.(13)	N.D.(13)	N.D.(13)	N.D.(13)
Total Petroleum Hydrocarbons (Aliphatic+Aromatic)	Calc		mg/kg	N	**11.0(13)**	N.D.(13)	N.D.(13)	N.D.(13)	N.D.(13)

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Phenols (Speciated)

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
				Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Resorcinol	HPLC	0.05	mg/kg	SM	<0.05	<0.05	<0.05	<0.05	<0.05
Catechol	HPLC	0.05	mg/kg	SN	_(NR)	_(NR)	_(NR)	_(NR)	_(NR)
Phenol	HPLC	0.1	mg/kg	SM	<0.1	<0.1	<0.1	<0.1	<0.1
Cresols	HPLC	0.05	mg/kg	SM	<0.05	<0.05	<0.05	<0.05	<0.05
Xylenols	HPLC	0.05	mg/kg	SM	<0.06	<0.06	<0.06	<0.06	<0.06
Naphthols	HPLC	0.05	mg/kg	SN	<0.05	<0.05	<0.05	<0.05	<0.05
Trimethyl phenol	HPLC	0.05	mg/kg	SM	<0.05	<0.05	<0.05	<0.05	<0.05
Total Phenols	HPLC	0.1	mg/kg	SN	_(NR)	_(NR)	_(NR)	_(NR)	_(NR)

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Semi-Volatile Organic Compounds (USEPA 625)

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
				Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroethyl) ether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chlorophenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroisopropyl) ether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-methyl phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
3/4-Methylphenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachloroethane	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Isophorone	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dimethylphenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroethoxy) methane	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
1,2,4-Trichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1(131)	<0.1(131)	<0.1(131)	<0.1(131)	<0.1(131)
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobutadiene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chloronaphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethyl phthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-Dinitrotoluene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
3-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzofuran	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrotoluene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Diethyl phthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chlorophenyl phenylether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Azobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Bromophenyl phenylether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Carbazole	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-butylphthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Butyl benzylphthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-ethylhexyl)phthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol					
Di-n-octylphthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Volatile Organic Compounds (USEPA 624) (MCERTS)

Concept Reference				**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
Customer Sample Reference				**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample				**M105**	**M105**	**M105**	**M105**	**M105**
Bottom Depth				**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
Hole ID				**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
Top Depth				**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
Date Sampled				**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled				**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type				**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference				**1**	**1**	**10**	**5**	**16**
Matrix Class				**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**				
Dichlorodifluoromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Chloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
Vinyl chloride monomer	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Bromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
Chloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Trichlorofluoromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Dichloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
Trans-1,2-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1-Dichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Cis-1,2-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
2,2-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
Chloroform	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Bromochloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1,1-Trichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Carbon tetrachloride	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,2-Dichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20[110]
1,2-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Trichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Bromodichloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Dibromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Cis-1,3-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20[110]
Trans-1,3-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1,2-Trichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,3-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Tetrachloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Chlorodibromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,2-dibromoethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Chlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1,1,2-Tetrachloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20[110]
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20[110]
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20[110]
Styrene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
Bromoform	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Isopropyl benzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1,2,2-Tetrachloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
1,2,3-Trichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
n-Propylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Bromobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,3,5-Trimethylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Tert-Butylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,2,4-Trimethylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Sec-Butylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
p-Isopropyltoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
2-Chlorotoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
4-Chlorotoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
1,3-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,4-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Volatile Organic Compounds (USEPA 624) (MCERTS)

Concept Reference		**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
Customer Sample Reference		**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample		**M105**	**M105**	**M105**	**M105**	**M105**
Bottom Depth		**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
Hole ID		**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
Top Depth		**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
Date Sampled		**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled		**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type		**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference		**1**	**1**	**10**	**5**	**16**
Matrix Class		**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
1,2-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Waste Acceptance Criteria

Concept Reference		**783470 010**	**783470 013**	**783470 014**		
Customer Sample Reference		**BH08**	**BH02**	**BH01**		
Test Sample		**10:1**	**10:1**	**10:1**		
Bottom Depth		**5.00**	**5.50**	**1.00**		
Hole ID		**BH08**	**BH02**	**BH01**		
Top Depth		**4.50**	**4.50**	**0.00**		
Date Sampled		**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**		
Time Sampled		**12:00**	**12:00**	**12:00**		
AGS Type		**ES**	**ES**	**ES**		
AGS Sample Reference		**14**	**12**	**1**		
Matrix Class		**Sandy Soil**	**Sandy Soil**	**Sandy Soil**		
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**3.4**	**2.4**	**2.7**
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**32**	**37**	**14**
Molybdenum (Dissolved)	ICP/MS (Filtered)	1	µg/l	N	**9**	<5[9]	**18**
Total Dissolved Solids	Grav	100	mg/l	N	**1600**	**2600**	**2700**
Phenols (Total-Mono)	Colorimetry	0.1	mg/l	U	<0.1	<0.1	<0.1
Dissolved Organic Carbon	OX/IR	1	mg/l	N	**2**	**2**	**3**
Electrical Conductivity	Probe	10	µS/cm	N	**2600**	**4300**	**4500**
Antimony (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<5[9]	<5[9]	<5[9]
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	<0.10[9]	<0.10[9]	<0.10[9]
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<5[9]	<5[9]	<5[9]
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<2.5[9]	<2.5[9]	<2.5[9]
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	<1.5[9]	<1.5[9]	<1.5[9]
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.25[9]	<0.25[9]	<0.25[9]
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<5[9]	<5[9]	<5[9]
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<2.5[9]	<2.5[9]	<2.5[9]
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	**100**	<10[9]	<10[9]
Chloride	Discrete Analyser	1	mg/l	U	**760**	**1200**	**1200**
Fluoride	Discrete Analyser	0.05	mg/l	U	**0.11**	**0.08**	**0.16**
Sulphate	Discrete Analyser	0.5	mg/l	U	**94**	**160**	**190**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Metals ICP MS

				Concept Reference	**783470 008**	**783470 011**	**783470 019**
				Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**10:1**	**10:1**	**10:1**
				Bottom Depth	**2.00**	**0.50**	**3.50**
				Hole ID	**BH08**	**BH02**	**BH01**
				Top Depth	**1.50**	**0.00**	**2.50**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**9**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**4.4**	**3.5**	**2.6**
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	<0.10[9]	<0.10[9]	<0.02
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<5[9]	<5[9]	<1
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<2.5[9]	<2.5[9]	**0.9**
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<5[9]	<5[9]	<1
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	<1.5[9]	<1.5[9]	<1.5[9]
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	**20**	<10[9]	<2
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.25[9]	<0.25[9]	<0.25[9]
Vanadium (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	<10[9]	<10[9]	**4**
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<2.5[9]	<2.5[9]	<0.5
Manganese (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<5[9]	<5[9]	<1
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**25**	**16**	**31**
Beryllium (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.25[9]	<0.25[9]	<0.05

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Metals ICP OES

				Concept Reference	**783470 008**	**783470 011**	**783470 019**
				Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**10:1**	**10:1**	**10:1**
				Bottom Depth	**2.00**	**0.50**	**3.50**
				Hole ID	**BH08**	**BH02**	**BH01**
				Top Depth	**1.50**	**0.00**	**2.50**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**9**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Calcium	ICP/OES	0.1	mg/l	N	<0.1	<0.1	<0.1
Sodium	ICP/OES	0.1	mg/l	N	<0.1	<0.1	<0.1
Magnesium	ICP/OES	0.1	mg/l	N	**1400**	**1400**	**670**
Potassium	ICP/OES	0.1	mg/l	N	**130**	**130**	<0.1
Aluminium	ICP/OES	0.02	mg/l	U	**0.35**	**3.4**	**1.1**
Chromium VI	Discrete Analyser	0.003	mg/l	U	<0.003	<0.003	<0.003
Boron	ICP/OES	0.01	mg/l	N	**8.3**	**8.1**	**5.3**
Iron	ICP/OES	0.01	mg/l	U	<0.01	<0.01	<0.01

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

PAH US EPA 16 (B and K split)

Concept Reference	**783470 008**	**783470 011**	**783470 019**
Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.00**	**0.50**	**3.50**
Hole ID	**BH08**	**BH02**	**BH01**
Top Depth	**1.50**	**0.00**	**2.50**
Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**1**	**9**

Determinand	Method	LOD	Units	Symbol			
Naphthalene	GC/MS (SIR)	0.01	µg/l	U	**0.18**(13)	**0.05**(13)	**0.11**(13)
Acenaphthylene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(100,13)	<0.02(100,13)
Acenaphthene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(100,13)	<0.02(100,13)
Fluorene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(13,100)	<0.02(100,13)
Phenanthrene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(13,100)
Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(100,13)
Fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(100,13)	<0.02(13,100)
Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(100,13)
Benzo(a)Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(100,13)
Chrysene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(100,13)	<0.02(100,13)
Benzo(b)fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(13,100)	<0.02(100,13)
Benzo(k)fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(13,100)
Benzo(a)Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(100,13)
Indeno(123-cd)Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(13,100)	<0.02(100,13)
Dibenzo(ah)Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(100,13)
Benzo(ghi)Perylene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(100,13)	<0.02(13,100)
Polyaromatic Hydrocarbons (Total)	GC/MS (SIR)	0.01	µg/l	U	**0.18**	**0.05**	**0.11**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

TPH (CWG)

				Concept Reference	**783470 008**	**783470 011**	**783470 019**
				Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**10:1**	**10:1**	**10:1**
				Bottom Depth	**2.00**	**0.50**	**3.50**
				Hole ID	**BH08**	**BH02**	**BH01**
				Top Depth	**1.50**	**0.00**	**2.50**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**9**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (Aliphatic) total	Calc		mg/l	N	N.D.[13]	N.D.[13]	N.D.[13]
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (Aromatic) total	Calc		mg/l	N	N.D.[13]	N.D.[13]	N.D.[13]
Total Petroleum Hydrocarbons (Aliphatic+Aromatic)	Calc		mg/l	N	N.D.[13]	N.D.[13]	N.D.[13]

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Volatile Organic Compounds (USEPA 624)

Concept Reference	**783470 008**	**783470 011**	**783470 019**
Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.00**	**0.50**	**3.50**
Hole ID	**BH08**	**BH02**	**BH01**
Top Depth	**1.50**	**0.00**	**2.50**
Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**1**	**9**

Determinand	Method	LOD	Units	Symbol			
Dichlorodifluoromethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chloromethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Vinyl chloride monomer	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromomethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Trichlorofluoromethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Dichloromethane	GC/MS (Headspace)	50	µg/l	N	<50	<50	<50
Trans-1,2-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1-Dichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Cis-1,2-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
2,2-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chloroform	GC/MS (Headspace)	1	µg/l	U	**6**	**23**	**2**
Bromochloromethane	GC/MS (Headspace)	1	µg/l	U	<1	**5**	<1
1,1,1-Trichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Carbon tetrachloride	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2-Dichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Benzene	GC/MS (Headspace)	1	µg/l	U	<1[13]	<1[13]	<1[13]
1,2-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,2-Trichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromodichloromethane	GC/MS (Headspace)	1	µg/l	U	**2**	**3**	<1
Dibromomethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Cis-1,3-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Toluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Trans-1,3-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,2-Trichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,3-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Tetrachloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chlorodibromomethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2-dibromoethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,1,2-Tetrachloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
EthylBenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Meta/Para-Xylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Ortho-Xylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Styrene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromoform	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Isopropyl benzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,2,2-Tetrachloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2,3-Trichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
n-Propylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,3,5-Trimethylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Tert-Butylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2,4-Trimethylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Sec-Butylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
p-Isopropyltoluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
2-Chlorotoluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
4-Chlorotoluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,3-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,4-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

SVOC (USEPA 625) (B and K split)

Concept Reference	**783470 008**	**783470 011**	**783470 019**
Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.00**	**0.50**	**3.50**
Hole ID	**BH08**	**BH02**	**BH01**
Top Depth	**1.50**	**0.00**	**2.50**
Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**1**	**9**

Determinand	Method	LOD	Units	Symbol			
Phenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Bis (2-chloroethyl) ether	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2-Chlorophenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
1,3-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
1,4-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
1,2-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Bis (2-chloroisopropyl) ether	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2-methyl phenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
3/4-Methylphenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Hexachloroethane	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Nitrobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Isophorone	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2-Nitrophenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2,4-Dimethylphenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Bis (2-chloroethoxy) methane	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2,4-Dichlorophenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
1,2,4-Trichlorobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Naphthalene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
4-Chloroaniline	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Hexachlorobutadiene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
4-Chloro-3-methylphenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2-Methylnaphthalene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Hexachlorocyclopentadiene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2,4,6-Trichlorophenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2,4,5-Trichlorophenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2-Chloronaphthalene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2-Nitroaniline	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Dimethyl phthalate	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2,6-Dinitrotoluene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Acenaphthylene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Acenaphthene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
3-Nitroaniline	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Dibenzofuran	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2,4-Dinitrotoluene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Diethyl phthalate	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Fluorene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
4-Chlorophenyl phenylether	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
4-Nitroaniline	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Azobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
4-Bromophenyl phenylether	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Hexachlorobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Pentachlorophenol	GC/MS (1l ext.)	1	µg/l	U	<1[131]	<1[131]	<1[131]
Phenanthrene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Anthracene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Carbazole	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Di-n-butylphthalate	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Fluoranthene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Pyrene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Butyl benzylphthalate	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Benzo(a)Anthracene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Chrysene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Bis (2-ethylhexyl)phthalate	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Di-n-octylphthalate	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

SVOC (USEPA 625) (B and K split)

Concept Reference	**783470 008**	**783470 011**	**783470 019**
Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.00**	**0.50**	**3.50**
Hole ID	**BH08**	**BH02**	**BH01**
Top Depth	**1.50**	**0.00**	**2.50**
Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**1**	**9**

Determinand	Method	LOD	Units	Symbol			
Benzo(a)Pyrene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Indeno(123-cd)Pyrene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Dibenzo(ah)Anthracene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Benzo(ghi)Perylene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Benzo(b)fluoranthene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Benzo(k)fluoranthene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference	**783470 008**	**783470 011**	**783470 019**
Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.00**	**0.50**	**3.50**
Hole ID	**BH08**	**BH02**	**BH01**
Top Depth	**1.50**	**0.00**	**2.50**
Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**1**	**9**

Determinand	Method	LOD	Units	Symbol			
Polychlorinated biphenyl BZ#81	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#77	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#105	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#114	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#118	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#123	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#126	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#156	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#157	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#167	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#169	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#189	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Phenols (Speciated)

	Concept Reference	783470 008	783470 011	783470 019
	Customer Sample Reference	BH08	BH02	BH01 (SOIL)
	Test Sample	10:1	10:1	10:1
	Bottom Depth	2.00	0.50	3.50
	Hole ID	BH08	BH02	BH01
	Top Depth	1.50	0.00	2.50
	Date Sampled	06-NOV-2018	06-NOV-2018	08-NOV-2018
	Time Sampled	12:00	12:00	12:00
	AGS Type	ES	ES	ES
	AGS Sample Reference	6	1	9

Determinand	Method	LOD	Units	Symbol			
Catechol	HPLC	0.005	mg/l	N	<0.005	<0.005	<0.005
Cresols	HPLC	0.005	mg/l	N	<0.005	<0.005	<0.005
Naphthols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01
Phenol	HPLC	0.005	mg/l	N	<0.005(13)	<0.005(13)	<0.005(13)
Resorcinol	HPLC	0.005	mg/l	N	<0.005	<0.005	<0.005
Total Phenols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01
Trimethyl phenols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01
Xylenols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Special Waste Leachate Suite - Clause 15.7

	Concept Reference	783470 008	783470 011	783470 019
	Customer Sample Reference	BH08	BH02	BH01 (SOIL)
	Test Sample	10:1	10:1	10:1
	Bottom Depth	2.00	0.50	3.50
	Hole ID	BH08	BH02	BH01
	Top Depth	1.50	0.00	2.50
	Date Sampled	06-NOV-2018	06-NOV-2018	08-NOV-2018
	Time Sampled	12:00	12:00	12:00
	AGS Type	ES	ES	ES
	AGS Sample Reference	6	1	9

Determinand	Method	LOD	Units	Symbol			
pH	Probe			U	**7.59**	**7.63**	**7.70**
Sulphate	Discrete Analyser	0.5	mg/l	U	**150**	**130**	**92**
Chloride	Discrete Analyser	1	mg/l	U	**930**	**940**	**470**
Ammonia expressed as N	Discrete Analyser	0.05	mg/l	U	<0.05	**0.50**	<0.05
Nitrate	Discrete Analyser	0.5	mg/l	U	<0.5	<0.5	<0.5
Nitrite	Discrete Analyser	0.1	mg/l	U	<0.1	<0.1	<0.1
orthophosphate	Discrete Analyser	0.5	mg/l	N	<0.5	<0.5	<0.5
Cyanide (Total)	Colorimetry	0.05	mg/l	U	<0.05	<0.05	<0.05
Benzo(j)fluoranthene	GC/MS (SIR)	0.01	mg/l	N	<0.02(100,13)	<0.02(100,13)	<0.02(13,100)
Dibutyl tin	GC/MS (Deriv.)	0.01	µg/l	N	<0.01	<0.01	<0.01
Tributyl tin	GC/MS (Deriv.)	0.01	µg/l	N	<0.01	<0.01	<0.01

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**783470 005**	**783470 006**	**783470 015**	**783470 016**	**783470 017**
				Customer Sample Reference	**BH07**	**BH07**	**BH01**	**BH01**	**BH07 (MARINE SEDIMENT)**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**1.50**	**3.50**	**3.50**	**6.00**	**0.50**
				Hole ID	**BH07**	**BH07**	**BH01**	**BH01**	**BH07**
				Top Depth	**1.00**	**2.50**	**2.50**	**5.50**	**0.00**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**	**08-NOV-2018**	**06-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**4**	**8**	**9**	**16**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Naphthalene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Acenaphthylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Acenaphthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Fluorene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Phenanthrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(a)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Chrysene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(a)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Indeno(123-cd)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(ghi)Perylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(b)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(k)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Dibenzo(ah)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Polyaromatic Hydrocarbons (Total)	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**783470 018**	**783470 022**
				Customer Sample Reference	**BH01 (MARINE SEDIMENT)**	**Method Blank**
				Test Sample	**AR**	**AR**
				Bottom Depth	**1.00**	
				Hole ID	**BH01**	
				Top Depth	**0.00**	
				Date Sampled	**08-NOV-2018**	
				Time Sampled	**12:00**	
				AGS Type	**ES**	
				AGS Sample Reference	**1**	
				Matrix Class		
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Naphthalene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Acenaphthylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Acenaphthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Fluorene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Phenanthrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(a)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Chrysene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(a)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Indeno(123-cd)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(ghi)Perylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(b)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(k)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Dibenzo(ah)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Polyaromatic Hydrocarbons (Total)	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**783470 005**	**783470 006**	**783470 015**	**783470 016**	**783470 017**
				Customer Sample Reference	**BH07**	**BH07**	**BH01**	**BH01**	**BH07 (MARINE SEDIMENT)**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**1.50**	**3.50**	**3.50**	**6.00**	**0.50**
				Hole ID	**BH07**	**BH07**	**BH01**	**BH01**	**BH07**
				Top Depth	**1.00**	**2.50**	**2.50**	**5.50**	**0.00**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**	**08-NOV-2018**	**06-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**4**	**8**	**9**	**16**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.10	µg/kg	U	<0.10	<0.10	<0.10	<0.10	<0.10
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
PCB EC7 (Sum)	Calc	0.7	µg/kg	N	<0.7	<0.7	<0.7	<0.7	<0.7

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
PCB EC7

Concept Reference	**783470 018**	**783470 022**
Customer Sample Reference	**BH01 (MARINE SEDIMENT)**	**Method Blank**
Test Sample	**AR**	**AR**
Bottom Depth	**1.00**	
Hole ID	**BH01**	
Top Depth	**0.00**	
Date Sampled	**08-NOV-2018**	
Time Sampled	**12:00**	
AGS Type	**ES**	
AGS Sample Reference	**1**	
Matrix Class		

Determinand	Method	LOD	Units	Symbol		
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.10	µg/kg	U	<0.10	<0.10
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1
PCB EC7 (Sum)	Calc	0.7	µg/kg	N	<0.7	<0.7

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

Concept Reference					**783470 005**	**783470 006**	**783470 015**	**783470 016**	**783470 017**
Customer Sample Reference					**BH07**	**BH07**	**BH01**	**BH01**	**BH07 (MARINE SEDIMENT)**
Test Sample					**AR**	**AR**	**AR**	**AR**	**AR**
Bottom Depth					**1.50**	**3.50**	**3.50**	**6.00**	**0.50**
Hole ID					**BH07**	**BH07**	**BH01**	**BH01**	**BH07**
Top Depth					**1.00**	**2.50**	**2.50**	**5.50**	**0.00**
Date Sampled					**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**	**08-NOV-2018**	**06-NOV-2018**
Time Sampled					**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type					**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference					**4**	**8**	**9**	**16**	**1**
Matrix Class					**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Arsenic (Total)	ICP/MS (Total)	1.0	mg/kg	N	**7.6**	**7.0**	**6.2**	**6.1**	**4.1**
Cadmium (Total)	ICP/MS (Total)	0.05	mg/kg	N	**0.13**	**0.09**	**0.10**	**0.10**	**0.08**
Chromium (Total)	ICP/MS (Total)	0.2	mg/kg	N	**30**	**30**	**30**	**25**	**23**
Copper (Total)	ICP/MS (Total)	0.1	mg/kg	N	**6.8**	**4.6**	**5.2**	**3.4**	**3.2**
Mercury	CVAFS	0.01	mg/kg	N	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]
Lead (Total)	ICP/MS (Total)	0.2	mg/kg	N	**12**	**11**	**12**	**10**	**11**
Nickel (Total)	ICP/MS (Total)	0.2	mg/kg	N	**15**	**15**	**14**	**12**	**9.8**
Zinc	ICP/MS (HF)	1	mg/kg	N	**100**	**56**	**66**	**38**	**25**
Tributyl tin	GC/MS	10	µg/kg	N	<10	<10	<10	<10	<10
Dibutyl tin	GC/MS	10	µg/kg	N	<10	<10	<10	<10	<10
Total Organic Carbon	OX/IR	0.1	%	N	**0.4**	**1.0**	**1.1**	**0.5**	**1.2**
Dry solids @105C	Grav (1 Dec) (105 C)	0.1	%	N	**74**	**74**	**74**	**76**	**80**
Dry solids @40C	Grav (1 Dec) (40 C)	0.1	%	N	**74**	**76**	**73**	**77**	**78**
Gasoline Range Organics (C5-C10)	GC/MS (Headspace)	10	µg/kg	N	<10	<10	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C12-C16)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C16-C21)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C21-C35)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C40-C44)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Poly-Chlorinated Biphenyls (Total Tri-Hepta)	GC/MS (HR)	1.4	µg/kg	U	<1.4	<1.4	<1.4	<1.4	<1.4

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

Concept Reference	**783470 018**
Customer Sample Reference	**BH01 (MARINE SEDIMENT)**
Test Sample	**AR**
Bottom Depth	**1.00**
Hole ID	**BH01**
Top Depth	**0.00**
Date Sampled	**08-NOV-2018**
Time Sampled	**12:00**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	

Determinand	Method	LOD	Units	Symbol	
Arsenic (Total)	ICP/MS (Total)	1.0	mg/kg	N	**5.3**
Cadmium (Total)	ICP/MS (Total)	0.05	mg/kg	N	**0.11**
Chromium (Total)	ICP/MS (Total)	0.2	mg/kg	N	**30**
Copper (Total)	ICP/MS (Total)	0.1	mg/kg	N	**3.6**
Mercury	CVAFS	0.01	mg/kg	N	<0.01(13)
Lead (Total)	ICP/MS (Total)	0.2	mg/kg	N	**13**
Nickel (Total)	ICP/MS (Total)	0.2	mg/kg	N	**12**
Zinc	ICP/MS (HF)	1	mg/kg	N	**41**
Tributyl tin	GC/MS	10	µg/kg	N	<10
Dibutyl tin	GC/MS	10	µg/kg	N	<10
Total Organic Carbon	OX/IR	0.1	%	N	**1.1**
Dry solids @105C	Grav (1 Dec) (105 C)	0.1	%	N	**73**
Dry solids @40C	Grav (1 Dec) (40 C)	0.1	%	N	**71**
Gasoline Range Organics (C5-C10)	GC/MS (Headspace)	10	µg/kg	N	<10
Total Petroleum Hydrocarbons (C10-C12)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C12-C16)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C16-C21)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C21-C35)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C40-C44)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Poly-Chlorinated Biphenyls (Total Tri-Hepta)	GC/MS (HR)	1.4	µg/kg	U	<1.4

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Blank Suite

				Concept Reference	**783470 022**
				Customer Sample Reference	**Method Blank**
				Test Sample	**AR**
Determinand	**Method**	**LOD**	**Units**	**Symbol**	
Arsenic (Total)	ICP/MS (Total)	1.0	mg/kg	N	<1.0
Cadmium (Total)	ICP/MS (Total)	0.05	mg/kg	N	<0.05
Chromium (Total)	ICP/MS (Total)	0.2	mg/kg	N	<0.2
Copper (Total)	ICP/MS (Total)	0.1	mg/kg	N	<0.1
Mercury	CVAFS	0.01	mg/kg	N	<0.01
Lead (Total)	ICP/MS (Total)	0.2	mg/kg	N	**0.6**
Nickel (Total)	ICP/MS (Total)	0.2	mg/kg	N	<0.2
Zinc	ICP/MS (HF)	1	mg/kg	N	**4**
Tributyl tin	GC/MS	10	µg/kg	N	<10
Dibutyl tin	GC/MS	10	µg/kg	N	<10
Total Organic Carbon	OX/IR	0.1	%	N	<0.1
Dry solids @40C	Grav (1 Dec) (40 C)	0.1	%	N	-(NR)
Dry solids @105C	Grav (1 Dec) (105 C)	0.1	%	N	-(NR)
Gasoline Range Organics (C5-C10)	GC/MS (Headspace)	10	µg/kg	N	<10
Total Petroleum Hydrocarbons (C10-C12)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C12-C16)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C16-C21)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C21-C35)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C40-C44)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Poly-Chlorinated Biphenyls (Total Tri-Hepta)	GC/MS (HR)	1.4	µg/kg	U	<1.4

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Recovery Suite

Concept Reference	**783470 021**
Customer Sample Reference	**Matrix Spike**
Test Sample	**AR**

Determinand	Method	LOD	Units	Symbol	
Acenaphthene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Acenaphthylene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Anthracene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Benzo(a)Anthracene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Benzo(a)Pyrene Recovery	GC/MS (HR) (Recovery)	1	%	N	**98**
Benzo(b)fluoranthene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Benzo(b/k)Fluoranthene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Benzo(ghi)Perylene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Benzo(k)fluoranthene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Phenanthrene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Dibenzo(ah)Anthracene Recovery	GC/MS (HR) (Recovery)	1	%	N	**110**
Fluoranthene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Fluorene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Indeno(123-cd)Pyrene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Naphthalene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Arsenic Recovery	ICP/MS (Recovery)	1	%	N	**100**
Cadmium Recovery	ICP/MS (Recovery)	1	%	N	**100**
Chromium Recovery	ICP/MS (Recovery)	1	%	N	**100**
Copper Recovery	ICP/MS (Recovery)	1	%	N	**100**
Mercury Recovery	CVAFS (Recovery)	1	%	N	**210**
Nickel Recovery	ICP/MS (Recovery)	1	%	N	**100**
Lead Recovery	ICP/MS (Recovery)	1	%	N	**100**
Zinc Recovery	ICP/MS (Recovery)	1	%	N	**97**
Poly-Chlorinated Biphenyls (Total Tri-Hepta) Recovery	GC/MS (HR) (Recovery)	1	%	N	**110**
Polychlorinated biphenyl BZ#101 Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Polychlorinated biphenyl BZ#118 Recovery	GC/MS (HR) (Recovery)	1	%	N	**110**
Polychlorinated biphenyl BZ#138 Recovery	GC/MS (HR) (Recovery)	1	%	N	**120**
Polychlorinated biphenyl BZ#153 Recovery	GC/MS (HR) (Recovery)	1	%	N	**96**
Polychlorinated biphenyl BZ#180 Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Polychlorinated biphenyl BZ#28 Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Polychlorinated biphenyl BZ#52 Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Dibutyl tin Recovery	GC/MS (Recovery)	1	%	N	**92**
Tributyl tin Recovery	GC/MS (Recovery)	1	%	N	**130**
Total Organic Carbon	OX/IR (Recovery)	1	%	N	**12**

Index to symbols used in 783470-2

Value	Description
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
AR	As Received
10:1 S	Data for BS EN 12457-2 (10:1)
A40	Assisted dried < 40C
10:1	Leachate to BS EN 12457-2 (10:1)
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
N.D.	Not Detected
131	Result is outside of the scope of accreditation due to a QC Failure
13	Results have been blank corrected.
9	LOD raised due to dilution of sample
26	LOD raised because the analysis was performed by an alternative technique
110	LOD raised due to low internal standard recovery.
100	LOD determined by sample aliquot used for analysis
NR	No Result
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

These samples have been analysed exceeding recommended holding times for pH, PAH, BTEX, TPH, VOC, SVOC, PCB. It is possible therefore that the results provided may be compromised.
SVOC (leachate) testing was transferred to Concept East Kilbride.
Speciated Phenols (soil) testing was subcontracted to Exova Jones.
Speciated Phenols (leachate) testing was transferred to Concept Braintree.
Asbestos was subcontracted to REC Asbestos.

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 785487-2

Date of Report: 10-Jan-2019

Customer: Fugro GeoServices
Fugro House
Hithercroft Road
Wallingford
Oxfordshire
OX10 9RB

Customer Contact: Ms Karen Blackmore

Customer Job Reference: G180030U, CoC 23901
Customer Purchase Order: 74376KB-WAL
Customer Site Reference: St. Ola Pier, Scrabster
Date Job Received at Concept: 20-Nov-2018
Date Analysis Started: 28-Nov-2018
Date Analysis Completed: 10-Jan-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aleksandra Pacula
Senior Customer Service Advisor

Issued by :
Aleksandra Pacula
Senior Customer Service Advisor

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil
MCERTS Preparation

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Moisture @105C	T162	AR	0.1	%	**22**	**16**	**26**
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Asbestos ID	T27	A40			N.D.	N.D.	N.D.
Cyanide(Total)	T4	AR	1	mg/kg	<1	<1	<1
Sulphur (total)	T6	A40	0.01	%	**0.12**	**0.11**	**0.17**
(Acid Soluble) SO4	T192	A40	0.01	%	**0.09**	**0.09**	**0.12**
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	**0.19**	**0.15**	**0.30**
pH	T7	A40			**8.4**	**8.8**	**8.5**
Moisture @105C	T162	AR	0.1	%	**22**	**16**	**26**
Soil Organic Matter	T287	A40	0.1	%	**0.7**	**1.0**	**0.9**
Dibutyl tin	T72	AR	0.01	mg/kg	<0.01	<0.01	<0.01
Benzo(j)fluoranthrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1
Tributyl tin	T72	AR	0.01	mg/kg	<0.01	<0.01	<0.01

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil
Heavy Metals(9)

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Arsenic	T6	M40	2	mg/kg	**6**	**7**	**5**
Boron (water-soluble)	T6	A40	1	mg/kg	<1	<1	**1**
Barium	T6	A40	1	mg/kg	**96**	**93**	**100**
Beryllium	T6	A40	2	mg/kg	<2	<2	<2
Cadmium	T6	M40	1	mg/kg	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**17**	**16**	**17**
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1
Copper	T6	M40	1	mg/kg	**8**	**8**	**7**
Iron	T6	A40	1	mg/kg	**10000**	**9200**	**9300**
Mercury	T6	M40	1	mg/kg	<1	<1	<1
Nickel	T6	M40	1	mg/kg	**13**	**13**	**13**
Lead	T6	M40	1	mg/kg	**8**	**7**	**7**
Selenium	T6	M40	3	mg/kg	<3	<3	<3
Vanadium	T6	M40	1	mg/kg	**21**	**20**	**20**
Zinc	T6	M40	1	mg/kg	**34**	**25**	**31**

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	**0.8**	<0.1	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	**0.7**	<0.1	<0.1
Pyrene	T207	M105	0.1	mg/kg	**0.5**	<0.1	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Chrysene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
PAH(total)	T207	M105	0.1	mg/kg	**2.4**	<0.1	<0.1

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil
Phenols (Speciated)

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Resorcinol	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05
Catechol	T17	AR	0.05	mg/kg	(NR)	(NR)	(NR)
Phenol	T17	AR	0.1	mg/kg	<0.1	<0.1	<0.1
Cresols	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05
Xylenols	T17	AR	0.05	mg/kg	<0.06	<0.06	<0.06
Naphthols	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05
Trimethyl phenol	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05
Total Phenols	T17	AR	0.1	mg/kg	(NR)	(NR)	(NR)

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil
TPH UKCWG

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Benzene	T209	M105	10	µg/kg	<100(13,110)	<10(13)	<20(110,13)
Toluene	T209	M105	10	µg/kg	<100(110)	<10	<20(110)
EthylBenzene	T209	M105	10	µg/kg	<20(110)	<10	<20(110)
M/P Xylene	T209	M105	10	µg/kg	<20(110)	<10	<20(110)
O Xylene	T209	M105	10	µg/kg	<20(110)	<10	<20(110)
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<20(110)	<10	<20(110)
TPH (C5-C6 aliphatic)	T209	M105	100	µg/kg	<200(110)	<100	<200(110)
TPH (C6-C8 aliphatic)	T209	M105	100	µg/kg	<200(110)	<100	<200(110)
TPH (C8-C10 aliphatic)	T209	M105	100	µg/kg	<200(110)	<100	<200(110)
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	**1(13)**	<1(13)	<1(13)
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	**2(13)**	**1(13)**	<1(13)
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	**3(13)**	**1(13)**	**1(13)**
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	**8(13)**	<2(13)	**3(13)**
TPH (Aliphatic) total	T85	M105		mg/kg	**11(13)**	**2.0(13)**	**4.0(13)**
TPH (C6-C7 aromatic)	T209	M105	100	µg/kg	<200(110)	<100	<200(110)
TPH (C7-C8 aromatic)	T209	M105	100	µg/kg	<200(110)	<100	<200(110)
TPH (C8-C10 aromatic)	T209	M105	100	µg/kg	<200(110)	<100	<200(110)
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	<2(13)	<2(13)	<2(13)
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	<1(13)	<1(13)	<1(13)
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	<1(13)	<1(13)	<1(13)
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	**8(13)**	**3(13)**	<1(13)
TPH (Aromatic) total	T85	M105		mg/kg	**8.0(13)**	**3.0(13)**	N.D.(13)
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	**19.0(13)**	**5.00(13)**	**4.00(13)**

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil

Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
PCB BZ#77	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#81	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#105	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#114	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#118	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#123	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#126	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#156	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#157	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#167	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#169	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#189	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Phenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Bis (2-chloroethyl) ether	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2-Chlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
1,2-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Bis (2-chloroisopropyl) ether	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2-methyl phenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
3/4-Methylphenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Hexachloroethane	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Nitrobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Isophorone	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2-Nitrophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2,4-Dimethylphenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Bis (2-chloroethoxy) methane	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2,4-Dichlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
1,2,4-Trichlorobenzene	T207	M105	0.1	mg/kg	<0.1[131]	<0.1[131]	<0.1[131]
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
4-Chloroaniline	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Hexachlorobutadiene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2-Methylnaphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	T207	M105	0.1	mg/kg	<0.3[131,162]	<0.3[131,162]	<0.3[131,162]
2,4,6-Trichlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2-Chloronaphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2-Nitroaniline	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Dimethyl phthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2,6-Dinitrotoluene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
3-Nitroaniline	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Dibenzofuran	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2,4-Dinitrotoluene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Diethyl phthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
4-Chlorophenyl phenylether	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
4-Nitroaniline	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Azobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
4-Bromophenyl phenylether	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Hexachlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Pentachlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	**0.8**	<0.1	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Carbazole	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Di-n-butylphthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	**0.7**	<0.1	<0.1
Pyrene	T207	M105	0.1	mg/kg	**0.5**	<0.1	<0.1
Butyl benzylphthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Chrysene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1
Bis (2-ethylhexyl)phthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Di-n-octylphthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

				Concept Reference	**785487 001**	**785487 007**	**785487 009**
				Customer Sample Reference	**BH03**	**BH05**	**BH11**
				Hole ID	**BH03**	**BH05**	**BH11**
				Bottom Depth	**0.50**	**4.00**	**2.50**
				Top Depth	**0.00**	**3.50**	**1.50**
				Depth	**0.00**	**3.50**	**1.50**
				Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**13**	**5**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	**0.3**	<0.1	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil

Volatile Organic Compounds (USEPA 624) (MCERTS)

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Dichlorodifluoromethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Chloromethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Vinyl chloride	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Bromomethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Chloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Trichlorofluoromethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1-Dichloroethylene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Dichloromethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1-Dichloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
2,2-Dichloropropane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Chloroform	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Bromochloromethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1,1-Trichloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1-Dichloropropene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Carbon tetrachloride	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,2-Dichloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Benzene	T209	M105	10	µg/kg	<100[13,110]	<10[13]	<20[110,13]
1,2-Dichloropropane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Trichloroethene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Bromodichloromethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Dibromomethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Toluene	T209	M105	10	µg/kg	<100[110]	<10	<20[110]
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1,2-Trichloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,3-Dichloropropane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Tetrachloroethene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Chlorodibromomethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,2-dibromoethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Chlorobenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
EthylBenzene	T209	M105	10	µg/kg	<20[110]	<10	<20[110]
M/P Xylene	T209	M105	10	µg/kg	<20[110]	<10	<20[110]
O Xylene	T209	M105	10	µg/kg	<20[110]	<10	<20[110]
Styrene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Bromoform	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Isopropyl benzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,2,3-Trichloropropane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
n-Propylbenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Bromobenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
T-Butylbenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
S-Butylbenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
p-Isopropyltoluene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
2-Chlorotoluene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
4-Chlorotoluene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,3-Dichlorobenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,4-Dichlorobenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,2-Dichlorobenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

Concept Reference				**785487 002**	**785487 003**	**785487 004**	**785487 006**	**785487 008**
Customer Sample Reference				**BH03**	**BH03**	**BH03**	**BH05**	**BH11**
Hole ID				**BH03**	**BH03**	**BH03**	**BH05**	**BH11**
Bottom Depth				**1.00**	**2.00**	**3.00**	**3.00**	**1.00**
Top Depth				**0.50**	**1.50**	**2.50**	**2.50**	**0.00**
Depth				**0.50**	**1.50**	**2.50**	**2.50**	**0.00**
Date Sampled				**09-NOV-2018**	**09-NOV-2018**	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type				**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference				**4**	**7**	**11**	**9**	**1**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
As (Total)	T301	AR	1.0	mg/kg	**6.3**	**5.5**	**6.9**	**6.4**	**3.7**
Cd (Total)	T301	AR	0.05	mg/kg	**0.05**	<0.05	<0.05	<0.05	<0.05
Cr (Total)	T301	AR	0.2	mg/kg	**29**	**25**	**29**	**23**	**21**
Cu (Total)	T301	AR	0.1	mg/kg	**5.8**	**4.2**	**4.7**	**3.9**	**3.3**
Mercury	T355	AR	0.01	mg/kg	**0.03**(13)	**0.02**(13)	**0.01**(13)	<0.01(13)	<0.01(13)
Pb (Total)	T301	AR	0.2	mg/kg	**13**	**12**	**13**	**13**	**12**
Ni (Total)	T301	AR	0.2	mg/kg	**14**	**12**	**14**	**12**	**9.0**
Zinc	T740	AR	1	mg/kg	**60**	**27**	**41**	**31**	**22**
Tributyl tin	T16	AR	10	µg/kg	<10	<10	<10	<10	<10
Dibutyl tin	T16	AR	10	µg/kg	<10	<10	<10	<10	<10
Total Organic Carbon	T21	AR	0.1	%	**0.2**	**0.1**	**0.1**	**0.2**	**0.2**
Dry solids @40C	T277	AR	0.1	%	**78**	**81**	**74**	**75**	**72**
Dry solids @105C	T162	AR	0.1	%	**79**	**81**	**74**	**74**	**74**
GRO (C5-C10)	T54	AR	10	µg/kg	<10	<10	<10	<10	<20(110)
TPH (C10-C12)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
TPH (C12-C16)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
TPH (C16-C21)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0	<1.0	**>1.0**
TPH (C21-C35)	T250	AR	0.1	mg/kg	**>1.0**	<1.0	<1.0	**>1.0**	**>1.0**
TPH (C40-C44)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
PCB (Total Tri-Hepta)	T1	AR	1.4	µg/kg	<1.4	<1.4	<1.4	<1.4	<1.4

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

Concept Reference	**785487 010**	**785487 011**	**785487 012**
Customer Sample Reference	**BH11**	**BH03 (marine sediment)**	**BH11 (marine sediment)**
Hole ID	**BH11**	**BH03**	**BH11**
Bottom Depth	**3.50**	**0.50**	**2.50**
Top Depth	**2.50**	**0.00**	**1.50**
Depth	**2.50**	**0.00**	**1.50**
Date Sampled	**10-NOV-2018**	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**8**	**1**	**5**

Determinand	Method	Test Sample	LOD	Units			
As (Total)	T301	AR	1.0	mg/kg	**5.1**	**7.4**	**5.8**
Cd (Total)	T301	AR	0.05	mg/kg	**0.05**	<0.05	<0.05
Cr (Total)	T301	AR	0.2	mg/kg	**24**	**30**	**29**
Cu (Total)	T301	AR	0.1	mg/kg	**4.8**	**6.6**	**4.9**
Mercury	T355	AR	0.01	mg/kg	<0.01(13)	<0.01(13)	<0.01(13)
Pb (Total)	T301	AR	0.2	mg/kg	**12**	**14**	**15**
Ni (Total)	T301	AR	0.2	mg/kg	**11**	**14**	**14**
Zinc	T740	AR	1	mg/kg	**36**	**35**	**34**
Tributyl tin	T16	AR	10	µg/kg	<10	<10	<10
Dibutyl tin	T16	AR	10	µg/kg	<10	<10	<10
Total Organic Carbon	T21	AR	0.1	%	<0.1	**0.2**	**0.2**
Dry solids @40C	T277	AR	0.1	%	**74**	**74**	**75**
Dry solids @105C	T162	AR	0.1	%	**77**	**73**	**74**
GRO (C5-C10)	T54	AR	10	µg/kg	<10	<10	<10
TPH (C10-C12)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0
TPH (C12-C16)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0
TPH (C16-C21)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0
TPH (C21-C35)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0
TPH (C40-C44)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0
PCB (Total Tri-Hepta)	T1	AR	1.4	µg/kg	<1.4	<1.4	<1.4

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**785487 002**	**785487 003**	**785487 004**	**785487 006**	**785487 008**
				Customer Sample Reference	**BH03**	**BH03**	**BH03**	**BH05**	**BH11**
				Hole ID	**BH03**	**BH03**	**BH03**	**BH05**	**BH11**
				Bottom Depth	**1.00**	**2.00**	**3.00**	**3.00**	**1.00**
				Top Depth	**0.50**	**1.50**	**2.50**	**2.50**	**0.00**
				Depth	**0.50**	**1.50**	**2.50**	**2.50**	**0.00**
				Date Sampled	**09-NOV-2018**	**09-NOV-2018**	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**4**	**7**	**11**	**9**	**1**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Naphthalene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Acenaphthylene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Acenaphthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Fluorene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Phenanthrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(a)Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Chrysene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(a)Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Indeno(123-cd)Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(ghi)Perylene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(b)fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(k)fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Dibenzo(ah)Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
PAH(total)	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**785487 010**	**785487 011**	**785487 012**
				Customer Sample Reference	**BH11**	**BH03 (marine sediment)**	**BH11 (marine sediment)**
				Hole ID	**BH11**	**BH03**	**BH11**
				Bottom Depth	**3.50**	**0.50**	**2.50**
				Top Depth	**2.50**	**0.00**	**1.50**
				Depth	**2.50**	**0.00**	**1.50**
				Date Sampled	**10-NOV-2018**	**09-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**8**	**1**	**5**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Naphthalene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Acenaphthylene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Acenaphthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Fluorene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Phenanthrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(a)Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Chrysene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(a)Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Indeno(123-cd)Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(ghi)Perylene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(b)fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(k)fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Dibenzo(ah)Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
PAH(total)	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**785487 002**	**785487 003**	**785487 004**	**785487 006**	**785487 008**
				Customer Sample Reference	**BH03**	**BH03**	**BH03**	**BH05**	**BH11**
				Hole ID	**BH03**	**BH03**	**BH03**	**BH05**	**BH11**
				Bottom Depth	**1.00**	**2.00**	**3.00**	**3.00**	**1.00**
				Top Depth	**0.50**	**1.50**	**2.50**	**2.50**	**0.00**
				Depth	**0.50**	**1.50**	**2.50**	**2.50**	**0.00**
				Date Sampled	**09-NOV-2018**	**09-NOV-2018**	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**4**	**7**	**11**	**9**	**1**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
PCB BZ#28	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PCB BZ#52	T1	AR	0.10	µg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
PCB BZ#101	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PCB BZ#118	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PCB BZ#153	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PCB BZ#138	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PCB BZ#180	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PCB EC7 (Sum)	T85	AR	0.7	µg/kg	<0.7	<0.7	<0.7	<0.7	<0.7

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**785487 010**	**785487 011**	**785487 012**
				Customer Sample Reference	**BH11**	**BH03 (marine sediment)**	**BH11 (marine sediment)**
				Hole ID	**BH11**	**BH03**	**BH11**
				Bottom Depth	**3.50**	**0.50**	**2.50**
				Top Depth	**2.50**	**0.00**	**1.50**
				Depth	**2.50**	**0.00**	**1.50**
				Date Sampled	**10-NOV-2018**	**09-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**8**	**1**	**5**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
PCB BZ#28	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#52	T1	AR	0.10	µg/kg	<0.10	<0.10	<0.10
PCB BZ#101	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#118	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#153	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#138	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#180	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB EC7 (Sum)	T85	AR	0.7	µg/kg	<0.7	<0.7	<0.7

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Special Waste Leachate Suite - Clause 15.7

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
pH	T7	10:1			**7.85**	**7.82**
Sulphate	T686	10:1	0.5	mg/l	**79**	**120**
Chloride	T686	10:1	1	mg/l	**690**	**950**
Ammonia expressed as N	T686	10:1	0.05	mg/l	**0.25**	<0.05
Nitrate	T686	10:1	0.5	mg/l	<0.5	<0.5
Nitrite	T686	10:1	0.1	mg/l	<0.1	<0.1
orthophosphate	T686	10:1	0.5	mg/l	<0.5	<0.5
Cyanide(Total)	T4	10:1	0.05	mg/l	<0.05	<0.05
Benzo(j)fluoranthrene	T149	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
Dibutyl tin	T72	10:1	0.01	µg/l	<0.01	<0.01
Tributyl tin	T72	10:1	0.01	µg/l	<0.01	<0.01

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Metals ICP MS

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
As (Dissolved)	T281	10:1	0.2	µg/l	**2.4**	**1.7**
Cd (Dissolved)	T281	10:1	0.02	µg/l	<0.02	<0.02
Cr (Dissolved)	T281	10:1	1	µg/l	**1**	**2**
Cu (Dissolved)	T281	10:1	0.5	µg/l	<0.5	<0.5
Ni (Dissolved)	T281	10:1	1	µg/l	**1**	**1**
Pb (Dissolved)	T281	10:1	0.3	µg/l	<0.3	<0.3
Zn (Dissolved)	T281	10:1	2	µg/l	<2	<2
Hg (Dissolved)	T281	10:1	0.05	µg/l	<0.05	<0.05
V (Dissolved)	T281	10:1	2	µg/l	<2	**3**
Se (Dissolved)	T281	10:1	0.5	µg/l	<0.5	<0.5
Mn (Dissolved)	T281	10:1	1	µg/l	<1	**2**
Ba (Dissolved)	T281	10:1	1	µg/l	**36**	**38**
Be (Dissolved)	T281	10:1	0.05	µg/l	<0.05	<0.05

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Metals ICP OES

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Calcium	T6	10:1	0.1	mg/l	**33**	**35**
Sodium	T6	10:1	0.1	mg/l	**420**	**490**
Magnesium	T6	10:1	0.1	mg/l	**42**	**53**
Potassium	T6	10:1	0.1	mg/l	**19**	**23**
Aluminium	T6	10:1	0.02	mg/l	**0.05**	**0.07**
Chromium VI	T686	10:1	0.003	mg/l	<0.003	<0.003
Boron	T6	10:1	0.01	mg/l	**0.37**	**0.36**
Iron	T6	10:1	0.01	mg/l	<0.01	**0.05**

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
PAH US EPA 16 (B and K split)

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Naphthalene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Acenaphthylene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Acenaphthene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Fluorene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Phenanthrene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Anthracene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Fluoranthene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Pyrene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Benzo(a)Anthracene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Chrysene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Benzo(b)fluoranthene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Benzo(k)fluoranthene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Benzo(a)Pyrene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Indeno(123-cd)Pyrene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Dibenzo(ah)Anthracene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Benzo(ghi)Perylene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
PAH(total)	T149	10:1	0.01	µg/l	<0.01	<0.01

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Phenols (Speciated)

				Concept Reference	**785487 001**	**785487 009**
				Customer Sample Reference	**BH03**	**BH11**
				Hole ID	**BH03**	**BH11**
				Bottom Depth	**0.50**	**2.50**
				Top Depth	**0.00**	**1.50**
				Depth	**0.00**	**1.50**
				Date Sampled	**09-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**
				AGS Sample Reference	**1**	**5**
				Matrix Class	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Catechol	T17	10:1	0.005	mg/l	<0.005	<0.005
Cresols	T17	10:1	0.005	mg/l	<0.005	<0.005
Naphthols	T17	10:1	0.01	mg/l	<0.01	<0.01
Phenol	T17	10:1	0.005	mg/l	<0.005(13)	<0.005(13)
Resorcinol	T17	10:1	0.005	mg/l	<0.005	<0.005
Total Phenols	T17	10:1	0.01	mg/l	<0.01	<0.01
Trimethyl phenols	T17	10:1	0.01	mg/l	<0.01	<0.01
Xylenols	T17	10:1	0.01	mg/l	<0.01	<0.01

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Poly-Chlorinated Biphenyls (WHO 12)

				Concept Reference	**785487 001**	**785487 009**
				Customer Sample Reference	**BH03**	**BH11**
				Hole ID	**BH03**	**BH11**
				Bottom Depth	**0.50**	**2.50**
				Top Depth	**0.00**	**1.50**
				Depth	**0.00**	**1.50**
				Date Sampled	**09-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**
				AGS Sample Reference	**1**	**5**
				Matrix Class	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
PCB BZ#81	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#77	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#105	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#114	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#118	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#123	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#126	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#156	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#157	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#167	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#169	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#189	T16	10:1	0.005	µg/l	<0.005	<0.005

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
TPH (CWG)

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
TPH (C5-C6 aliphatic)	T215	10:1	10	µg/l	<10	<10
TPH (C6-C8 aliphatic)	T215	10:1	10	µg/l	<10	<10
TPH (C8-C10 aliphatic)	T215	10:1	10	µg/l	<10	<10
TPH (C10-C12 aliphatic)	T910	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH (C12-C16 aliphatic)	T910	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH (C16-C21 aliphatic)	T910	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH (C21-C35 aliphatic)	T910	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH (Aliphatic) total	T85	10:1		mg/l	N.D.(13)	N.D.(13)
TPH (C6-C7 aromatic)	T215	10:1	10	µg/l	<10	<10
TPH (C7-C8 aromatic)	T215	10:1	10	µg/l	<10	<10
TPH (C8-C10 aromatic)	T215	10:1	10	µg/l	<10	<10
TPH (C10-C12 aromatic)	T910	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH (C12-C16 aromatic)	T910	10:1	0.01	mg/l	**0.02(13)**	<0.01(13)
TPH (C16-C21 aromatic)	T910	10:1	0.01	mg/l	**0.02(13)**	<0.01(13)
TPH (C21-C35 aromatic)	T910	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH (Aromatic) total	T85	10:1		mg/l	**0.04(13)**	N.D.(13)
TPH (Aliphatic+Aromatic) (sum)	T85	10:1		mg/l	**0.04(13)**	N.D.(13)

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
SVOC (USEPA 625) (B and K split)

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Phenol	T71	10:1	1	µg/l	<10(26)	<10(26)
Bis (2-chloroethyl) ether	T71	10:1	1	µg/l	<10(26)	<10(26)
2-Chlorophenol	T71	10:1	1	µg/l	<10(26)	<10(26)
1,3-Dichlorobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
1,4-Dichlorobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
1,2-Dichlorobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
Bis (2-chloroisopropyl) ether	T71	10:1	1	µg/l	<10(26)	<10(26)
2-methyl phenol	T71	10:1	1	µg/l	<10(26)	<10(26)
3/4-Methylphenol	T71	10:1	1	µg/l	<10(26)	<10(26)
Hexachloroethane	T71	10:1	1	µg/l	<10(26)	<10(26)
Nitrobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
Isophorone	T71	10:1	1	µg/l	<10(26)	<10(26)
2-Nitrophenol	T71	10:1	1	µg/l	<10(26)	<10(26)
2,4-Dimethylphenol	T71	10:1	1	µg/l	<10(26)	<10(26)
Bis (2-chloroethoxy) methane	T71	10:1	1	µg/l	<10(26)	<10(26)
2,4-Dichlorophenol	T71	10:1	1	µg/l	<10(26)	<10(26)
1,2,4-Trichlorobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
Naphthalene	T71	10:1	1	µg/l	<10(26)	<10(26)
4-Chloroaniline	T71	10:1	1	µg/l	<10(26)	<10(26)
Hexachlorobutadiene	T71	10:1	1	µg/l	<10(26)	<10(26)
4-Chloro-3-methylphenol	T71	10:1	1	µg/l	<10(26)	<10(26)
2-Methylnaphthalene	T71	10:1	1	µg/l	<10(26)	<10(26)
Hexachlorocyclopentadiene	T71	10:1	1	µg/l	<10(26)	<10(26)
2,4,6-Trichlorophenol	T71	10:1	1	µg/l	<10(26)	<10(26)
2,4,5-Trichlorophenol	T71	10:1	1	µg/l	<10(26)	<10(26)
2-Chloronaphthalene	T71	10:1	1	µg/l	<10(26)	<10(26)
2-Nitroaniline	T71	10:1	1	µg/l	<10(26)	<10(26)
Dimethyl phthalate	T71	10:1	1	µg/l	<10(26)	<10(26)
2,6-Dinitrotoluene	T71	10:1	1	µg/l	<10(26)	<10(26)
Acenaphthylene	T71	10:1	1	µg/l	<10(26)	<10(26)
Acenaphthene	T71	10:1	1	µg/l	<10(26)	<10(26)
3-Nitroaniline	T71	10:1	1	µg/l	<10(26)	<10(26)
Dibenzofuran	T71	10:1	1	µg/l	<10(26)	<10(26)
2,4-Dinitrotoluene	T71	10:1	1	µg/l	<10(26)	<10(26)
Diethyl phthalate	T71	10:1	1	µg/l	<10(26)	<10(26)
Fluorene	T71	10:1	1	µg/l	<10(26)	<10(26)
4-Chlorophenyl phenylether	T71	10:1	1	µg/l	<10(26)	<10(26)
4-Nitroaniline	T71	10:1	1	µg/l	<10(131,26)	<10(131,26)
Azobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
4-Bromophenyl phenylether	T71	10:1	1	µg/l	<10(26)	<10(26)
Hexachlorobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
Pentachlorophenol	T71	10:1	1	µg/l	<2(413,100)	<2(413,100)
Phenanthrene	T71	10:1	1	µg/l	<10(26)	<10(26)
Anthracene	T71	10:1	1	µg/l	<10(26)	<10(26)
Carbazole	T71	10:1	1	µg/l	<10(26)	<10(26)
Di-n-butylphthalate	T71	10:1	1	µg/l	<10(26)	<10(26)
Fluoranthene	T71	10:1	1	µg/l	<10(26)	<10(26)
Pyrene	T71	10:1	1	µg/l	<10(26)	<10(26)
Butyl benzylphthalate	T71	10:1	1	µg/l	<10(26)	<10(26)
Benzo(a)Anthracene	T71	10:1	1	µg/l	<10(26)	<10(26)
Chrysene	T71	10:1	1	µg/l	<10(26)	<10(26)
Bis (2-ethylhexyl)phthalate	T71	10:1	1	µg/l	<10(26)	<10(26)
Di-n-octylphthalate	T71	10:1	1	µg/l	<10(26)	<10(26)

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
SVOC (USEPA 625) (B and K split)

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Benzo(a)Pyrene	T71	10:1	1	µg/l	<10[26]	<10[26]
Indeno(123-cd)Pyrene	T71	10:1	1	µg/l	<10[26]	<10[26]
Dibenzo(ah)Anthracene	T71	10:1	1	µg/l	<10[26]	<10[26]
Benzo(ghi)Perylene	T71	10:1	1	µg/l	<10[26]	<10[26]
Benzo(b)fluoranthene	T71	10:1	1	µg/l	<10[26]	<10[26]
Benzo(k)fluoranthene	T71	10:1	1	µg/l	<10[26]	<10[26]

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Volatile Organic Compounds (USEPA 624)

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Dichlorodifluoromethane	T54	10:1	1	µg/l	<1	<1
Chloromethane	T54	10:1	1	µg/l	<1	<1
Vinyl chloride	T54	10:1	1	µg/l	<1	<1
Bromomethane	T54	10:1	1	µg/l	<1	<1
Chloroethane	T54	10:1	1	µg/l	<1	<1
Trichlorofluoromethane	T54	10:1	1	µg/l	<1	<1
1,1-Dichloroethylene	T54	10:1	1	µg/l	<1	<1
Dichloromethane	T54	10:1	50	µg/l	<50	<50
Trans-1,2-Dichloroethene	T54	10:1	1	µg/l	<1	<1
1,1-Dichloroethane	T54	10:1	1	µg/l	<1	<1
Cis-1,2-Dichloroethylene	T54	10:1	1	µg/l	<1	<1
2,2-Dichloropropane	T54	10:1	1	µg/l	<1	<1
Chloroform	T54	10:1	1	µg/l	<1	<1
Bromochloromethane	T54	10:1	1	µg/l	<1	<1
1,1,1-Trichloroethane	T54	10:1	1	µg/l	<1	<1
1,1-Dichloropropene	T54	10:1	1	µg/l	<1	<1
Carbon tetrachloride	T54	10:1	1	µg/l	<1	<1
1,2-Dichloroethane	T54	10:1	1	µg/l	<1	<1
Benzene	T54	10:1	1	µg/l	<1(13)	<1(13)
1,2-Dichloropropane	T54	10:1	1	µg/l	<1	<1
1,1,2-Trichloroethylene	T54	10:1	1	µg/l	<1	<1
Bromodichloromethane	T54	10:1	1	µg/l	<1	<1
Dibromomethane	T54	10:1	1	µg/l	<1	<1
Cis-1,3-Dichloropropene	T54	10:1	1	µg/l	<1	<1
Toluene	T54	10:1	1	µg/l	<1	<1
Trans-1,3-Dichloropropene	T54	10:1	1	µg/l	<1	<1
1,1,2-Trichloroethane	T54	10:1	1	µg/l	<1	<1
1,3-Dichloropropane	T54	10:1	1	µg/l	<1	<1
Tetrachloroethene	T54	10:1	1	µg/l	<1	<1
Chlorodibromomethane	T54	10:1	1	µg/l	<1	<1
1,2-dibromoethane	T54	10:1	1	µg/l	<1	<1
Chlorobenzene	T54	10:1	1	µg/l	<1	<1
1,1,1,2-Tetrachloroethane	T54	10:1	1	µg/l	<1	<1
EthylBenzene	T54	10:1	1	µg/l	<1	<1
M/P Xylene	T54	10:1	1	µg/l	<1	<1
O Xylene	T54	10:1	1	µg/l	<1	<1
Styrene	T54	10:1	1	µg/l	<1	<1
Bromoform	T54	10:1	1	µg/l	<1	<1
Isopropyl benzene	T54	10:1	1	µg/l	<1	<1
1,1,2,2-Tetrachloroethane	T54	10:1	1	µg/l	<1	<1
1,2,3-Trichloropropane	T54	10:1	1	µg/l	<1	<1
n-Propylbenzene	T54	10:1	1	µg/l	<1	<1
Bromobenzene	T54	10:1	1	µg/l	<1	<1
1,3,5-Trimethylbenzene	T54	10:1	1	µg/l	<1	<1
T-Butylbenzene	T54	10:1	1	µg/l	<1	<1
1,2,4-Trimethylbenzene	T54	10:1	1	µg/l	<1	<1
S-Butylbenzene	T54	10:1	1	µg/l	<1	<1
p-Isopropyltoluene	T54	10:1	1	µg/l	<1	<1
2-Chlorotoluene	T54	10:1	1	µg/l	<1	<1
4-Chlorotoluene	T54	10:1	1	µg/l	<1	<1
1,3-Dichlorobenzene	T54	10:1	1	µg/l	<1	<1
1,4-Dichlorobenzene	T54	10:1	1	µg/l	<1	<1
1,2-Dichlorobenzene	T54	10:1	1	µg/l	<1	<1

Index to symbols used in 785487-2

Value	Description
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
AR	As Received
A40	Assisted dried < 40C
10:1	Leachate to BS EN 12457-2 (10:1)
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
N.D.	Not Detected
100	LOD determined by sample aliquot used for analysis
13	Results have been blank corrected.
162	LOD determined by matrix spike recovery
26	LOD raised because the analysis was performed by an alternative technique
110	LOD raised due to low internal standard recovery.
131	Result is outside of the scope of accreditation due to a QC Failure
413	The associated QC has failed performance criteria for this compound and the result is indicative only. Result is non accredited.
NR	No Result
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Soil samples have been analysed exceeding recommended holding times for pH, PAH, BTEX, TPH, VOC, SVOC and PCB. It is possible therefore that the results provided may be compromised.
SVOC (leachate) was transferred to Concept East Kilbride.
Phenols Speciated (leachate) testing was subcontractedc to Exova Jones.
Asbestos testing was subcontracted to REC Asbestos.
Please Note: The recoveries in several samples are low, however the S/N is >20:1, therefore the data is considered valid.

Method Index

Value	Description
T2	Grav
T21	OX/IR
T27	PLM
T7	Probe
T209	GC/MS (Head Space)(MCERTS)
T740	ICP/MS (HF)
T250	GC/FID (LD)
T207	GC/MS (MCERTS)
T686	Discrete Analyser
T355	CVAFS
T1	GC/MS (HR)
T54	GC/MS (Headspace)
T72	GC/MS (Deriv.)
T85	Calc
T277	Grav (1 Dec) (40 C)
T301	ICP/MS (Total)
T149	GC/MS (SIR)
T281	ICP/MS (Filtered)
T287	Calc TOC/0.58
T4	Colorimetry
T6	ICP/OES
T71	GC/MS (1l ext.)
T215	GC/MS (Headspace)(LV)
T909	GCxGC
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T16	GC/MS
T17	HPLC
T162	Grav (1 Dec) (105 C)
T192	HCl Extraction/ICP/OES (TRL 447 T2)
T910	GCxGC (LV)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Retained on 10mm sieve	T2	M40	0.1	%	N	001,007,009
As (Total)	T301	AR	1.0	mg/kg	N	002-004,006,008,010-012
Cd (Total)	T301	AR	0.05	mg/kg	N	002-004,006,008,010-012
Cr (Total)	T301	AR	0.2	mg/kg	N	002-004,006,008,010-012
Cu (Total)	T301	AR	0.1	mg/kg	N	002-004,006,008,010-012
Mercury	T355	AR	0.01	mg/kg	N	002-004,006,008,010-012
Pb (Total)	T301	AR	0.2	mg/kg	N	002-004,006,008,010-012
Ni (Total)	T301	AR	0.2	mg/kg	N	002-004,006,008,010-012
Zinc	T740	AR	1	mg/kg	N	002-004,006,008,010-012
Tributyl tin	T16	AR	10	µg/kg	N	002-004,006,008,010-012
Dibutyl tin	T16	AR	10	µg/kg	N	002-004,006,008,010-012
Total Organic Carbon	T21	AR	0.1	%	N	002-004,006,008,010-012
Dry solids @40C	T277	AR	0.1	%	N	002-004,006,008,010-012
Dry solids @105C	T162	AR	0.1	%	N	002-004,006,008,010-012
GRO (C5-C10)	T54	AR	10	µg/kg	N	002-004,006,008,010-012
TPH (C10-C12)	T250	AR	0.1	mg/kg	N	002-004,006,008,010-012
TPH (C12-C16)	T250	AR	0.1	mg/kg	N	002-004,006,008,010-012
TPH (C16-C21)	T250	AR	0.1	mg/kg	N	002-004,006,008,010-012
TPH (C21-C35)	T250	AR	0.1	mg/kg	N	002-004,006,008,010-012
TPH (C40-C44)	T250	AR	0.1	mg/kg	N	002-004,006,008,010-012
PCB (Total Tri-Hepta)	T1	AR	1.4	µg/kg	U	002-004,006,008,010-012
Naphthalene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Acenaphthylene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Acenaphthene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Fluorene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Phenanthrene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Anthracene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Fluoranthene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Pyrene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Benzo(a)Anthracene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Chrysene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Benzo(a)Pyrene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Indeno(123-cd)Pyrene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Benzo(ghi)Perylene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Benzo(b)fluoranthene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Benzo(k)fluoranthene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Dibenzo(ah)Anthracene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
PAH(total)	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
PCB BZ#28	T1	AR	0.1	µg/kg	U	002-004,006,008,010-012
PCB BZ#52	T1	AR	0.10	µg/kg	U	002-004,006,008,010-012
PCB BZ#101	T1	AR	0.1	µg/kg	U	002-004,006,008,010-012
PCB BZ#118	T1	AR	0.1	µg/kg	U	002-004,006,008,010-012
PCB BZ#153	T1	AR	0.1	µg/kg	U	002-004,006,008,010-012
PCB BZ#138	T1	AR	0.1	µg/kg	U	002-004,006,008,010-012
PCB BZ#180	T1	AR	0.1	µg/kg	U	002-004,006,008,010-012
PCB EC7 (Sum)	T85	AR	0.7	µg/kg	N	002-004,006,008,010-012
Asbestos ID	T27	A40			SU	001,007,009
Cyanide(Total)	T4	AR	1	mg/kg	M	001,007,009
Sulphur (total)	T6	A40	0.01	%	M	001,007,009
(Acid Soluble) SO4	T192	A40	0.01	%	M	001,007,009
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	M	001,007,009
pH	T7	A40			M	001,007,009
Moisture @105C	T162	AR	0.1	%	N	001,007,009
Soil Organic Matter	T287	A40	0.1	%	N	001,007,009
Benzo(j)fluoranthrene	T16	AR	0.1	mg/kg	N	001,007,009
Dibutyl tin	T72	AR	0.01	mg/kg	N	001,007,009
Tributyl tin	T72	AR	0.01	mg/kg	N	001,007,009
Resorcinol	T17	AR	0.05	mg/kg	SM	001,007,009
Catechol	T17	AR	0.05	mg/kg	SN	001,007,009
Phenol	T17	AR	0.1	mg/kg	SM	001,007,009
Cresols	T17	AR	0.05	mg/kg	SM	001,007,009
Xylenols	T17	AR	0.05	mg/kg	SM	001,007,009
Naphthols	T17	AR	0.05	mg/kg	SN	001,007,009
Trimethyl phenol	T17	AR	0.05	mg/kg	SM	001,007,009
Total Phenols	T17	AR	0.1	mg/kg	SN	001,007,009
Arsenic	T6	M40	2	mg/kg	M	001,007,009
Boron (water-soluble)	T6	A40	1	mg/kg	N	001,007,009
Barium	T6	A40	1	mg/kg	U	001,007,009
Beryllium	T6	A40	2	mg/kg	U	001,007,009
Cadmium	T6	M40	1	mg/kg	M	001,007,009

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Chromium	T6	M40	1	mg/kg	M	001,007,009
Chromium VI	T6	A40	1	mg/kg	N	001,007,009
Copper	T6	M40	1	mg/kg	M	001,007,009
Iron	T6	A40	1	mg/kg	U	001,007,009
Mercury	T6	M40	1	mg/kg	M	001,007,009
Nickel	T6	M40	1	mg/kg	M	001,007,009
Lead	T6	M40	1	mg/kg	M	001,007,009
Selenium	T6	M40	3	mg/kg	M	001,007,009
Vanadium	T6	M40	1	mg/kg	M	001,007,009
Zinc	T6	M40	1	mg/kg	M	001,007,009
Naphthalene	T207	M105	0.1	mg/kg	M	001,007,009
Fluorene	T207	M105	0.1	mg/kg	M	001,007,009
Phenanthrene	T207	M105	0.1	mg/kg	M	001,007,009
Fluoranthene	T207	M105	0.1	mg/kg	M	001,007,009
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001,007,009
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001,007,009
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001,007,009
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001,007,009
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001,007,009
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001,007,009
PAH(total)	T207	M105	0.1	mg/kg	U	001,007,009
PCB BZ#77	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#81	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#105	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#114	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#118	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#123	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#126	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#156	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#157	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#167	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#169	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#189	T1	AR	0.05	µg/kg	U	001,007,009
Phenol	T207	M105	0.1	mg/kg	M	001,007,009
Bis (2-chloroethyl) ether	T207	M105	0.1	mg/kg	M	001,007,009
2-Chlorophenol	T207	M105	0.1	mg/kg	M	001,007,009
1,3-Dichlorobenzene	T207	M105	0.1	mg/kg	M	001,007,009
1,4-Dichlorobenzene	T207	M105	0.1	mg/kg	M	001,007,009
1,2-Dichlorobenzene	T207	M105	0.1	mg/kg	M	001,007,009
Bis (2-chloroisopropyl) ether	T207	M105	0.1	mg/kg	M	001,007,009
2-methyl phenol	T207	M105	0.1	mg/kg	M	001,007,009
3/4-Methylphenol	T207	M105	0.1	mg/kg	M	001,007,009
Hexachloroethane	T207	M105	0.1	mg/kg	U	001,007,009
Nitrobenzene	T207	M105	0.1	mg/kg	M	001,007,009
Isophorone	T207	M105	0.1	mg/kg	U	001,007,009
2-Nitrophenol	T207	M105	0.1	mg/kg	U	001,007,009
2,4-Dimethylphenol	T207	M105	0.1	mg/kg	U	001,007,009
Bis (2-chloroethoxy) methane	T207	M105	0.1	mg/kg	M	001,007,009
2,4-Dichlorophenol	T207	M105	0.1	mg/kg	U	001,007,009
1,2,4-Trichlorobenzene	T207	M105	0.1	mg/kg	M	001,007,009
4-Chloroaniline	T207	M105	0.1	mg/kg	U	001,007,009
Hexachlorobutadiene	T207	M105	0.1	mg/kg	M	001,007,009
4-Chloro-3-methylphenol	T207	M105	0.1	mg/kg	M	001,007,009
2-Methylnaphthalene	T207	M105	0.1	mg/kg	M	001,007,009
Hexachlorocyclopentadiene	T207	M105	0.1	mg/kg	U	001,007,009
2,4,6-Trichlorophenol	T207	M105	0.1	mg/kg	U	001,007,009
2,4,5-Trichlorophenol	T207	M105	0.1	mg/kg	U	001,007,009
2-Chloronaphthalene	T207	M105	0.1	mg/kg	M	001,007,009
2-Nitroaniline	T207	M105	0.1	mg/kg	M	001,007,009
Dimethyl phthalate	T207	M105	0.1	mg/kg	U	001,007,009
2,6-Dinitrotoluene	T207	M105	0.1	mg/kg	U	001,007,009
Acenaphthylene	T207	M105	0.1	mg/kg	U	001,007,009
Acenaphthene	T207	M105	0.1	mg/kg	M	001,007,009
3-Nitroaniline	T207	M105	0.1	mg/kg	U	001,007,009
Dibenzofuran	T207	M105	0.1	mg/kg	M	001,007,009
2,4-Dinitrotoluene	T207	M105	0.1	mg/kg	M	001,007,009
Diethyl phthalate	T207	M105	0.1	mg/kg	U	001,007,009
4-Chlorophenyl phenylether	T207	M105	0.1	mg/kg	M	001,007,009
4-Nitroaniline	T207	M105	0.1	mg/kg	U	001,007,009
Azobenzene	T207	M105	0.1	mg/kg	M	001,007,009

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
4-Bromophenyl phenylether	T207	M105	0.1	mg/kg	M	001,007,009
Hexachlorobenzene	T207	M105	0.1	mg/kg	M	001,007,009
Pentachlorophenol	T207	M105	0.1	mg/kg	U	001,007,009
Anthracene	T207	M105	0.1	mg/kg	U	001,007,009
Carbazole	T207	M105	0.1	mg/kg	U	001,007,009
Di-n-butylphthalate	T207	M105	0.1	mg/kg	M	001,007,009
Pyrene	T207	M105	0.1	mg/kg	M	001,007,009
Butyl benzylphthalate	T207	M105	0.1	mg/kg	U	001,007,009
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001,007,009
Chrysene	T207	M105	0.1	mg/kg	M	001,007,009
Bis (2-ethylhexyl)phthalate	T207	M105	0.1	mg/kg	M	001,007,009
Di-n-octylphthalate	T207	M105	0.1	mg/kg	M	001,007,009
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	M	001,007,009
Dichlorodifluoromethane	T209	M105	50	µg/kg	M	001,007,009
Chloromethane	T209	M105	50	µg/kg	U	001,007,009
Vinyl chloride	T209	M105	50	µg/kg	M	001,007,009
Bromomethane	T209	M105	50	µg/kg	U	001,007,009
Chloroethane	T209	M105	50	µg/kg	M	001,007,009
Trichlorofluoromethane	T209	M105	50	µg/kg	M	001,007,009
1,1-Dichloroethylene	T209	M105	50	µg/kg	M	001,007,009
Dichloromethane	T209	M105	50	µg/kg	U	001,007,009
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	M	001,007,009
1,1-Dichloroethane	T209	M105	50	µg/kg	M	001,007,009
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	M	001,007,009
2,2-Dichloropropane	T209	M105	50	µg/kg	U	001,007,009
Chloroform	T209	M105	50	µg/kg	M	001,007,009
Bromochloromethane	T209	M105	50	µg/kg	M	001,007,009
1,1,1-Trichloroethane	T209	M105	50	µg/kg	M	001,007,009
1,1-Dichloropropene	T209	M105	50	µg/kg	M	001,007,009
Carbon tetrachloride	T209	M105	50	µg/kg	M	001,007,009
1,2-Dichloroethane	T209	M105	50	µg/kg	M	001,007,009
1,2-Dichloropropane	T209	M105	50	µg/kg	M	001,007,009
Trichloroethene	T209	M105	50	µg/kg	M	001,007,009
Bromodichloromethane	T209	M105	50	µg/kg	M	001,007,009
Dibromomethane	T209	M105	50	µg/kg	M	001,007,009
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	M	001,007,009
Toluene	T209	M105	10	µg/kg	M	001,007,009
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	M	001,007,009
1,1,2-Trichloroethane	T209	M105	50	µg/kg	M	001,007,009
1,3-Dichloropropane	T209	M105	50	µg/kg	M	001,007,009
Tetrachloroethene	T209	M105	50	µg/kg	M	001,007,009
Chlorodibromomethane	T209	M105	50	µg/kg	M	001,007,009
1,2-dibromoethane	T209	M105	50	µg/kg	M	001,007,009
Chlorobenzene	T209	M105	50	µg/kg	M	001,007,009
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	M	001,007,009
O Xylene	T209	M105	10	µg/kg	M	001,007,009
Styrene	T209	M105	50	µg/kg	U	001,007,009
Bromoform	T209	M105	50	µg/kg	M	001,007,009
Isopropyl benzene	T209	M105	50	µg/kg	M	001,007,009
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	U	001,007,009
1,2,3-Trichloropropane	T209	M105	50	µg/kg	U	001,007,009
n-Propylbenzene	T209	M105	50	µg/kg	M	001,007,009
Bromobenzene	T209	M105	50	µg/kg	M	001,007,009
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	M	001,007,009
T-Butylbenzene	T209	M105	50	µg/kg	M	001,007,009
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	M	001,007,009
S-Butylbenzene	T209	M105	50	µg/kg	M	001,007,009
p-Isopropyltoluene	T209	M105	50	µg/kg	M	001,007,009
2-Chlorotoluene	T209	M105	50	µg/kg	U	001,007,009
4-Chlorotoluene	T209	M105	50	µg/kg	U	001,007,009
1,3-Dichlorobenzene	T209	M105	50	µg/kg	M	001,007,009
1,4-Dichlorobenzene	T209	M105	50	µg/kg	M	001,007,009
1,2-Dichlorobenzene	T209	M105	50	µg/kg	M	001,007,009
Benzene	T209	M105	10	µg/kg	M	001,007,009
EthylBenzene	T209	M105	10	µg/kg	M	001,007,009
M/P Xylene	T209	M105	10	µg/kg	M	001,007,009
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	001,007,009
TPH (C5-C6 aliphatic)	T209	M105	100	µg/kg	N	001,007,009
TPH (C6-C8 aliphatic)	T209	M105	100	µg/kg	N	001,007,009
TPH (C8-C10 aliphatic)	T209	M105	100	µg/kg	N	001,007,009

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	M	001,007,009
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	M	001,007,009
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	M	001,007,009
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	M	001,007,009
TPH (Aliphatic) total	T85	M105		mg/kg	N	001,007,009
TPH (C6-C7 aromatic)	T209	M105	100	µg/kg	N	001,007,009
TPH (C7-C8 aromatic)	T209	M105	100	µg/kg	N	001,007,009
TPH (C8-C10 aromatic)	T209	M105	100	µg/kg	N	001,007,009
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	M	001,007,009
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	M	001,007,009
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	M	001,007,009
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	M	001,007,009
TPH (Aromatic) total	T85	M105		mg/kg	N	001,007,009
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N	001,007,009
pH	T7	10:1			U	001,009
Sulphate	T686	10:1	0.5	mg/l	U	001,009
Chloride	T686	10:1	1	mg/l	U	001,009
Ammonia expressed as N	T686	10:1	0.05	mg/l	U	001,009
Nitrate	T686	10:1	0.5	mg/l	U	001,009
Nitrite	T686	10:1	0.1	mg/l	U	001,009
orthophosphate	T686	10:1	0.5	mg/l	N	001,009
Cyanide(Total)	T4	10:1	0.05	mg/l	U	001,009
Benzo(j)fluoranthrene	T149	10:1	0.01	mg/l	N	001,009
Dibutyl tin	T72	10:1	0.01	µg/l	N	001,009
Tributyl tin	T72	10:1	0.01	µg/l	N	001,009
PCB BZ#81	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#77	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#105	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#114	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#118	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#123	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#126	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#156	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#157	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#167	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#169	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#189	T16	10:1	0.005	µg/l	U	001,009
Catechol	T17	10:1	0.005	mg/l	N	001,009
Cresols	T17	10:1	0.005	mg/l	N	001,009
Naphthols	T17	10:1	0.01	mg/l	N	001,009
Phenol	T17	10:1	0.005	mg/l	N	001,009
Resorcinol	T17	10:1	0.005	mg/l	N	001,009
Total Phenols	T17	10:1	0.01	mg/l	N	001,009
Trimethyl phenols	T17	10:1	0.01	mg/l	N	001,009
Xylenols	T17	10:1	0.01	mg/l	N	001,009
Calcium	T6	10:1	0.1	mg/l	N	001,009
Sodium	T6	10:1	0.1	mg/l	N	001,009
Magnesium	T6	10:1	0.1	mg/l	N	001,009
Potassium	T6	10:1	0.1	mg/l	N	001,009
Aluminium	T6	10:1	0.02	mg/l	U	001,009
Chromium VI	T686	10:1	0.003	mg/l	U	001,009
Boron	T6	10:1	0.01	mg/l	N	001,009
Iron	T6	10:1	0.01	mg/l	U	001,009
As (Dissolved)	T281	10:1	0.2	µg/l	U	001,009
Cd (Dissolved)	T281	10:1	0.02	µg/l	U	001,009
Cr (Dissolved)	T281	10:1	1	µg/l	U	001,009
Cu (Dissolved)	T281	10:1	0.5	µg/l	U	001,009
Ni (Dissolved)	T281	10:1	1	µg/l	U	001,009
Pb (Dissolved)	T281	10:1	0.3	µg/l	U	001,009
Zn (Dissolved)	T281	10:1	2	µg/l	U	001,009
Hg (Dissolved)	T281	10:1	0.05	µg/l	U	001,009
V (Dissolved)	T281	10:1	2	µg/l	U	001,009
Se (Dissolved)	T281	10:1	0.5	µg/l	U	001,009
Mn (Dissolved)	T281	10:1	1	µg/l	U	001,009
Ba (Dissolved)	T281	10:1	1	µg/l	U	001,009
Be (Dissolved)	T281	10:1	0.05	µg/l	U	001,009
Naphthalene	T149	10:1	0.01	µg/l	U	001,009
Acenaphthylene	T149	10:1	0.01	µg/l	U	001,009
Acenaphthene	T149	10:1	0.01	µg/l	U	001,009
Fluorene	T149	10:1	0.01	µg/l	U	001,009

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Phenanthrene	T149	10:1	0.01	µg/l	U	001,009
Anthracene	T149	10:1	0.01	µg/l	U	001,009
Fluoranthene	T149	10:1	0.01	µg/l	U	001,009
Pyrene	T149	10:1	0.01	µg/l	U	001,009
Benzo(a)Anthracene	T149	10:1	0.01	µg/l	U	001,009
Chrysene	T149	10:1	0.01	µg/l	U	001,009
Benzo(b)fluoranthene	T149	10:1	0.01	µg/l	U	001,009
Benzo(k)fluoranthene	T149	10:1	0.01	µg/l	U	001,009
Benzo(a)Pyrene	T149	10:1	0.01	µg/l	U	001,009
Indeno(123-cd)Pyrene	T149	10:1	0.01	µg/l	U	001,009
Dibenzo(ah)Anthracene	T149	10:1	0.01	µg/l	U	001,009
Benzo(ghi)Perylene	T149	10:1	0.01	µg/l	U	001,009
PAH(total)	T149	10:1	0.01	µg/l	U	001,009
Phenol	T71	10:1	1	µg/l	U	001,009
Bis (2-chloroethyl) ether	T71	10:1	1	µg/l	U	001,009
2-Chlorophenol	T71	10:1	1	µg/l	U	001,009
1,3-Dichlorobenzene	T71	10:1	1	µg/l	U	001,009
1,4-Dichlorobenzene	T71	10:1	1	µg/l	U	001,009
1,2-Dichlorobenzene	T71	10:1	1	µg/l	U	001,009
Bis (2-chloroisopropyl) ether	T71	10:1	1	µg/l	U	001,009
2-methyl phenol	T71	10:1	1	µg/l	U	001,009
3/4-Methylphenol	T71	10:1	1	µg/l	U	001,009
Hexachloroethane	T71	10:1	1	µg/l	U	001,009
Nitrobenzene	T71	10:1	1	µg/l	U	001,009
Isophorone	T71	10:1	1	µg/l	U	001,009
2-Nitrophenol	T71	10:1	1	µg/l	U	001,009
2,4-Dimethylphenol	T71	10:1	1	µg/l	U	001,009
Bis (2-chloroethoxy) methane	T71	10:1	1	µg/l	U	001,009
2,4-Dichlorophenol	T71	10:1	1	µg/l	U	001,009
1,2,4-Trichlorobenzene	T71	10:1	1	µg/l	U	001,009
Naphthalene	T71	10:1	1	µg/l	U	001,009
4-Chloroaniline	T71	10:1	1	µg/l	U	001,009
Hexachlorobutadiene	T71	10:1	1	µg/l	U	001,009
4-Chloro-3-methylphenol	T71	10:1	1	µg/l	U	001,009
2-Methylnaphthalene	T71	10:1	1	µg/l	U	001,009
Hexachlorocyclopentadiene	T71	10:1	1	µg/l	U	001,009
2,4,6-Trichlorophenol	T71	10:1	1	µg/l	U	001,009
2,4,5-Trichlorophenol	T71	10:1	1	µg/l	U	001,009
2-Chloronaphthalene	T71	10:1	1	µg/l	U	001,009
2-Nitroaniline	T71	10:1	1	µg/l	U	001,009
Dimethyl phthalate	T71	10:1	1	µg/l	U	001,009
2,6-Dinitrotoluene	T71	10:1	1	µg/l	U	001,009
Acenaphthylene	T71	10:1	1	µg/l	U	001,009
Acenaphthene	T71	10:1	1	µg/l	U	001,009
3-Nitroaniline	T71	10:1	1	µg/l	U	001,009
Dibenzofuran	T71	10:1	1	µg/l	U	001,009
2,4-Dinitrotoluene	T71	10:1	1	µg/l	U	001,009
Diethyl phthalate	T71	10:1	1	µg/l	U	001,009
Fluorene	T71	10:1	1	µg/l	U	001,009
4-Chlorophenyl phenylether	T71	10:1	1	µg/l	U	001,009
4-Nitroaniline	T71	10:1	1	µg/l	U	001,009
Azobenzene	T71	10:1	1	µg/l	U	001,009
4-Bromophenyl phenylether	T71	10:1	1	µg/l	U	001,009
Hexachlorobenzene	T71	10:1	1	µg/l	U	001,009
Pentachlorophenol	T71	10:1	1	µg/l	U	001,009
Phenanthrene	T71	10:1	1	µg/l	U	001,009
Anthracene	T71	10:1	1	µg/l	U	001,009
Carbazole	T71	10:1	1	µg/l	U	001,009
Di-n-butylphthalate	T71	10:1	1	µg/l	U	001,009
Fluoranthene	T71	10:1	1	µg/l	U	001,009
Pyrene	T71	10:1	1	µg/l	U	001,009
Butyl benzylphthalate	T71	10:1	1	µg/l	U	001,009
Benzo(a)Anthracene	T71	10:1	1	µg/l	U	001,009
Chrysene	T71	10:1	1	µg/l	U	001,009
Bis (2-ethylhexyl)phthalate	T71	10:1	1	µg/l	U	001,009
Di-n-octylphthalate	T71	10:1	1	µg/l	U	001,009
Benzo(a)Pyrene	T71	10:1	1	µg/l	U	001,009
Indeno(123-cd)Pyrene	T71	10:1	1	µg/l	U	001,009
Dibenzo(ah)Anthracene	T71	10:1	1	µg/l	U	001,009
Benzo(ghi)Perylene	T71	10:1	1	µg/l	U	001,009

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Benzo(b)fluoranthene	T71	10:1	1	µg/l	U	001,009
Benzo(k)fluoranthene	T71	10:1	1	µg/l	U	001,009
Dichlorodifluoromethane	T54	10:1	1	µg/l	U	001,009
Chloromethane	T54	10:1	1	µg/l	U	001,009
Vinyl chloride	T54	10:1	1	µg/l	U	001,009
Bromomethane	T54	10:1	1	µg/l	U	001,009
Chloroethane	T54	10:1	1	µg/l	U	001,009
Trichlorofluoromethane	T54	10:1	1	µg/l	U	001,009
1,1-Dichloroethylene	T54	10:1	1	µg/l	U	001,009
Dichloromethane	T54	10:1	50	µg/l	N	001,009
Trans-1,2-Dichloroethene	T54	10:1	1	µg/l	U	001,009
1,1-Dichloroethane	T54	10:1	1	µg/l	U	001,009
Cis-1,2-Dichloroethylene	T54	10:1	1	µg/l	U	001,009
2,2-Dichloropropane	T54	10:1	1	µg/l	U	001,009
Chloroform	T54	10:1	1	µg/l	U	001,009
Bromochloromethane	T54	10:1	1	µg/l	U	001,009
1,1,1-Trichloroethane	T54	10:1	1	µg/l	U	001,009
1,1-Dichloropropene	T54	10:1	1	µg/l	U	001,009
Carbon tetrachloride	T54	10:1	1	µg/l	U	001,009
1,2-Dichloroethane	T54	10:1	1	µg/l	U	001,009
Benzene	T54	10:1	1	µg/l	U	001,009
1,2-Dichloropropane	T54	10:1	1	µg/l	U	001,009
1,1,2-Trichloroethylene	T54	10:1	1	µg/l	U	001,009
Bromodichloromethane	T54	10:1	1	µg/l	U	001,009
Dibromomethane	T54	10:1	1	µg/l	U	001,009
Cis-1,3-Dichloropropene	T54	10:1	1	µg/l	U	001,009
Toluene	T54	10:1	1	µg/l	U	001,009
Trans-1,3-Dichloropropene	T54	10:1	1	µg/l	U	001,009
1,1,2-Trichloroethane	T54	10:1	1	µg/l	U	001,009
1,3-Dichloropropane	T54	10:1	1	µg/l	U	001,009
Tetrachloroethene	T54	10:1	1	µg/l	U	001,009
Chlorodibromomethane	T54	10:1	1	µg/l	U	001,009
1,2-dibromoethane	T54	10:1	1	µg/l	U	001,009
Chlorobenzene	T54	10:1	1	µg/l	U	001,009
1,1,1,2-Tetrachloroethane	T54	10:1	1	µg/l	U	001,009
EthylBenzene	T54	10:1	1	µg/l	U	001,009
M/P Xylene	T54	10:1	1	µg/l	U	001,009
O Xylene	T54	10:1	1	µg/l	U	001,009
Styrene	T54	10:1	1	µg/l	U	001,009
Bromoform	T54	10:1	1	µg/l	U	001,009
Isopropyl benzene	T54	10:1	1	µg/l	U	001,009
1,1,2,2-Tetrachloroethane	T54	10:1	1	µg/l	U	001,009
1,2,3-Trichloropropane	T54	10:1	1	µg/l	U	001,009
n-Propylbenzene	T54	10:1	1	µg/l	U	001,009
Bromobenzene	T54	10:1	1	µg/l	U	001,009
1,3,5-Trimethylbenzene	T54	10:1	1	µg/l	U	001,009
T-Butylbenzene	T54	10:1	1	µg/l	U	001,009
1,2,4-Trimethylbenzene	T54	10:1	1	µg/l	U	001,009
S-Butylbenzene	T54	10:1	1	µg/l	U	001,009
p-Isopropyltoluene	T54	10:1	1	µg/l	U	001,009
2-Chlorotoluene	T54	10:1	1	µg/l	U	001,009
4-Chlorotoluene	T54	10:1	1	µg/l	U	001,009
1,3-Dichlorobenzene	T54	10:1	1	µg/l	U	001,009
1,4-Dichlorobenzene	T54	10:1	1	µg/l	U	001,009
1,2-Dichlorobenzene	T54	10:1	1	µg/l	U	001,009
TPH (C5-C6 aliphatic)	T215	10:1	10	µg/l	N	001,009
TPH (C6-C8 aliphatic)	T215	10:1	10	µg/l	N	001,009
TPH (C8-C10 aliphatic)	T215	10:1	10	µg/l	N	001,009
TPH (C10-C12 aliphatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (C12-C16 aliphatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (C16-C21 aliphatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (C21-C35 aliphatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (Aliphatic) total	T85	10:1		mg/l	N	001,009
TPH (C6-C7 aromatic)	T215	10:1	10	µg/l	N	001,009
TPH (C7-C8 aromatic)	T215	10:1	10	µg/l	N	001,009
TPH (C8-C10 aromatic)	T215	10:1	10	µg/l	N	001,009
TPH (C10-C12 aromatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (C12-C16 aromatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (C16-C21 aromatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (C21-C35 aromatic)	T910	10:1	0.01	mg/l	N	001,009

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
TPH (Aromatic) total	T85	10:1		mg/l	N	001,009
TPH (Aliphatic+Aromatic) (sum)	T85	10:1		mg/l	N	001,009

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Date of Report: 22-Jan-2019

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Customer Contact: Ms Karen Blackmore

Customer Job Reference: G180030U, CoC_BH23-BH21-BH09_REV
Customer Purchase Order: 74376KB-WAL
Customer Site Reference: St Ola Pier, Scrabster
Date Job Received at Concept: 15-Nov-2018
Date Analysis Started: 28-Nov-2018
Date Analysis Completed: 22-Jan-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aleksandra Pacula
Senior Customer Service Advisor

Issued by :
Aleksandra Pacula
Senior Customer Service Advisor

Waste Acceptance Criteria

Customer Sample Reference : BH21
Our Sample Reference : 785568 005
Project Site : St Ola Pier, Scrabster
Customer Reference : G180030U, CoC_BH23-BH21-BH09_REV
Empty Dish Weight : 0
Wet Sample in Dish Weight : 100
Hole ID : BH21
Top Depth : 1.50
Bottom Depth : 2.00
Test Portion Mass (g) : 175
Sample in Dish @ 105C : 80.2
Date Sampled : 13-NOV-2018
AGS Type : ES
AGS Sample Reference : 6
Matrix Class : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
PCB EC7 (Sum)	Calc	0.007	mg/kg	M	<0.007	1.0		
Acid Neutralising Capacity (pH 4)	Titration	2	Mol/kg	N	<2			
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
Loss on Ignition	Grav	0.1	%	N	**1.0**			10.0
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
pH	Probe			M	**8.9**		> 6.0	
Total Organic Carbon	OX/IR	0.1	%	N	**0.3**	3.0	5.0	6.0
Total Petroleum Hydrocarbons C10-C40 (Sum)	Calc	1	mg/kg	N	(13) <1	500.0		

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.036**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.71**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	**0.0011**	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**4000**	**800.0**	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.034**	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.095**	2.0	50.0	100.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**19**	500.0	800.0	1000.0
Fluoride	Calc (W)	0.50	mg/kg	N	**2.0**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	**0.017**	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.029**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	**0.11**	0.4	10.0	40.0
Phenols (Total-Mono)	Calc	1.0	mg/kg	N	<1.0	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
Sulphate	Calc (W)	5	mg/kg	N	**820**	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	1000	mg/kg	N	**9600**	**4000.0**	60000.0	100000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	**1.1**	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

*** Waste Sampling and Testing for Disposal at Landfill, EBPRI 11507B, Environment Agency (England and Wales) March 2013**

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**785568 004**	**785568 005**
				Customer Sample Reference	**BH21**	**BH21**
				Test Sample	**AR**	**AR**
				Hole ID	**BH21**	**BH21**
				Top Depth	**0.00**	**1.50**
				Bottom Depth	**0.50**	**2.00**
				Date Sampled	**13-NOV-2018**	**13-NOV-2018**
				AGS Type	**ES**	**ES**
				AGS Sample Reference	**1**	**6**
				Matrix Class	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**22**	**20**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**785568 004**	**785568 005**
				Customer Sample Reference	**BH21**	**BH21**
				Test Sample	**M40**	**M40**
				Hole ID	**BH21**	**BH21**
				Top Depth	**0.00**	**1.50**
				Bottom Depth	**0.50**	**2.00**
				Date Sampled	**13-NOV-2018**	**13-NOV-2018**
				AGS Type	**ES**	**ES**
				AGS Sample Reference	**1**	**6**
				Matrix Class	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Retained on 10mm sieve	Grav	0.1	%	N	<0.1	<0.1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Heavy Metals(9)

				Concept Reference	**785568 004**
				Customer Sample Reference	**BH21**
				Test Sample	**A40**
				Hole ID	**BH21**
				Top Depth	**0.00**
				Bottom Depth	**0.50**
				Date Sampled	**13-NOV-2018**
				AGS Type	**ES**
				AGS Sample Reference	**1**
				Matrix Class	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**	
Boron (water-soluble)	ICP/OES	1	mg/kg	N	<1
Barium	ICP/OES	1	mg/kg	U	**120**
Beryllium	ICP/OES	2	mg/kg	U	<2
Chromium VI	ICP/OES	1	mg/kg	N	<1
Iron	ICP/OES	1	mg/kg	U	**290**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Heavy Metals(9)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**M40**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Arsenic	ICP/OES	2	mg/kg	M	**12**
Cadmium	ICP/OES	1	mg/kg	M	<1
Chromium	ICP/OES	1	mg/kg	M	**22**
Copper	ICP/OES	1	mg/kg	M	**18**
Mercury	ICP/OES	1	mg/kg	M	<1
Nickel	ICP/OES	1	mg/kg	M	**18**
Lead	ICP/OES	1	mg/kg	M	**19**
Selenium	ICP/OES	3	mg/kg	M	<3
Vanadium	ICP/OES	1	mg/kg	M	**31**
Zinc	ICP/OES	1	mg/kg	M	**67**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**A40**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Asbestos ID	PLM			SU	N.D.
Sulphur (total)	ICP/OES	0.01	%	M	**0.02**
(Acid Soluble) Sulphate	HCl Extraction/ICP/OES (TRL 447 T2)	0.01	%	M	**0.20**
(Water Soluble) Sulphate expressed as SO4	2:1 Extraction/ICP/OES (TRL 447 T1)	0.01	g/l	M	**0.47**
pH	Probe			M	**8.4**
Soil Organic Matter	Calc TOC/0.58	0.1	%	N	**1.1**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**AR**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Cyanide (Total)	Colorimetry	1	mg/kg	M	<1
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**22**
Benzo(j)fluoranthene	GC/MS	0.1	mg/kg	N	<0.1
Dibutyl tin	GC/MS (Deriv.)	0.01	mg/kg	N	<0.01
Tributyl tin	GC/MS (Deriv.)	0.01	mg/kg	N	<0.01

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
BTEX

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10[13]
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
PCB EC7 and Total

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**AR**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Polychlorinated biphenyl BZ#101	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#118	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#138	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#153	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#180	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#28	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#52	GC/MS (SIR)	1	µg/kg	M	<1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**AR**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Polychlorinated biphenyl BZ#77	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#81	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#105	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#114	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#123	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#126	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#156	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#157	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#167	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#169	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#189	GC/MS (HR)	0.05	µg/kg	U	<0.05

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Total and Speciated USEPA16 PAH

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.1**
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	**0.1**
Coronene	GC/MS	0.1	mg/kg	N	<0.1
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.4**
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.3**
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Benzo(b)fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.1**
Benzo(k)fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	**1.8**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Total Petroleum Hydrocarbons

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Total Petroleum Hydrocarbons	GC/FID	1	mg/kg	M	<1[13]
Total Petroleum Hydrocarbons (C35-C40)	GC/FID	1	mg/kg	N	<1[13]

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
TPH UKCWG

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10[13]
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Methyl tert-Butyl Ether	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<100
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<100
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<100
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GCxGC	1	mg/kg	M	<1[13]
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GCxGC	1	mg/kg	M	**1[13]**
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GCxGC	1	mg/kg	M	**4[13]**
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GCxGC	2	mg/kg	M	**5[13]**
Total Petroleum Hydrocarbons (Aliphatic) total	Calc		mg/kg	N	**10[13]**
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<100
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<100
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<100
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GCxGC	2	mg/kg	M	<2[13]
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GCxGC	1	mg/kg	M	<1[13]
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GCxGC	1	mg/kg	M	<1[13]
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GCxGC	1	mg/kg	M	<1[13]
Total Petroleum Hydrocarbons (Aromatic) total	Calc		mg/kg	N	N.D.[13]
Total Petroleum Hydrocarbons (Aliphatic+Aromatic)	Calc		mg/kg	N	**10.0[13]**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Phenols (Speciated)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**AR**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Resorcinol	HPLC	0.05	mg/kg	SM	<0.05
Catechol	HPLC	0.05	mg/kg	SN	-[NR]
Phenol	HPLC	0.1	mg/kg	SM	<0.1
Cresols	HPLC	0.05	mg/kg	SM	<0.05
Xylenols	HPLC	0.05	mg/kg	SM	<0.06
Naphthols	HPLC	0.05	mg/kg	SN	<0.05
Trimethyl phenol	HPLC	0.05	mg/kg	SM	<0.05
Total Phenols	HPLC	0.1	mg/kg	SN	-[NR]

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Semi-Volatile Organic Compounds (USEPA 625)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Bis (2-chloroethyl) ether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
2-Chlorophenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
1,3-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
1,4-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
1,2-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Bis (2-chloroisopropyl) ether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
2-methyl phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
3/4-Methylphenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Hexachloroethane	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Nitrobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Isophorone	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
2-Nitrophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
2,4-Dimethylphenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Bis (2-chloroethoxy) methane	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
2,4-Dichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
1,2,4-Trichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1 (131)
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
4-Chloroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Hexachlorobutadiene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
4-Chloro-3-methylphenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
2-Methylnaphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Hexachlorocyclopentadiene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.3 (162,131)
2,4,6-Trichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
2,4,5-Trichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
2-Chloronaphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
2-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Dimethyl phthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
2,6-Dinitrotoluene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
3-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Dibenzofuran	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
2,4-Dinitrotoluene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Diethyl phthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
4-Chlorophenyl phenylether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
4-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Azobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
4-Bromophenyl phenylether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Hexachlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Pentachlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Carbazole	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Di-n-butylphthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.4**
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.3**
Butyl benzylphthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Bis (2-ethylhexyl)phthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Di-n-octylphthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.3**
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Volatile Organic Compounds (USEPA 624) (MCERTS)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Dichlorodifluoromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Chloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
Vinyl chloride monomer	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Bromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
Chloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Trichlorofluoromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Dichloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
Trans-1,2-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1-Dichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Cis-1,2-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
2,2-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
Chloroform	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Bromochloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1,1-Trichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Carbon tetrachloride	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,2-Dichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10[13]
1,2-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Trichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Bromodichloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Dibromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Cis-1,3-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Trans-1,3-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1,2-Trichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,3-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Tetrachloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Chlorodibromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,2-dibromoethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Chlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1,1,2-Tetrachloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Styrene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
Bromoform	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Isopropyl benzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1,2,2-Tetrachloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
1,2,3-Trichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
n-Propylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Bromobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,3,5-Trimethylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Tert-Butylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,2,4-Trimethylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Sec-Butylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
p-Isopropyltoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
2-Chlorotoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
4-Chlorotoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
1,3-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,4-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,2-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Waste Acceptance Criteria

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**3.6**
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**71**
Molybdenum (Dissolved)	ICP/MS (Filtered)	1	µg/l	N	**3**
Total Dissolved Solids	Grav	100	mg/l	N	**960**
Phenols (Total-Mono)	Colorimetry	0.1	mg/l	U	<0.1
Dissolved Organic Carbon	OX/IR	1	mg/l	N	**2**
Electrical Conductivity	Probe	10	µS/cm	N	**1600**
Antimony (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<1
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	**0.11**
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**3**
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	**9.5**
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	**1.7**
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**3**
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<0.5
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	**110**
Chloride	Discrete Analyser	1	mg/l	U	**400**
Fluoride	Discrete Analyser	0.05	mg/l	U	**0.20**
Sulphate	Discrete Analyser	0.5	mg/l	U	**82**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Metals ICP MS

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**3.6**
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	**0.11**
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**3**
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	**9.5**
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**3**
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	**1.7**
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	**110**
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05
Vanadium (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	**2**
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<0.5
Manganese (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**16**
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**71**
Beryllium (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Metals ICP OES

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Calcium	ICP/OES	0.1	mg/l	N	**30**
Sodium	ICP/OES	0.1	mg/l	N	**230**
Magnesium	ICP/OES	0.1	mg/l	N	**26**
Potassium	ICP/OES	0.1	mg/l	N	**12**
Aluminium	ICP/OES	0.02	mg/l	U	**0.06**
Chromium VI	Discrete Analyser	0.003	mg/l	U	<0.003
Boron	ICP/OES	0.01	mg/l	N	**0.20**
Iron	ICP/OES	0.01	mg/l	U	<0.01

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Special Waste Leachate Suite - Clause 15.7

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
pH	Probe			U	**7.70**
Sulphate	Discrete Analyser	0.5	mg/l	U	**82**
Chloride	Discrete Analyser	1	mg/l	U	**400**
Ammonia expressed as N	Discrete Analyser	0.05	mg/l	U	<0.05
Nitrate	Discrete Analyser	0.5	mg/l	U	**5.0**
Nitrite	Discrete Analyser	0.1	mg/l	U	<0.1
orthophosphate	Discrete Analyser	0.5	mg/l	N	<0.5
Cyanide (Total)	Colorimetry	0.05	mg/l	U	<0.05
Benzo(j)fluoranthene	GC/MS (SIR)	0.01	mg/l	N	<0.01[13]
Dibutyl tin	GC/MS (Deriv.)	0.01	µg/l	N	<0.01
Tributyl tin	GC/MS (Deriv.)	0.01	µg/l	N	<0.01

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

PAH US EPA 16 (B and K split)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Naphthalene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Acenaphthylene	GC/MS (SIR)	0.01	µg/l	U	**0.01(13)**
Acenaphthene	GC/MS (SIR)	0.01	µg/l	U	**0.01(13)**
Fluorene	GC/MS (SIR)	0.01	µg/l	U	**0.01(13)**
Phenanthrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Benzo(a)Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Chrysene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Benzo(b)fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Benzo(k)fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Benzo(a)Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Indeno(123-cd)Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Dibenzo(ah)Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Benzo(ghi)Perylene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Polyaromatic Hydrocarbons (Total)	GC/MS (SIR)	0.01	µg/l	U	**0.03**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

TPH (CWG)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]
Total Petroleum Hydrocarbons (Aliphatic) total	Calc		mg/l	N	N.D.[13]
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GCxGC (LV)	0.01	mg/l	N	**0.05[13]**
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GCxGC (LV)	0.01	mg/l	N	**0.01[13]**
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]
Total Petroleum Hydrocarbons (Aromatic) total	Calc		mg/l	N	**0.06[13]**
Total Petroleum Hydrocarbons (Aliphatic+Aromatic)	Calc		mg/l	N	**0.06[13]**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Polychlorinated biphenyl BZ#81	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#77	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#105	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#114	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#118	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#123	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#126	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#156	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#157	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#167	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#169	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#189	GC/MS	0.005	µg/l	U	<0.005

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Phenols (Speciated)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Catechol	HPLC	0.005	mg/l	N	<0.005
Cresols	HPLC	0.005	mg/l	N	<0.005
Naphthols	HPLC	0.01	mg/l	N	<0.01
Phenol	HPLC	0.005	mg/l	N	<0.005(13)
Resorcinol	HPLC	0.005	mg/l	N	<0.005
Total Phenols	HPLC	0.01	mg/l	N	<0.01
Trimethyl phenols	HPLC	0.01	mg/l	N	<0.01
Xylenols	HPLC	0.01	mg/l	N	<0.01

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

SVOC (USEPA 625) (B and K split)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Phenol	GC/MS (1l ext.)	1	µg/l	SU	<1
Bis (2-chloroethyl) ether	GC/MS (1l ext.)	1	µg/l	SU	<1
2-Chlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1
1,3-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
1,4-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
1,2-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
Bis (2-chloroisopropyl) ether	GC/MS (1l ext.)	1	µg/l	SU	<1
2-methyl phenol	GC/MS (1l ext.)	1	µg/l	SU	<1
3/4-Methylphenol	GC/MS (1l ext.)	1	µg/l	SU	<1
Hexachloroethane	GC/MS (1l ext.)	1	µg/l	SU	<1
Nitrobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
Isophorone	GC/MS (1l ext.)	1	µg/l	SU	<1
2-Nitrophenol	GC/MS (1l ext.)	1	µg/l	SU	<1
2,4-Dimethylphenol	GC/MS (1l ext.)	1	µg/l	SU	<1
Bis (2-chloroethoxy) methane	GC/MS (1l ext.)	1	µg/l	SU	<1
2,4-Dichlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1
1,2,4-Trichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
Naphthalene	GC/MS (1l ext.)	1	µg/l	SU	<1
4-Chloroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1
Hexachlorobutadiene	GC/MS (1l ext.)	1	µg/l	SU	<1
4-Chloro-3-methylphenol	GC/MS (1l ext.)	1	µg/l	SU	<1
2-Methylnaphthalene	GC/MS (1l ext.)	1	µg/l	SU	<1
Hexachlorocyclopentadiene	GC/MS (1l ext.)	1	µg/l	SU	<1
2,4,6-Trichlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1
2,4,5-Trichlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1
2-Chloronaphthalene	GC/MS (1l ext.)	1	µg/l	SU	<1
2-Nitroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1
Dimethyl phthalate	GC/MS (1l ext.)	1	µg/l	SU	<1
2,6-Dinitrotoluene	GC/MS (1l ext.)	1	µg/l	SU	<1
Acenaphthylene	GC/MS (1l ext.)	1	µg/l	SU	<1
Acenaphthene	GC/MS (1l ext.)	1	µg/l	SU	<1
3-Nitroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1
Dibenzofuran	GC/MS (1l ext.)	1	µg/l	SU	<1
2,4-Dinitrotoluene	GC/MS (1l ext.)	1	µg/l	SU	<1
Diethyl phthalate	GC/MS (1l ext.)	1	µg/l	SU	<1
Fluorene	GC/MS (1l ext.)	1	µg/l	SU	<1
4-Chlorophenyl phenylether	GC/MS (1l ext.)	1	µg/l	SU	<1
4-Nitroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1
Azobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
4-Bromophenyl phenylether	GC/MS (1l ext.)	1	µg/l	SU	<1
Hexachlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
Pentachlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1(131)
Phenanthrene	GC/MS (1l ext.)	1	µg/l	SU	<1
Anthracene	GC/MS (1l ext.)	1	µg/l	SU	<1
Carbazole	GC/MS (1l ext.)	1	µg/l	SU	<1
Di-n-butylphthalate	GC/MS (1l ext.)	1	µg/l	SU	<2
Fluoranthene	GC/MS (1l ext.)	1	µg/l	SU	<1
Pyrene	GC/MS (1l ext.)	1	µg/l	SU	<1
Butyl benzylphthalate	GC/MS (1l ext.)	1	µg/l	SU	<1
Benzo(a)Anthracene	GC/MS (1l ext.)	1	µg/l	SU	<1
Chrysene	GC/MS (1l ext.)	1	µg/l	SU	<1
Bis (2-ethylhexyl)phthalate	GC/MS (1l ext.)	1	µg/l	SU	<5
Di-n-octylphthalate	GC/MS (1l ext.)	1	µg/l	SU	<1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

SVOC (USEPA 625) (B and K split)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Benzo(a)Pyrene	GC/MS (1l ext.)	1	µg/l	SU	<1
Indeno(123-cd)Pyrene	GC/MS (1l ext.)	1	µg/l	SU	<1
Dibenzo(ah)Anthracene	GC/MS (1l ext.)	1	µg/l	SU	<1
Benzo(ghi)Perylene	GC/MS (1l ext.)	1	µg/l	SU	<1
Benzo(b)fluoranthene	GC/MS (1l ext.)	1	µg/l	SU	<1
Benzo(k)fluoranthene	GC/MS (1l ext.)	1	µg/l	SU	<1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Volatile Organic Compounds (USEPA 624)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Dichlorodifluoromethane	GC/MS (Headspace)	1	µg/l	U	<1
Chloromethane	GC/MS (Headspace)	1	µg/l	U	<1
Vinyl chloride monomer	GC/MS (Headspace)	1	µg/l	U	<1
Bromomethane	GC/MS (Headspace)	1	µg/l	U	<1
Chloroethane	GC/MS (Headspace)	1	µg/l	U	<1
Trichlorofluoromethane	GC/MS (Headspace)	1	µg/l	U	<1
1,1-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1
Dichloromethane	GC/MS (Headspace)	50	µg/l	N	<50
Trans-1,2-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1
1,1-Dichloroethane	GC/MS (Headspace)	1	µg/l	U	<1
Cis-1,2-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1
2,2-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1
Chloroform	GC/MS (Headspace)	1	µg/l	U	**23**
Bromochloromethane	GC/MS (Headspace)	1	µg/l	U	**4**
1,1,1-Trichloroethane	GC/MS (Headspace)	1	µg/l	U	<1
1,1-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1
Carbon tetrachloride	GC/MS (Headspace)	1	µg/l	U	<1
1,2-Dichloroethane	GC/MS (Headspace)	1	µg/l	U	<1
Benzene	GC/MS (Headspace)	1	µg/l	U	<1(13)
1,2-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1
1,1,2-Trichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1
Bromodichloromethane	GC/MS (Headspace)	1	µg/l	U	**3**
Dibromomethane	GC/MS (Headspace)	1	µg/l	U	<1
Cis-1,3-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1
Toluene	GC/MS (Headspace)	1	µg/l	U	<1
Trans-1,3-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1
1,1,2-Trichloroethane	GC/MS (Headspace)	1	µg/l	U	<1
1,3-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1
Tetrachloroethylene	GC/MS (Headspace)	1	µg/l	U	<1
Chlorodibromomethane	GC/MS (Headspace)	1	µg/l	U	<1
1,2-dibromoethane	GC/MS (Headspace)	1	µg/l	U	<1
Chlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1
1,1,1,2-Tetrachloroethane	GC/MS (Headspace)	1	µg/l	U	<1
EthylBenzene	GC/MS (Headspace)	1	µg/l	U	<1
Meta/Para-Xylene	GC/MS (Headspace)	1	µg/l	U	<1
Ortho-Xylene	GC/MS (Headspace)	1	µg/l	U	<1
Styrene	GC/MS (Headspace)	1	µg/l	U	<1
Bromoform	GC/MS (Headspace)	1	µg/l	U	<1
Isopropyl benzene	GC/MS (Headspace)	1	µg/l	U	<1
1,1,2,2-Tetrachloroethane	GC/MS (Headspace)	1	µg/l	U	<1
1,2,3-Trichloropropane	GC/MS (Headspace)	1	µg/l	U	<1
n-Propylbenzene	GC/MS (Headspace)	1	µg/l	U	<1
Bromobenzene	GC/MS (Headspace)	1	µg/l	U	<1
1,3,5-Trimethylbenzene	GC/MS (Headspace)	1	µg/l	U	<1
Tert-Butylbenzene	GC/MS (Headspace)	1	µg/l	U	<1
1,2,4-Trimethylbenzene	GC/MS (Headspace)	1	µg/l	U	<1
Sec-Butylbenzene	GC/MS (Headspace)	1	µg/l	U	<1
p-Isopropyltoluene	GC/MS (Headspace)	1	µg/l	U	<1
2-Chlorotoluene	GC/MS (Headspace)	1	µg/l	U	<1
4-Chlorotoluene	GC/MS (Headspace)	1	µg/l	U	<1
1,3-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1
1,4-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1
1,2-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

				Concept Reference	**785568 001**	**785568 002**	**785568 003**
				Customer Sample Reference	**BH23**	**BH23**	**BH23**
				Test Sample	**AR**	**AR**	**AR**
				Hole ID	**BH23**	**BH23**	**BH23**
				Top Depth	**0.00**	**0.50**	**1.50**
				Bottom Depth	**0.50**	**1.00**	**2.00**
				Date Sampled	**14-NOV-2018**	**14-NOV-2018**	**14-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**4**	**7**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Arsenic (Total)	ICP/MS (Total)	1.0	mg/kg	N	**5.4**	**5.4**	**7.4**
Cadmium (Total)	ICP/MS (Total)	0.05	mg/kg	N	<0.05	<0.05	**0.08**
Chromium (Total)	ICP/MS (Total)	0.2	mg/kg	N	**26**	**30**	**25**
Copper (Total)	ICP/MS (Total)	0.1	mg/kg	N	**11**	**37**	**7.5**
Mercury	CVAFS	0.01	mg/kg	N	**0.01(13)**	<0.01(13)	<0.01(13)
Lead (Total)	ICP/MS (Total)	0.2	mg/kg	N	**14**	**24**	**13**
Nickel (Total)	ICP/MS (Total)	0.2	mg/kg	N	**12**	**13**	**11**
Zinc	ICP/MS (HF)	1	mg/kg	N	**39**	**69**	**37**
Tributyl tin	GC/MS	10	µg/kg	N	**77**	<10	<10
Dibutyl tin	GC/MS	10	µg/kg	N	<10	<10	<10
Total Organic Carbon	OX/IR	0.1	%	N	**0.4**	**0.3**	**0.3**
Dry solids @105C	Grav (1 Dec) (105 C)	0.1	%	SN	**81**	**79**	**81**
Dry solids @40C	Grav (1 Dec) (40 C)	0.1	%	SN	**81**	**82**	**79**
Gasoline Range Organics (C5-C10)	GC/MS (Headspace)	10	µg/kg	SN	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C12-C16)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C16-C21)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C21-C35)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C40-C44)	GC/FID (LD)	0.1	mg/kg	SN	<1.0	<1.0	<1.0
Poly-Chlorinated Biphenyls (Total Tri-Hepta)	GC/MS (HR)	1.4	µg/kg	U	<1.4	<1.4	**2.1**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**785568 001**	**785568 002**	**785568 003**
				Customer Sample Reference	**BH23**	**BH23**	**BH23**
				Test Sample	**AR**	**AR**	**AR**
				Hole ID	**BH23**	**BH23**	**BH23**
				Top Depth	**0.00**	**0.50**	**1.50**
				Bottom Depth	**0.50**	**1.00**	**2.00**
				Date Sampled	**14-NOV-2018**	**14-NOV-2018**	**14-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**4**	**7**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Naphthalene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Acenaphthylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Acenaphthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Fluorene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Phenanthrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Benzo(a)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Chrysene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Benzo(a)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Indeno(123-cd)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Benzo(ghi)Perylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Benzo(b)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Benzo(k)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Dibenzo(ah)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Polyaromatic Hydrocarbons (Total)	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**785568 001**	**785568 002**	**785568 003**
				Customer Sample Reference	**BH23**	**BH23**	**BH23**
				Test Sample	**AR**	**AR**	**AR**
				Hole ID	**BH23**	**BH23**	**BH23**
				Top Depth	**0.00**	**0.50**	**1.50**
				Bottom Depth	**0.50**	**1.00**	**2.00**
				Date Sampled	**14-NOV-2018**	**14-NOV-2018**	**14-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**4**	**7**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.10	µg/kg	U	<0.10	<0.10	<0.10
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	**0.4**
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	**0.2**
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	**0.5**
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	**0.6**
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	**0.3**
PCB EC7 (Sum)	Calc	0.7	µg/kg	N	<0.7	<0.7	**5.2**

Index to symbols used in 785568-2

Value	Description
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
A40	Assisted dried < 40C
AR	As Received
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C

10:1	Leachate to BS EN 12457-2 (10:1)
10:1 S	Data for BS EN 12457-2 (10:1)
N.D.	Not Detected
162	LOD determined by matrix spike recovery
13	Results have been blank corrected.
131	Result is outside of the scope of accreditation due to a QC Failure
NR	No Result
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos was subcontracted to REC Asbestos.
Phenols (soils) testing was subcontracted to Exova Jones.
Please Note: The recovery in sample 005 for PCB Who12 was low, however the S/N is >20:1, therefore the data is considered valid.
These samples (except for Marine Sediments) have been analysed exceeding recommended holding times for VOC, TPH, SVOC, PAH, pH, PCB and Phenol. It is possible therefore that the results provided may be compromised.
SVOC (leachate) testing was subcontracted to Exova Jones.
Phenols (leachate) testing was transferred to Concept Braintree.

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

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Report Number: 785646-2

Date of Report: 22-Jan-2019

Customer: Fugro GeoServices
Fugro House
Hithercroft Road
Wallingford
Oxfordshire
OX10 9RB

Customer Contact: Ms Karen Blackmore

Customer Job Reference: G180030U, CoC_181611_REV
Customer Purchase Order: 74376KB-WAL
Customer Site Reference: St Ola Pier, Scrabster
Date Job Received at Concept: 21-Nov-2018
Date Analysis Started: 28-Nov-2018
Date Analysis Completed: 22-Jan-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aleksandra Pacula
Senior Customer Service Advisor

Issued by :
Aleksandra Pacula
Senior Customer Service Advisor

Waste Acceptance Criteria

Customer Sample Reference : BH22
Our Sample Reference : 785646 008
Project Site : St Ola Pier, Scrabster
Customer Reference : G180030U, CoC_181611_REV
Sample in Dish @ 105C : 57.6
Test Portion Mass (g) : 175
Hole ID : BH22
Wet Sample in Dish Weight : 100
Empty Dish Weight : 0
Top Depth : 3.00
Bottom Depth : 3.50
Date Sampled : 13-NOV-2018
AGS Type : ES
AGS Sample Reference : 8
Matrix Class : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
PCB EC7 (Sum)	Calc	0.007	mg/kg	M	<0.007	1.0		
Acid Neutralising Capacity (pH 4)	Titration	2	Mol/kg	N	<2			
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.040	mg/kg	U	(13) <0.040	6.0		
Loss on Ignition	Grav	0.1	%	N	**1.0**			10.0
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
pH	Probe			M	**8.6**		> 6.0	
Total Organic Carbon	OX/IR	0.1	%	N	**0.2**	3.0	5.0	6.0
Total Petroleum Hydrocarbons C10-C40 (Sum)	Calc	1	mg/kg	N	(13) <1	500.0		

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	**0.040**	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.062**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.66**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	<0.00020	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**5000**	**800.0**	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.015**	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.0055**	2.0	50.0	100.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**17**	500.0	800.0	1000.0
Fluoride	Calc (W)	0.50	mg/kg	N	**1.2**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	<0.0030	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.055**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	**13**	**0.4**	**10.0**	40.0
Phenols (Total-Mono)	Calc	1.0	mg/kg	N	<1.0	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
Sulphate	Calc (W)	5	mg/kg	N	**780**	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	1000	mg/kg	N	**11000**	**4000.0**	60000.0	100000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	<0.020	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

*** Waste Sampling and Testing for Disposal at Landfill, EBPRI 11507B, Environment Agency (England and Wales) March 2013**

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**785646 003**	**785646 007**	**785646 008**	**785646 011**	**785646 012**
				Customer Sample Reference	**BH05**	**BH22**	**BH22**	**BH24A**	**BH05**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**2.50**	**1.00**	**3.50**	**2.00**	**1.00**
				Top Depth	**1.50**	**0.00**	**3.00**	**1.50**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH22**	**BH24A**	**BH05**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**8**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**21**	**17**	**15**	**18**	**21**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**785646 013**
				Customer Sample Reference	**BH20**
				Test Sample	**AR**
				Bottom Depth	**0.50**
				Top Depth	**0.00**
				Hole ID	**BH20**
				Date Sampled	**12-NOV-2018**
				AGS Type	**ES**
				AGS Sample Reference	**1**
				Matrix Class	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**	
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**22**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**785646 003**	**785646 007**	**785646 008**	**785646 011**	**785646 012**
				Customer Sample Reference	**BH05**	**BH22**	**BH22**	**BH24A**	**BH05**
				Test Sample	**M40**	**M40**	**M40**	**M40**	**M40**
				Bottom Depth	**2.50**	**1.00**	**3.50**	**2.00**	**1.00**
				Top Depth	**1.50**	**0.00**	**3.00**	**1.50**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH22**	**BH24A**	**BH05**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**8**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Retained on 10mm sieve	Grav	0.1	%	N	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
MCERTS Preparation

Concept Reference	**785646 013**
Customer Sample Reference	**BH20**
Test Sample	**M40**
Bottom Depth	**0.50**
Top Depth	**0.00**
Hole ID	**BH20**
Date Sampled	**12-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Retained on 10mm sieve	Grav	0.1	%	N	<0.1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Heavy Metals(9)

Concept Reference					**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
Customer Sample Reference					**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Test Sample					**A40**	**A40**	**A40**	**A40**	**A40**
Bottom Depth					**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
Top Depth					**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
Hole ID					**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Date Sampled					**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
AGS Type					**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference					**6**	**1**	**8**	**1**	**1**
Matrix Class					**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Boron (water-soluble)	ICP/OES	1	mg/kg	N	<1	<1	<1	<1	<1
Barium	ICP/OES	1	mg/kg	U	**140**	**120**	**67**	**130**	**150**
Beryllium	ICP/OES	2	mg/kg	U	<2	<2	<2	<2	<2
Chromium VI	ICP/OES	1	mg/kg	N	<1	<1	<1	<1	<1
Iron	ICP/OES	1	mg/kg	U	**11000**	**15000**	**12000**	**12000**	**13000**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Heavy Metals(9)

				Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Test Sample	**M40**	**M40**	**M40**	**M40**	**M40**
				Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
				Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Arsenic	ICP/OES	2	mg/kg	M	**5**	**6**	**8**	**4**	**6**
Cadmium	ICP/OES	1	mg/kg	M	<1	<1	<1	<1	<1
Chromium	ICP/OES	1	mg/kg	M	**14**	**18**	**16**	**14**	**18**
Copper	ICP/OES	1	mg/kg	M	**5**	**16**	**6**	**5**	**11**
Mercury	ICP/OES	1	mg/kg	M	<1	<1	<1	<1	<1
Nickel	ICP/OES	1	mg/kg	M	**10**	**14**	**12**	**10**	**13**
Lead	ICP/OES	1	mg/kg	M	**9**	**11**	**7**	**6**	**10**
Selenium	ICP/OES	3	mg/kg	M	<3	<3	<3	<3	<3
Vanadium	ICP/OES	1	mg/kg	M	**20**	**23**	**22**	**19**	**24**
Zinc	ICP/OES	1	mg/kg	M	**31**	**50**	**35**	**24**	**39**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

				Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Test Sample	**A40**	**A40**	**A40**	**A40**	**A40**
				Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
				Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Asbestos ID	PLM			SU	N.D.	N.D.	N.D.	N.D.	N.D.
Sulphur (total)	ICP/OES	0.01	%	M	**0.16**	**0.14**	**0.11**	**0.14**	**0.13**
(Acid Soluble) Sulphate	HCl Extraction/ICP/OES (TRL 447 T2)	0.01	%	M	**0.32**	**0.31**	**0.26**	**0.31**	**0.29**
(Water Soluble) Sulphate expressed as SO4	2:1 Extraction/ICP/OES (TRL 447 T1)	0.01	g/l	M	**0.46**	**0.32**	**0.27**	**0.28**	**0.33**
pH	Probe			M	**8.2**	**8.3**	**8.4**	**8.5**	**8.4**
Soil Organic Matter	Calc TOC/0.58	0.1	%	N	**0.9**	**1.0**	**0.4**	**0.6**	**0.6**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

	Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
	Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
	Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
	Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
	Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
	Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
	Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
	AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
	AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
	Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Cyanide (Total)	Colorimetry	1	mg/kg	M	<1	<1	<1	<1	<1
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**21**	**17**	**18**	**21**	**22**
Benzo(j)fluoranthene	GC/MS	0.1	mg/kg	N	<0.1	<0.1	<0.1	<0.1	<0.1
Dibutyl tin	GC/MS (Deriv.)	0.01	mg/kg	N	<0.01	<0.01	<0.01	<0.01	<0.01
Tributyl tin	GC/MS (Deriv.)	0.01	mg/kg	N	<0.01	**0.02**	<0.01	<0.01	<0.01

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
BTEX

	Concept Reference	**785646 008**
	Customer Sample Reference	**BH22**
	Test Sample	**M105**
	Bottom Depth	**3.50**
	Top Depth	**3.00**
	Hole ID	**BH22**
	Date Sampled	**13-NOV-2018**
	AGS Type	**ES**
	AGS Sample Reference	**8**
	Matrix Class	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**	
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10[13]
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
PCB EC7 and Total

Concept Reference	**785646 008**
Customer Sample Reference	**BH22**
Test Sample	**AR**
Bottom Depth	**3.50**
Top Depth	**3.00**
Hole ID	**BH22**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**8**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Polychlorinated biphenyl BZ#101	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#118	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#138	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#153	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#180	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#28	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#52	GC/MS (SIR)	1	µg/kg	M	<1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference					**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
Customer Sample Reference					**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Test Sample					**AR**	**AR**	**AR**	**AR**	**AR**
Bottom Depth					**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
Top Depth					**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
Hole ID					**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Date Sampled					**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
AGS Type					**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference					**6**	**1**	**8**	**1**	**1**
Matrix Class					**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Polychlorinated biphenyl BZ#77	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#81	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#105	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#114	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#123	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#126	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#156	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#157	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#167	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#169	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#189	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Total and Speciated USEPA16 PAH

Concept Reference	**785646 008**
Customer Sample Reference	**BH22**
Test Sample	**M105**
Bottom Depth	**3.50**
Top Depth	**3.00**
Hole ID	**BH22**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**8**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Coronene	GC/MS	0.1	mg/kg	N	<0.1
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

				Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
				Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	**0.2**
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	**0.2**
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	**0.4**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Total Petroleum Hydrocarbons

				Concept Reference	**785646 008**
				Customer Sample Reference	**BH22**
				Test Sample	**M105**
				Bottom Depth	**3.50**
				Top Depth	**3.00**
				Hole ID	**BH22**
				Date Sampled	**13-NOV-2018**
				AGS Type	**ES**
				AGS Sample Reference	**8**
				Matrix Class	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**	
Total Petroleum Hydrocarbons	GC/FID	1	mg/kg	M	<1[13]
Total Petroleum Hydrocarbons (C35-C40)	GC/FID	1	mg/kg	N	<1[13]

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
TPH UKCWG

Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol					
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20[13,110]	<10[13]	<20[13,110]	<20[110,13]	<10[13]
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<100[110]	<10	<20[110]	<20[110]	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20[110]	<10	<20[110]	<20[110]	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20[110]	<10	<20[110]	<20[110]	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20[110]	<10	<20[110]	<20[110]	<10
Methyl tert-Butyl Ether	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20[110]	<10	<20[110]	<20[110]	<10
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<200[110]	<100	<200[110]	<200[110]	<100
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<200[110]	<100	<200[110]	<200[110]	<100
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<200[110]	<100	<200[110]	<200[110]	<100
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GCxGC	1	mg/kg	M	**5[13]**	<1[13]	<1[13]	<1[13]	<1[13]
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GCxGC	1	mg/kg	M	**3[13]**	<1[13]	<1[13]	<1[13]	<1[13]
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GCxGC	1	mg/kg	M	<1[13]	<1[13]	<1[13]	<1[13]	<1[13]
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GCxGC	2	mg/kg	M	<2[13]	**3[13]**	<2[13]	<2[13]	<2[13]
Total Petroleum Hydrocarbons (Aliphatic) total	Calc		mg/kg	N	**8.0[13]**	**3.0[13]**	N.D.[13]	N.D.[13]	N.D.[13]
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<200[110]	<100	<200[110]	<200[110]	<100
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<200[110]	<100	<200[110]	<200[110]	<100
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<200[110]	<100	<200[110]	<200[110]	<100
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GCxGC	2	mg/kg	M	**4[13]**	<2[13]	<2[13]	<2[13]	<2[13]
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GCxGC	1	mg/kg	M	<1[13]	<1[13]	<1[13]	<1[13]	<1[13]
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GCxGC	1	mg/kg	M	<1[13]	**6[13]**	<1[13]	<1[13]	<1[13]
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GCxGC	1	mg/kg	M	<1[13]	**12[13]**	<1[13]	<1[13]	<1[13]
Total Petroleum Hydrocarbons (Aromatic) total	Calc		mg/kg	N	**4.0[13]**	**18[13]**	N.D.[13]	N.D.[13]	N.D.[13]
Total Petroleum Hydrocarbons (Aliphatic+Aromatic)	Calc		mg/kg	N	**12.0[13]**	**21.0[13]**	N.D.[13]	N.D.[13]	N.D.[13]

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Phenols (Speciated)

Concept Reference					**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
Customer Sample Reference					**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Test Sample					**AR**	**AR**	**AR**	**AR**	**AR**
Bottom Depth					**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
Top Depth					**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
Hole ID					**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Date Sampled					**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
AGS Type					**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference					**6**	**1**	**8**	**1**	**1**
Matrix Class					**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Resorcinol	HPLC	0.05	mg/kg	SM	<0.05	<0.05	<0.05	<0.05	<0.05
Catechol	HPLC	0.05	mg/kg	SN	-[NR]	-[NR]	-[NR]	-[NR]	-[NR]
Phenol	HPLC	0.1	mg/kg	SM	<0.1	<0.1	<0.1	<0.1	<0.1
Cresols	HPLC	0.05	mg/kg	SM	<0.05	<0.05	<0.05	<0.05	<0.05
Xylenols	HPLC	0.05	mg/kg	SM	<0.06	<0.06	<0.06	<0.06	<0.06
Naphthols	HPLC	0.05	mg/kg	SN	<0.05	<0.05	<0.05	<0.05	<0.05
Trimethyl phenol	HPLC	0.05	mg/kg	SM	<0.05	<0.05	<0.05	<0.05	<0.05
Total Phenols	HPLC	0.1	mg/kg	SN	-[NR]	-[NR]	-[NR]	-[NR]	-[NR]

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Semi-Volatile Organic Compounds (USEPA 625)

				Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
				Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroethyl) ether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chlorophenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroisopropyl) ether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-methyl phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
3/4-Methylphenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachloroethane	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Isophorone	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dimethylphenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroethoxy) methane	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
1,2,4-Trichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1(131)	<0.1(131)	<0.1(131)	<0.1(131)	<0.1(131)
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobutadiene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chloronaphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethyl phthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-Dinitrotoluene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
3-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzofuran	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrotoluene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Diethyl phthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chlorophenyl phenylether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Azobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Bromophenyl phenylether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Carbazole	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-butylphthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	**0.2**
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	**0.2**
Butyl benzylphthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-ethylhexyl)phthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-octylphthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

				Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
				Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	**0.1**
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Volatile Organic Compounds (USEPA 624) (MCERTS)

				Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
				Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Dichlorodifluoromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Chloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
Vinyl chloride monomer	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Bromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
Chloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Trichlorofluoromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Dichloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
Trans-1,2-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1-Dichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Cis-1,2-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
2,2-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
Chloroform	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Bromochloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1,1-Trichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Carbon tetrachloride	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,2-Dichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(13,110)	<10(13)	<20(13,110)	<20(110,13)	<10(13)
1,2-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Trichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Bromodichloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Dibromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Cis-1,3-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<100(110)	<10	<20(110)	<20(110)	<10
Trans-1,3-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1,2-Trichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,3-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Tetrachloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Chlorodibromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,2-dibromoethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Chlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1,1,2-Tetrachloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<10	<20(110)	<20(110)	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<10	<20(110)	<20(110)	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<10	<20(110)	<20(110)	<10
Styrene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
Bromoform	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Isopropyl benzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1,2,2-Tetrachloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
1,2,3-Trichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
n-Propylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Bromobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,3,5-Trimethylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Tert-Butylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,2,4-Trimethylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Sec-Butylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
p-Isopropyltoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
2-Chlorotoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
4-Chlorotoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
1,3-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,4-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,2-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Waste Acceptance Criteria

Concept Reference	**785646 008**
Customer Sample Reference	**BH22**
Test Sample	**10:1**
Bottom Depth	**3.50**
Top Depth	**3.00**
Hole ID	**BH22**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**8**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**6.2**
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**66**
Molybdenum (Dissolved)	ICP/MS (Filtered)	1	µg/l	N	**6**
Total Dissolved Solids	Grav	100	mg/l	N	**1100**
Phenols (Total-Mono)	Colorimetry	0.1	mg/l	U	<0.1
Dissolved Organic Carbon	OX/IR	1	mg/l	N	**2**
Electrical Conductivity	Probe	10	µS/cm	N	**1800**
Antimony (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**4**
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	<0.02
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**1**
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	**0.5**
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	<0.3
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<1
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<0.5
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	<2
Chloride	Discrete Analyser	1	mg/l	U	**500**
Fluoride	Discrete Analyser	0.05	mg/l	U	**0.12**
Sulphate	Discrete Analyser	0.5	mg/l	U	**78**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Special Waste Leachate Suite - Clause 15.7

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
pH	Probe			U	**7.75**	**7.74**	**7.66**
Sulphate	Discrete Analyser	0.5	mg/l	U	**100**	**78**	**96**
Chloride	Discrete Analyser	1	mg/l	U	**730**	**500**	**590**
Ammonia expressed as N	Discrete Analyser	0.05	mg/l	U	<0.05	**0.06**	**0.05**
Nitrate	Discrete Analyser	0.5	mg/l	U	**1.1**	**1.3**	**1.1**
Nitrite	Discrete Analyser	0.1	mg/l	U	<0.1	<0.1	<0.1
orthophosphate	Discrete Analyser	0.5	mg/l	N	<0.5	<0.5	<0.5
Cyanide (Total)	Colorimetry	0.05	mg/l	U	<0.05	<0.05	<0.05
Benzo(j)fluoranthene	GC/MS (SIR)	0.01	mg/l	N	<0.01(13)	<0.01(13)	<0.01(13)
Dibutyl tin	GC/MS (Deriv.)	0.01	µg/l	N	<0.01	<0.01	<0.01
Tributyl tin	GC/MS (Deriv.)	0.01	µg/l	N	<0.01	<0.01	<0.01

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Metals ICP MS

				Concept Reference	**785646 003**	**785646 008**	**785646 011**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**
				Test Sample	**10:1**	**10:1**	**10:1**
				Bottom Depth	**2.50**	**3.50**	**2.00**
				Top Depth	**1.50**	**3.00**	**1.50**
				Hole ID	**BH05**	**BH22**	**BH24A**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**8**	**8**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**2.2**	**6.2**	**4.0**
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	<0.02	<0.02	<0.02
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**1**	**1**	**1**
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<0.5	**0.5**	**0.6**
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<1	<1	**1**
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	<0.3	<0.3	**0.8**
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	<2	<2	<2
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05	<0.05	<0.05
Vanadium (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	**3**	**6**	**5**
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<0.5	<0.5	<0.5
Manganese (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**1**	**3**	**1**
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**42**	**66**	**38**
Beryllium (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05	<0.05	<0.05

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Metals ICP OES

				Concept Reference	**785646 003**	**785646 008**	**785646 011**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**
				Test Sample	**10:1**	**10:1**	**10:1**
				Bottom Depth	**2.50**	**3.50**	**2.00**
				Top Depth	**1.50**	**3.00**	**1.50**
				Hole ID	**BH05**	**BH22**	**BH24A**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**8**	**8**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Calcium	ICP/OES	0.1	mg/l	N	**37**	**24**	**28**
Sodium	ICP/OES	0.1	mg/l	N	**440**	**290**	**320**
Magnesium	ICP/OES	0.1	mg/l	N	**46**	**29**	**35**
Potassium	ICP/OES	0.1	mg/l	N	**19**	**14**	**16**
Aluminium	ICP/OES	0.02	mg/l	U	**0.08**	**0.10**	**0.10**
Chromium VI	Discrete Analyser	0.003	mg/l	U	<0.003	<0.003	<0.003
Boron	ICP/OES	0.01	mg/l	N	**0.30**	**0.22**	**0.25**
Iron	ICP/OES	0.01	mg/l	U	<0.01	<0.01	<0.01

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

PAH US EPA 16 (B and K split)

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Naphthalene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Acenaphthylene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Acenaphthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Fluorene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Phenanthrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Benzo(a)Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Chrysene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Benzo(b)fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Benzo(k)fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Benzo(a)Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Indeno(123-cd)Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Dibenzo(ah)Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Benzo(ghi)Perylene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Polyaromatic Hydrocarbons (Total)	GC/MS (SIR)	0.01	µg/l	U	<0.01	<0.01	<0.01

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

TPH (CWG)

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (Aliphatic) total	Calc		mg/l	N	N.D.[13]	N.D.[13]	N.D.[13]
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GCxGC (LV)	0.01	mg/l	N	**0.01[13]**	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	**0.01[13]**
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (Aromatic) total	Calc		mg/l	N	**0.01[13]**	N.D.[13]	**0.01[13]**
Total Petroleum Hydrocarbons (Aliphatic+Aromatic)	Calc		mg/l	N	**0.01[13]**	N.D.[13]	**0.01[13]**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Phenols (Speciated)

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Catechol	HPLC	0.005	mg/l	N	<0.005	<0.005	<0.005
Cresols	HPLC	0.005	mg/l	N	<0.005	<0.005	<0.005
Naphthols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01
Phenol	HPLC	0.005	mg/l	N	<0.005[13]	<0.005[13]	<0.005[13]
Resorcinol	HPLC	0.005	mg/l	N	<0.005	<0.005	<0.005
Total Phenols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01
Trimethyl phenols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01
Xylenols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Polychlorinated biphenyl BZ#81	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#77	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#105	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#114	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#118	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#123	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#126	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#156	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#157	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#167	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#169	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#189	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

SVOC (USEPA 625) (B and K split)

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Phenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Bis (2-chloroethyl) ether	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2-Chlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
1,3-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
1,4-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
1,2-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Bis (2-chloroisopropyl) ether	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2-methyl phenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
3/4-Methylphenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Hexachloroethane	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Nitrobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Isophorone	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2-Nitrophenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2,4-Dimethylphenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Bis (2-chloroethoxy) methane	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2,4-Dichlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
1,2,4-Trichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Naphthalene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
4-Chloroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Hexachlorobutadiene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
4-Chloro-3-methylphenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2-Methylnaphthalene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Hexachlorocyclopentadiene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2,4,6-Trichlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2,4,5-Trichlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2-Chloronaphthalene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2-Nitroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Dimethyl phthalate	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2,6-Dinitrotoluene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Acenaphthylene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Acenaphthene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
3-Nitroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Dibenzofuran	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2,4-Dinitrotoluene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Diethyl phthalate	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Fluorene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
4-Chlorophenyl phenylether	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
4-Nitroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Azobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
4-Bromophenyl phenylether	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Hexachlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Pentachlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Phenanthrene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Anthracene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Carbazole	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Di-n-butylphthalate	GC/MS (1l ext.)	1	µg/l	SU	<2	<2	<2
Fluoranthene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Pyrene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Butyl benzylphthalate	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Benzo(a)Anthracene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Chrysene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Bis (2-ethylhexyl)phthalate	GC/MS (1l ext.)	1	µg/l	SU	<5	<5	<5
Di-n-octylphthalate	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

SVOC (USEPA 625) (B and K split)

				Concept Reference	**785646 003**	**785646 008**	**785646 011**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**
				Test Sample	**10:1**	**10:1**	**10:1**
				Bottom Depth	**2.50**	**3.50**	**2.00**
				Top Depth	**1.50**	**3.00**	**1.50**
				Hole ID	**BH05**	**BH22**	**BH24A**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**8**	**8**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Benzo(a)Pyrene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Indeno(123-cd)Pyrene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Dibenzo(ah)Anthracene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Benzo(ghi)Perylene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Benzo(b)fluoranthene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Benzo(k)fluoranthene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Volatile Organic Compounds (USEPA 624)

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Dichlorodifluoromethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chloromethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Vinyl chloride monomer	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromomethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Trichlorofluoromethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Dichloromethane	GC/MS (Headspace)	50	µg/l	N	<50	<50	<50
Trans-1,2-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1-Dichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Cis-1,2-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
2,2-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chloroform	GC/MS (Headspace)	1	µg/l	U	**22**[13]	<1	**12**
Bromochloromethane	GC/MS (Headspace)	1	µg/l	U	**4**	<1	**2**
1,1,1-Trichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Carbon tetrachloride	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2-Dichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Benzene	GC/MS (Headspace)	1	µg/l	U	<1[13]	<1[13]	<1[13]
1,2-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,2-Trichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromodichloromethane	GC/MS (Headspace)	1	µg/l	U	**2**	<1	**3**
Dibromomethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Cis-1,3-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Toluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Trans-1,3-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,2-Trichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,3-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Tetrachloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chlorodibromomethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2-dibromoethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,1,2-Tetrachloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
EthylBenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Meta/Para-Xylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Ortho-Xylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Styrene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromoform	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Isopropyl benzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,2,2-Tetrachloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2,3-Trichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
n-Propylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,3,5-Trimethylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Tert-Butylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2,4-Trimethylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Sec-Butylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
p-Isopropyltoluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
2-Chlorotoluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
4-Chlorotoluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,3-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,4-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

				Concept Reference	**785646 001**	**785646 002**	**785646 004**	**785646 005**	**785646 006**
				Customer Sample Reference	**BH05**	**BH05**	**BH20**	**BH20**	**BH20**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**1.00**	**1.50**	**0.50**	**1.00**	**2.00**
				Top Depth	**0.00**	**1.00**	**0.00**	**0.50**	**1.50**
				Hole ID	**BH05**	**BH05**	**BH20**	**BH20**	**BH20**
				Date Sampled	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**	**12-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**4**	**1**	**4**	**8**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Arsenic (Total)	ICP/MS (Total)	1.0	mg/kg	N	**5.5**	**6.2**	**6.9**	**17**	**6.1**
Cadmium (Total)	ICP/MS (Total)	0.05	mg/kg	N	**0.11**	<0.05	**0.06**	**0.13**	<0.05
Chromium (Total)	ICP/MS (Total)	0.2	mg/kg	N	**26**	**36**	**60**	**95**	**25**
Copper (Total)	ICP/MS (Total)	0.1	mg/kg	N	**4.3**	**6.8**	**7.9**	**19**	**8.1**
Mercury	CVAFS	0.01	mg/kg	N	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (Total)	ICP/MS (Total)	0.2	mg/kg	N	**10**	**10**	**14**	**31**	**10**
Nickel (Total)	ICP/MS (Total)	0.2	mg/kg	N	**13**	**12**	**16**	**41**	**12**
Zinc	ICP/MS (HF)	1	mg/kg	N	**62**	**50**	**53**	**100**	**35**
Tributyl tin	GC/MS	10	µg/kg	N	<10	<10	<10	<10	<10
Dibutyl tin	GC/MS	10	µg/kg	N	<10	<10	<10	<10	<10
Total Organic Carbon	OX/IR	0.1	%	N	**0.4**	**0.3**	**0.5**	**0.5**	**0.5**
Dry solids @105C	Grav (1 Dec) (105 C)	0.1	%	N	**79**	**78**	**74**	**73**	**76**
Dry solids @40C	Grav (1 Dec) (40 C)	0.1	%	N	**77**	**77**	**74**	**80**	**76**
Gasoline Range Organics (C5-C10)	GC/MS (Headspace)	10	µg/kg	N	<10	<10	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C12-C16)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C16-C21)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C21-C35)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C40-C44)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Poly-Chlorinated Biphenyls (Total Tri-Hepta)	GC/MS (HR)	1.4	µg/kg	U	<1.4(3)	<1.4(3)	<1.4(3)	<1.4(3)	<1.4(3)

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

Concept Reference	**785646 009**	**785646 010**
Customer Sample Reference	**BH24A**	**BH24A**
Test Sample	**AR**	**AR**
Bottom Depth	**0.50**	**1.00**
Top Depth	**0.00**	**0.50**
Hole ID	**BH24A**	**BH24A**
Date Sampled	**11-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**4**

Determinand	Method	LOD	Units	Symbol		
Arsenic (Total)	ICP/MS (Total)	1.0	mg/kg	N	**6.9**	**8.0**
Cadmium (Total)	ICP/MS (Total)	0.05	mg/kg	N	**0.06**	<0.05
Chromium (Total)	ICP/MS (Total)	0.2	mg/kg	N	**30**	**34**
Copper (Total)	ICP/MS (Total)	0.1	mg/kg	N	**8.2**	**7.3**
Mercury	CVAFS	0.01	mg/kg	N	**0.01**	<0.01
Lead (Total)	ICP/MS (Total)	0.2	mg/kg	N	**12**	**13**
Nickel (Total)	ICP/MS (Total)	0.2	mg/kg	N	**14**	**17**
Zinc	ICP/MS (HF)	1	mg/kg	N	**49**	**44**
Tributyl tin	GC/MS	10	µg/kg	N	<10	<10
Dibutyl tin	GC/MS	10	µg/kg	N	<10	<10
Total Organic Carbon	OX/IR	0.1	%	N	**0.5**	**0.6**
Dry solids @105C	Grav (1 Dec) (105 C)	0.1	%	N	**79**	**88**
Dry solids @40C	Grav (1 Dec) (40 C)	0.1	%	N	**79**	**89**
Gasoline Range Organics (C5-C10)	GC/MS (Headspace)	10	µg/kg	N	<10	<10
Total Petroleum Hydrocarbons (C10-C12)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0
Total Petroleum Hydrocarbons (C12-C16)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0
Total Petroleum Hydrocarbons (C16-C21)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0
Total Petroleum Hydrocarbons (C21-C35)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0
Total Petroleum Hydrocarbons (C40-C44)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0
Poly-Chlorinated Biphenyls (Total Tri-Hepta)	GC/MS (HR)	1.4	µg/kg	U	<1.4[3]	<1.4[3]

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**785646 001**	**785646 002**	**785646 004**	**785646 005**	**785646 006**
				Customer Sample Reference	**BH05**	**BH05**	**BH20**	**BH20**	**BH20**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**1.00**	**1.50**	**0.50**	**1.00**	**2.00**
				Top Depth	**0.00**	**1.00**	**0.00**	**0.50**	**1.50**
				Hole ID	**BH05**	**BH05**	**BH20**	**BH20**	**BH20**
				Date Sampled	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**	**12-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**4**	**1**	**4**	**8**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Naphthalene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Acenaphthylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Acenaphthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Fluorene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Phenanthrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(a)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Chrysene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(a)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Indeno(123-cd)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(ghi)Perylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(b)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(k)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Dibenzo(ah)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Polyaromatic Hydrocarbons (Total)	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**785646 009**	**785646 010**
				Customer Sample Reference	**BH24A**	**BH24A**
				Test Sample	**AR**	**AR**
				Bottom Depth	**0.50**	**1.00**
				Top Depth	**0.00**	**0.50**
				Hole ID	**BH24A**	**BH24A**
				Date Sampled	**11-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**
				AGS Sample Reference	**1**	**4**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Naphthalene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Acenaphthylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Acenaphthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Fluorene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Phenanthrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(a)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Chrysene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(a)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Indeno(123-cd)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(ghi)Perylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(b)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(k)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Dibenzo(ah)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Polyaromatic Hydrocarbons (Total)	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**785646 001**	**785646 002**	**785646 004**	**785646 005**	**785646 006**
				Customer Sample Reference	**BH05**	**BH05**	**BH20**	**BH20**	**BH20**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**1.00**	**1.50**	**0.50**	**1.00**	**2.00**
				Top Depth	**0.00**	**1.00**	**0.00**	**0.50**	**1.50**
				Hole ID	**BH05**	**BH05**	**BH20**	**BH20**	**BH20**
				Date Sampled	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**	**12-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**4**	**1**	**4**	**8**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.10	µg/kg	U	<0.50[3]	<0.50[3]	<0.50[3]	<0.50[3]	<0.50[3]
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]
PCB EC7 (Sum)	Calc	0.7	µg/kg	N	<0.7[3]	<0.7[3]	<0.7[3]	<0.7[3]	<0.7[3]

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**785646 009**	**785646 010**
				Customer Sample Reference	**BH24A**	**BH24A**
				Test Sample	**AR**	**AR**
				Bottom Depth	**0.50**	**1.00**
				Top Depth	**0.00**	**0.50**
				Hole ID	**BH24A**	**BH24A**
				Date Sampled	**11-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**
				AGS Sample Reference	**1**	**4**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.10	µg/kg	U	<0.50[3]	<0.50[3]
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]
PCB EC7 (Sum)	Calc	0.7	µg/kg	N	<0.7[3]	<0.7[3]

Index to symbols used in 785646-2

Value	Description
A40	Assisted dried < 40C
10:1 S	Data for BS EN 12457-2 (10:1)
AR	As Received
10:1	Leachate to BS EN 12457-2 (10:1)
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
N.D.	Not Detected
13	Results have been blank corrected.
131	Result is outside of the scope of accreditation due to a QC Failure
110	LOD raised due to low internal standard recovery.
3	LOD Raised Due to Elevated Blank
NR	No Result
S	Analysis was subcontracted

M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Speciated Phenols (leachate) were transferred to Concept Braintree.
Speciated Phenols (soils) were subcontracted to Exova Jones.
SVOC (leachate) was subcontracted to Exova Jones.
Asbestos was subcontracted to REC Asbestos.
Please Note: The recoveries in several samples for PCB EC7 HR and PCB Who12 HR are low, however the S/N is >20:1, therefore the data is considered valid.
These samples have been analysed exceeding recommended holding times for pH, TPH, PAH, PCB, VOC and SVOC. It is possible therefore that the results provided may be compromised.

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

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Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 785882-1

Date of Report: 10-Jan-2019

Customer: Fugro GeoServices
Fugro House
Hithercroft Road
Wallingford
Oxfordshire
OX10 9RB

Customer Contact: Ms Karen Blackmore

Customer Job Reference: G180030U
Customer Purchase Order: 74376KB-WAL
Customer Site Reference: St Ola Pier, Scrabster
Date Job Received at Concept: 20-Nov-2018
Date Analysis Started: 28-Nov-2018
Date Analysis Completed: 10-Jan-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aleksandra Pacula
Senior Customer Service Advisor

[Redacted]

Issued by :
Aleksandra Pacula
Senior Customer Service Advisor

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
MCERTS Preparation

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Moisture @105C	T162	AR	0.1	%	**9.9**
Retained on 10mm sieve	T2	M40	0.1	%	<0.1

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Asbestos ID	T27	A40			N.D.
Cyanide(Total)	T4	AR	1	mg/kg	<1
Sulphur (total)	T6	A40	0.01	%	**0.39**
(Acid Soluble) SO4	T192	A40	0.01	%	**0.09**
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	**0.32**
pH	T7	A40			**8.3**
Moisture @105C	T162	AR	0.1	%	**9.9**
Soil Organic Matter	T287	A40	0.1	%	**0.7**
Dibutyl tin	T72	AR	0.01	mg/kg	<0.01
Benzo(j)fluoranthrene	T16	AR	0.1	mg/kg	<0.1
Tributyl tin	T72	AR	0.01	mg/kg	<0.01

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Heavy Metals(9)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Arsenic	T6	M40	2	mg/kg	**20**
Boron (water-soluble)	T6	A40	1	mg/kg	<1
Barium	T6	A40	1	mg/kg	**200**
Beryllium	T6	A40	2	mg/kg	<2
Cadmium	T6	M40	1	mg/kg	<1
Chromium	T6	M40	1	mg/kg	**39**
Chromium VI	T6	A40	1	mg/kg	<1
Copper	T6	M40	1	mg/kg	**27**
Iron	T6	A40	1	mg/kg	**1500**
Mercury	T6	M40	1	mg/kg	<1
Nickel	T6	M40	1	mg/kg	**42**
Lead	T6	M40	1	mg/kg	**23**
Selenium	T6	M40	3	mg/kg	<3
Vanadium	T6	M40	1	mg/kg	**48**
Zinc	T6	M40	1	mg/kg	**73**

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Naphthalene	T207	M105	0.1	mg/kg	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1
PAH(total)	T207	M105	0.1	mg/kg	<0.1

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Phenols (Speciated)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Resorcinol	T17	AR	0.05	mg/kg	<0.05
Catechol	T17	AR	0.05	mg/kg	<0.05
Phenol	T17	AR	0.1	mg/kg	<0.1
Cresols	T17	AR	0.05	mg/kg	<0.05
Xylenols	T17	AR	0.05	mg/kg	<0.06
Naphthols	T17	AR	0.05	mg/kg	<0.05
Trimethyl phenol	T17	AR	0.05	mg/kg	<0.05
Total Phenols	T17	AR	0.1	mg/kg	<0.2

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
TPH UKCWG

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Benzene	T209	M105	10	µg/kg	<10(13)
Toluene	T209	M105	10	µg/kg	<10
EthylBenzene	T209	M105	10	µg/kg	<10
M/P Xylene	T209	M105	10	µg/kg	<10
O Xylene	T209	M105	10	µg/kg	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10
TPH (C5-C6 aliphatic)	T209	M105	100	µg/kg	<100
TPH (C6-C8 aliphatic)	T209	M105	100	µg/kg	<100
TPH (C8-C10 aliphatic)	T209	M105	100	µg/kg	<100
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	<1(13)
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	**1(13)**
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	**1(13)**
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	**3(13)**
TPH (Aliphatic) total	T85	M105		mg/kg	**5.0(13)**
TPH (C6-C7 aromatic)	T209	M105	100	µg/kg	<100
TPH (C7-C8 aromatic)	T209	M105	100	µg/kg	<100
TPH (C8-C10 aromatic)	T209	M105	100	µg/kg	<100
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	<2(13)
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	<1(13)
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	<1(13)
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	<1(13)
TPH (Aromatic) total	T85	M105		mg/kg	N.D.(13)
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	**5.00(13)**

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil

Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
PCB BZ#77	T1	AR	0.05	µg/kg	<0.05
PCB BZ#81	T1	AR	0.05	µg/kg	<0.05
PCB BZ#105	T1	AR	0.05	µg/kg	<0.05
PCB BZ#114	T1	AR	0.05	µg/kg	<0.05
PCB BZ#118	T1	AR	0.05	µg/kg	<0.05
PCB BZ#123	T1	AR	0.05	µg/kg	<0.05
PCB BZ#126	T1	AR	0.05	µg/kg	<0.05
PCB BZ#156	T1	AR	0.05	µg/kg	<0.05
PCB BZ#157	T1	AR	0.05	µg/kg	<0.05
PCB BZ#167	T1	AR	0.05	µg/kg	<0.05
PCB BZ#169	T1	AR	0.05	µg/kg	<0.05
PCB BZ#189	T1	AR	0.05	µg/kg	<0.05

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Phenol	T207	M105	0.1	mg/kg	<0.1
Bis (2-chloroethyl) ether	T207	M105	0.1	mg/kg	<0.1
2-Chlorophenol	T207	M105	0.1	mg/kg	<0.1
1,3-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1
1,4-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1
1,2-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1
Bis (2-chloroisopropyl) ether	T207	M105	0.1	mg/kg	<0.1
2-methyl phenol	T207	M105	0.1	mg/kg	<0.1
3/4-Methylphenol	T207	M105	0.1	mg/kg	<0.1
Hexachloroethane	T207	M105	0.1	mg/kg	<0.1
Nitrobenzene	T207	M105	0.1	mg/kg	<0.1
Isophorone	T207	M105	0.1	mg/kg	<0.1
2-Nitrophenol	T207	M105	0.1	mg/kg	<0.1
2,4-Dimethylphenol	T207	M105	0.1	mg/kg	<0.1
Bis (2-chloroethoxy) methane	T207	M105	0.1	mg/kg	<0.1(131)
2,4-Dichlorophenol	T207	M105	0.1	mg/kg	<0.1
1,2,4-Trichlorobenzene	T207	M105	0.1	mg/kg	<0.1(131)
Naphthalene	T207	M105	0.1	mg/kg	<0.1
4-Chloroaniline	T207	M105	0.1	mg/kg	<0.1
Hexachlorobutadiene	T207	M105	0.1	mg/kg	<0.1
4-Chloro-3-methylphenol	T207	M105	0.1	mg/kg	<0.1
2-Methylnaphthalene	T207	M105	0.1	mg/kg	<0.1
Hexachlorocyclopentadiene	T207	M105	0.1	mg/kg	<0.1
2,4,6-Trichlorophenol	T207	M105	0.1	mg/kg	<0.1
2,4,5-Trichlorophenol	T207	M105	0.1	mg/kg	<0.1
2-Chloronaphthalene	T207	M105	0.1	mg/kg	<0.1
2-Nitroaniline	T207	M105	0.1	mg/kg	<0.1
Dimethyl phthalate	T207	M105	0.1	mg/kg	<0.1
2,6-Dinitrotoluene	T207	M105	0.1	mg/kg	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1
3-Nitroaniline	T207	M105	0.1	mg/kg	<0.1
Dibenzofuran	T207	M105	0.1	mg/kg	<0.1
2,4-Dinitrotoluene	T207	M105	0.1	mg/kg	<0.1
Diethyl phthalate	T207	M105	0.1	mg/kg	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1
4-Chlorophenyl phenylether	T207	M105	0.1	mg/kg	<0.1
4-Nitroaniline	T207	M105	0.1	mg/kg	<0.1
Azobenzene	T207	M105	0.1	mg/kg	<0.1
4-Bromophenyl phenylether	T207	M105	0.1	mg/kg	<0.1
Hexachlorobenzene	T207	M105	0.1	mg/kg	<0.1
Pentachlorophenol	T207	M105	0.1	mg/kg	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1
Carbazole	T207	M105	0.1	mg/kg	<0.1
Di-n-butylphthalate	T207	M105	0.1	mg/kg	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1
Butyl benzylphthalate	T207	M105	0.1	mg/kg	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1
Bis (2-ethylhexyl)phthalate	T207	M105	0.1	mg/kg	<0.1
Di-n-octylphthalate	T207	M105	0.1	mg/kg	<0.1

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Volatile Organic Compounds (USEPA 624) (MCERTS)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Dichlorodifluoromethane	T209	M105	50	µg/kg	<50
Chloromethane	T209	M105	50	µg/kg	<50
Vinyl chloride	T209	M105	50	µg/kg	<50
Bromomethane	T209	M105	50	µg/kg	<50
Chloroethane	T209	M105	50	µg/kg	<50
Trichlorofluoromethane	T209	M105	50	µg/kg	<50
1,1-Dichloroethylene	T209	M105	50	µg/kg	<50
Dichloromethane	T209	M105	50	µg/kg	<50
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	<50
1,1-Dichloroethane	T209	M105	50	µg/kg	<50
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	<50
2,2-Dichloropropane	T209	M105	50	µg/kg	<50
Chloroform	T209	M105	50	µg/kg	<50
Bromochloromethane	T209	M105	50	µg/kg	<50
1,1,1-Trichloroethane	T209	M105	50	µg/kg	<50
1,1-Dichloropropene	T209	M105	50	µg/kg	<50
Carbon tetrachloride	T209	M105	50	µg/kg	<50
1,2-Dichloroethane	T209	M105	50	µg/kg	<50
Benzene	T209	M105	10	µg/kg	<10(13)
1,2-Dichloropropane	T209	M105	50	µg/kg	<50
Trichloroethene	T209	M105	50	µg/kg	<50
Bromodichloromethane	T209	M105	50	µg/kg	<50
Dibromomethane	T209	M105	50	µg/kg	<50
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	<50
Toluene	T209	M105	10	µg/kg	<10
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	<50
1,1,2-Trichloroethane	T209	M105	50	µg/kg	<50
1,3-Dichloropropane	T209	M105	50	µg/kg	<50
Tetrachloroethene	T209	M105	50	µg/kg	<50
Chlorodibromomethane	T209	M105	50	µg/kg	<50
1,2-dibromoethane	T209	M105	50	µg/kg	<50
Chlorobenzene	T209	M105	50	µg/kg	<50
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	<50
EthylBenzene	T209	M105	10	µg/kg	<10
M/P Xylene	T209	M105	10	µg/kg	<10
O Xylene	T209	M105	10	µg/kg	<10
Styrene	T209	M105	50	µg/kg	<50
Bromoform	T209	M105	50	µg/kg	<50
Isopropyl benzene	T209	M105	50	µg/kg	<50
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	<50
1,2,3-Trichloropropane	T209	M105	50	µg/kg	<50
n-Propylbenzene	T209	M105	50	µg/kg	<50
Bromobenzene	T209	M105	50	µg/kg	<50
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	<50
T-Butylbenzene	T209	M105	50	µg/kg	<50
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	<50
S-Butylbenzene	T209	M105	50	µg/kg	<50
p-Isopropyltoluene	T209	M105	50	µg/kg	<50
2-Chlorotoluene	T209	M105	50	µg/kg	<50
4-Chlorotoluene	T209	M105	50	µg/kg	<50
1,3-Dichlorobenzene	T209	M105	50	µg/kg	<50
1,4-Dichlorobenzene	T209	M105	50	µg/kg	<50
1,2-Dichlorobenzene	T209	M105	50	µg/kg	<50

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**785882 001**	**785882 002**	**785882 007**
				Customer Sample Reference	**BH30**	**BH30**	**Method Blank**
				Top Depth	**0.10**	**0.60**	
				Depth	**0.10**	**0.60**	
				Bottom Depth	**0.50**	**1.15**	
				Hole ID	**BH30**	**BH30**	
				Date Sampled	**16-NOV-2018**	**16-NOV-2018**	
				AGS Type	**ES**	**ES**	
				AGS Sample Reference	**2**	**4**	
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Naphthalene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Acenaphthylene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Acenaphthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Fluorene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Phenanthrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(a)Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Chrysene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(a)Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Indeno(123-cd)Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(ghi)Perylene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(b)fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(k)fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Dibenzo(ah)Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
PAH(total)	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**785882 001**	**785882 002**	**785882 007**
				Customer Sample Reference	**BH30**	**BH30**	**Method Blank**
				Top Depth	**0.10**	**0.60**	
				Depth	**0.10**	**0.60**	
				Bottom Depth	**0.50**	**1.15**	
				Hole ID	**BH30**	**BH30**	
				Date Sampled	**16-NOV-2018**	**16-NOV-2018**	
				AGS Type	**ES**	**ES**	
				AGS Sample Reference	**2**	**4**	
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
PCB BZ#28	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#52	T1	AR	0.10	µg/kg	<0.10	<0.10	<0.10
PCB BZ#101	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#118	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#153	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#138	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#180	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB EC7 (Sum)	T85	AR	0.7	µg/kg	<0.7	<0.7	<0.7

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

Concept Reference	**785882 001**	**785882 002**
Customer Sample Reference	**BH30**	**BH30**
Top Depth	**0.10**	**0.60**
Depth	**0.10**	**0.60**
Bottom Depth	**0.50**	**1.15**
Hole ID	**BH30**	**BH30**
Date Sampled	**16-NOV-2018**	**16-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**2**	**4**

Determinand	Method	Test Sample	LOD	Units		
As (Total)	T301	AR	1.0	mg/kg	**20**	**17**
Cd (Total)	T301	AR	0.05	mg/kg	**0.14**	**0.16**
Cr (Total)	T301	AR	0.2	mg/kg	**55**	**57**
Cu (Total)	T301	AR	0.1	mg/kg	**21**	**20**
Mercury	T355	AR	0.01	mg/kg	<0.01	<0.01
Pb (Total)	T301	AR	0.2	mg/kg	**25**	**25**
Ni (Total)	T301	AR	0.2	mg/kg	**34**	**37**
Zinc	T740	AR	1	mg/kg	**77**	**72**
Tributyl tin	T16	AR	10	µg/kg	<10	<10
Dibutyl tin	T16	AR	10	µg/kg	<10	<10
Total Organic Carbon	T21	AR	0.1	%	<0.1	<0.1
Dry solids @40C	T277	AR	0.1	%	**90**	**91**
Dry solids @105C	T162	AR	0.1	%	**90**	**90**
GRO (C5-C10)	T54	AR	10	µg/kg	<10	<10
TPH (C10-C12)	T250	AR	0.1	mg/kg	<1.0	<1.0
TPH (C12-C16)	T250	AR	0.1	mg/kg	<1.0	<1.0
TPH (C16-C21)	T250	AR	0.1	mg/kg	<1.0	<1.0
TPH (C21-C35)	T250	AR	0.1	mg/kg	<1.0	<1.0
TPH (C40-C44)	T250	AR	0.1	mg/kg	<1.0	<1.0
PCB (Total Tri-Hepta)	T1	AR	1.4	µg/kg	<1.4	<1.4

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Blank Suite

Concept Reference	**785882 007**
Customer Sample Reference	**Method Blank**

Determinand	Method	Test Sample	LOD	Units	
As (Total)	T301	AR	1.0	mg/kg	<1.0
Cd (Total)	T301	AR	0.05	mg/kg	<0.05
Cr (Total)	T301	AR	0.2	mg/kg	<0.2
Cu (Total)	T301	AR	0.1	mg/kg	<0.1
Mercury	T355	AR	0.01	mg/kg	<0.01
Pb (Total)	T301	AR	0.2	mg/kg	<0.2
Ni (Total)	T301	AR	0.2	mg/kg	<0.2
Zinc	T740	AR	1	mg/kg	<1
Tributyl tin	T16	AR	10	µg/kg	<10
Dibutyl tin	T16	AR	10	µg/kg	<10
Total Organic Carbon	T21	AR	0.1	%	<0.1
Dry solids @40C	T277	AR	0.1	%	(NR)
Dry solids @105C	T162	AR	0.1	%	(NR)
GRO (C5-C10)	T54	AR	10	µg/kg	<10
TPH (C10-C12)	T250	AR	0.1	mg/kg	<1.0
TPH (C12-C16)	T250	AR	0.1	mg/kg	<1.0
TPH (C16-C21)	T250	AR	0.1	mg/kg	<1.0
TPH (C21-C35)	T250	AR	0.1	mg/kg	<1.0
TPH (C40-C44)	T250	AR	0.1	mg/kg	<1.0
PCB (Total Tri-Hepta)	T1	AR	1.4	µg/kg	<1.4

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Recovery Suite

				Concept Reference	**785882 006**
				Customer Sample Reference	**Matrix Spike**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**	
Acenaphthene Recovery	T434	AR	1	%	**98**
Acenaphthylene Recovery	T434	AR	1	%	**100**
Anthracene Recovery	T434	AR	1	%	**100**
Benzo(a)Anthracene Recovery	T434	AR	1	%	**100**
Benzo(a)Pyrene Recovery	T434	AR	1	%	**100**
Benzo(b)fluoranthene Recovery	T434	AR	1	%	**96**
Benzo(b/k)Fluoranthene Recovery	T434	AR	1	%	**100**
Benzo(ghi)Perylene Recovery	T434	AR	1	%	**100**
Benzo(k)fluoranthene Recovery	T434	AR	1	%	**100**
Phenanthrene Recovery	T434	AR	1	%	**100**
Dibenzo(ah)Anthracene Recovery	T434	AR	1	%	**100**
Fluoranthene Recovery	T434	AR	1	%	**100**
Fluorene Recovery	T434	AR	1	%	**100**
Indeno(123-cd)Pyrene Recovery	T434	AR	1	%	**98**
Naphthalene Recovery	T434	AR	1	%	**98**
As Recovery	T750	AR	1	%	**100**
Cd Recovery	T750	AR	1	%	**100**
Cr Recovery	T750	AR	1	%	**96**
Cu Recovery	T750	AR	1	%	**98**
Hg Recovery	T751	AR	1	%	**150**
Ni Recovery	T750	AR	1	%	**100**
Pb Recovery	T750	AR	1	%	**97**
Zn Recovery	T750	AR	1	%	**96**
PCB (Total Tri-Hepta) Recovery	T434	AR	1	%	**100**
PCB BZ#101 Recovery	T434	AR	1	%	**100**
PCB BZ#118 Recovery	T434	AR	1	%	**110**
PCB BZ#138 Recovery	T434	AR	1	%	**96**
PCB BZ#153 Recovery	T434	AR	1	%	**98**
PCB BZ#180 Recovery	T434	AR	1	%	**110**
PCB BZ#28 Recovery	T434	AR	1	%	**110**
PCB BZ#52 Recovery	T434	AR	1	%	**100**
Dibutyl tin Recovery	T429	AR	1	%	**99**
Tributyl tin Recovery	T429	AR	1	%	**120**
Total Organic Carbon	T849	AR	1	%	**12**

Index to symbols used in 785882-1

Value	Description
AR	As Received
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
A40	Assisted dried < 40C
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
N.D.	Not Detected
131	Result is outside of the scope of accreditation due to a QC Failure
13	Results have been blank corrected.
NR	No Result
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Phenols Speciated (soil) testing was subcontracted to Exova Jones.
These samples have been analysed exceeding recommended holding times for pH, TPH and PAH. It is possible therefore that the results provided may be compromised.
Asbestos testing was subcontracted to REC Asbestos.

Method Index

Value	Description
T17	HPLC
T192	HCl Extraction/ICP/OES (TRL 447 T2)
T277	Grav (1 Dec) (40 C)
T16	GC/MS
T750	ICP/MS (Recovery)
T909	GCxGC
T6	ICP/OES
T1	GC/MS (HR)
T7	Probe
T740	ICP/MS (HF)
T849	OX/IR (Recovery)
T301	ICP/MS (Total)
T207	GC/MS (MCERTS)
T429	GC/MS (Recovery)
T434	GC/MS (HR) (Recovery)
T250	GC/FID (LD)
T355	CVAFS
T4	Colorimetry
T27	PLM
T751	CVAFS (Recovery)
T287	Calc TOC/0.58
T21	OX/IR
T85	Calc
T209	GC/MS (Head Space)(MCERTS)
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T2	Grav
T72	GC/MS (Deriv.)
T54	GC/MS (Headspace)
T162	Grav (1 Dec) (105 C)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Naphthalene	T1	AR	2.0	µg/kg	N	001-002,007
Acenaphthylene	T1	AR	2.0	µg/kg	N	001-002,007
Acenaphthene	T1	AR	2.0	µg/kg	N	001-002,007
Fluorene	T1	AR	2.0	µg/kg	N	001-002,007
Phenanthrene	T1	AR	2.0	µg/kg	N	001-002,007
Anthracene	T1	AR	2.0	µg/kg	N	001-002,007
Fluoranthene	T1	AR	2.0	µg/kg	N	001-002,007
Pyrene	T1	AR	2.0	µg/kg	N	001-002,007
Benzo(a)Anthracene	T1	AR	2.0	µg/kg	N	001-002,007
Chrysene	T1	AR	2.0	µg/kg	N	001-002,007
Benzo(a)Pyrene	T1	AR	2.0	µg/kg	N	001-002,007
Indeno(123-cd)Pyrene	T1	AR	2.0	µg/kg	N	001-002,007
Benzo(ghi)Perylene	T1	AR	2.0	µg/kg	N	001-002,007
Benzo(b)fluoranthene	T1	AR	2.0	µg/kg	N	001-002,007
Benzo(k)fluoranthene	T1	AR	2.0	µg/kg	N	001-002,007
Dibenzo(ah)Anthracene	T1	AR	2.0	µg/kg	N	001-002,007
PAH(total)	T1	AR	2.0	µg/kg	N	001-002,007
PCB BZ#28	T1	AR	0.1	µg/kg	U	001-002,007
PCB BZ#52	T1	AR	0.10	µg/kg	U	001-002,007
PCB BZ#101	T1	AR	0.1	µg/kg	U	001-002,007
PCB BZ#118	T1	AR	0.1	µg/kg	U	001-002,007
PCB BZ#153	T1	AR	0.1	µg/kg	U	001-002,007
PCB BZ#138	T1	AR	0.1	µg/kg	U	001-002,007
PCB BZ#180	T1	AR	0.1	µg/kg	U	001-002,007
PCB EC7 (Sum)	T85	AR	0.7	µg/kg	N	001-002,007
Retained on 10mm sieve	T2	M40	0.1	%	N	005
As (Total)	T301	AR	1.0	mg/kg	N	001-002,007
Cd (Total)	T301	AR	0.05	mg/kg	N	001-002,007
Cr (Total)	T301	AR	0.2	mg/kg	N	001-002,007
Cu (Total)	T301	AR	0.1	mg/kg	N	001-002,007
Mercury	T355	AR	0.01	mg/kg	N	001-002,007
Pb (Total)	T301	AR	0.2	mg/kg	N	001-002,007
Ni (Total)	T301	AR	0.2	mg/kg	N	001-002,007

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Zinc	T740	AR	1	mg/kg	N	001-002,007
Tributyl tin	T16	AR	10	µg/kg	N	001-002,007
Dibutyl tin	T16	AR	10	µg/kg	N	001-002,007
Total Organic Carbon	T21	AR	0.1	%	N	001-002,007
Dry solids @40C	T277	AR	0.1	%	N	001-002,007
Dry solids @105C	T162	AR	0.1	%	N	001-002,007
GRO (C5-C10)	T54	AR	10	µg/kg	N	001-002,007
TPH (C10-C12)	T250	AR	0.1	mg/kg	N	001-002,007
TPH (C12-C16)	T250	AR	0.1	mg/kg	N	001-002,007
TPH (C16-C21)	T250	AR	0.1	mg/kg	N	001-002,007
TPH (C21-C35)	T250	AR	0.1	mg/kg	N	001-002,007
TPH (C40-C44)	T250	AR	0.1	mg/kg	N	001-002,007
PCB (Total Tri-Hepta)	T1	AR	1.4	µg/kg	U	001-002,007
Asbestos ID	T27	A40			SU	005
Cyanide(Total)	T4	AR	1	mg/kg	M	005
Sulphur (total)	T6	A40	0.01	%	M	005
(Acid Soluble) SO4	T192	A40	0.01	%	M	005
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	M	005
pH	T7	A40			M	005
Moisture @105C	T162	AR	0.1	%	N	005
Soil Organic Matter	T287	A40	0.1	%	N	005
Benzo(j)fluoranthrene	T16	AR	0.1	mg/kg	N	005
Dibutyl tin	T72	AR	0.01	mg/kg	N	005
Tributyl tin	T72	AR	0.01	mg/kg	N	005
Resorcinol	T17	AR	0.05	mg/kg	SM	005
Catechol	T17	AR	0.05	mg/kg	SN	005
Phenol	T17	AR	0.1	mg/kg	SM	005
Cresols	T17	AR	0.05	mg/kg	SM	005
Xylenols	T17	AR	0.05	mg/kg	SM	005
Naphthols	T17	AR	0.05	mg/kg	SN	005
Trimethyl phenol	T17	AR	0.05	mg/kg	SM	005
Total Phenols	T17	AR	0.1	mg/kg	SN	005
Arsenic	T6	M40	2	mg/kg	M	005
Boron (water-soluble)	T6	A40	1	mg/kg	N	005
Barium	T6	A40	1	mg/kg	U	005
Beryllium	T6	A40	2	mg/kg	U	005
Cadmium	T6	M40	1	mg/kg	M	005
Chromium	T6	M40	1	mg/kg	M	005
Chromium VI	T6	A40	1	mg/kg	N	005
Copper	T6	M40	1	mg/kg	M	005
Iron	T6	A40	1	mg/kg	U	005
Mercury	T6	M40	1	mg/kg	M	005
Nickel	T6	M40	1	mg/kg	M	005
Lead	T6	M40	1	mg/kg	M	005
Selenium	T6	M40	3	mg/kg	M	005
Vanadium	T6	M40	1	mg/kg	M	005
Zinc	T6	M40	1	mg/kg	M	005
Acenaphthene	T207	M105	0.1	mg/kg	M	005
Phenanthrene	T207	M105	0.1	mg/kg	M	005
Anthracene	T207	M105	0.1	mg/kg	U	005
Pyrene	T207	M105	0.1	mg/kg	M	005
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	005
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	005
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	005
PAH(total)	T207	M105	0.1	mg/kg	U	005
PCB BZ#77	T1	AR	0.05	µg/kg	U	005
PCB BZ#81	T1	AR	0.05	µg/kg	U	005
PCB BZ#105	T1	AR	0.05	µg/kg	U	005
PCB BZ#114	T1	AR	0.05	µg/kg	U	005
PCB BZ#118	T1	AR	0.05	µg/kg	U	005
PCB BZ#123	T1	AR	0.05	µg/kg	U	005
PCB BZ#126	T1	AR	0.05	µg/kg	U	005
PCB BZ#156	T1	AR	0.05	µg/kg	U	005
PCB BZ#157	T1	AR	0.05	µg/kg	U	005
PCB BZ#167	T1	AR	0.05	µg/kg	U	005
PCB BZ#169	T1	AR	0.05	µg/kg	U	005
PCB BZ#189	T1	AR	0.05	µg/kg	U	005
Phenol	T207	M105	0.1	mg/kg	M	005
Bis (2-chloroethyl) ether	T207	M105	0.1	mg/kg	M	005
2-Chlorophenol	T207	M105	0.1	mg/kg	M	005

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
1,3-Dichlorobenzene	T207	M105	0.1	mg/kg	M	005
1,4-Dichlorobenzene	T207	M105	0.1	mg/kg	M	005
1,2-Dichlorobenzene	T207	M105	0.1	mg/kg	M	005
Bis (2-chloroisopropyl) ether	T207	M105	0.1	mg/kg	M	005
2-methyl phenol	T207	M105	0.1	mg/kg	M	005
3/4-Methylphenol	T207	M105	0.1	mg/kg	M	005
Hexachloroethane	T207	M105	0.1	mg/kg	U	005
Nitrobenzene	T207	M105	0.1	mg/kg	M	005
Isophorone	T207	M105	0.1	mg/kg	U	005
2-Nitrophenol	T207	M105	0.1	mg/kg	U	005
2,4-Dimethylphenol	T207	M105	0.1	mg/kg	U	005
Bis (2-chloroethoxy) methane	T207	M105	0.1	mg/kg	M	005
2,4-Dichlorophenol	T207	M105	0.1	mg/kg	U	005
1,2,4-Trichlorobenzene	T207	M105	0.1	mg/kg	M	005
Naphthalene	T207	M105	0.1	mg/kg	M	005
4-Chloroaniline	T207	M105	0.1	mg/kg	U	005
Hexachlorobutadiene	T207	M105	0.1	mg/kg	M	005
4-Chloro-3-methylphenol	T207	M105	0.1	mg/kg	M	005
2-Methylnaphthalene	T207	M105	0.1	mg/kg	M	005
Hexachlorocyclopentadiene	T207	M105	0.1	mg/kg	U	005
2,4,6-Trichlorophenol	T207	M105	0.1	mg/kg	U	005
2,4,5-Trichlorophenol	T207	M105	0.1	mg/kg	U	005
2-Chloronaphthalene	T207	M105	0.1	mg/kg	M	005
2-Nitroaniline	T207	M105	0.1	mg/kg	M	005
Dimethyl phthalate	T207	M105	0.1	mg/kg	U	005
2,6-Dinitrotoluene	T207	M105	0.1	mg/kg	U	005
Acenaphthylene	T207	M105	0.1	mg/kg	U	005
3-Nitroaniline	T207	M105	0.1	mg/kg	U	005
Dibenzofuran	T207	M105	0.1	mg/kg	M	005
2,4-Dinitrotoluene	T207	M105	0.1	mg/kg	M	005
Diethyl phthalate	T207	M105	0.1	mg/kg	U	005
Fluorene	T207	M105	0.1	mg/kg	M	005
4-Chlorophenyl phenylether	T207	M105	0.1	mg/kg	M	005
4-Nitroaniline	T207	M105	0.1	mg/kg	U	005
Azobenzene	T207	M105	0.1	mg/kg	M	005
4-Bromophenyl phenylether	T207	M105	0.1	mg/kg	M	005
Hexachlorobenzene	T207	M105	0.1	mg/kg	M	005
Pentachlorophenol	T207	M105	0.1	mg/kg	U	005
Carbazole	T207	M105	0.1	mg/kg	U	005
Di-n-butylphthalate	T207	M105	0.1	mg/kg	M	005
Fluoranthene	T207	M105	0.1	mg/kg	M	005
Butyl benzylphthalate	T207	M105	0.1	mg/kg	U	005
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	005
Chrysene	T207	M105	0.1	mg/kg	M	005
Bis (2-ethylhexyl)phthalate	T207	M105	0.1	mg/kg	M	005
Di-n-octylphthalate	T207	M105	0.1	mg/kg	M	005
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	M	005
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	005
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	005
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	005
Dichlorodifluoromethane	T209	M105	50	µg/kg	M	005
Chloromethane	T209	M105	50	µg/kg	U	005
Vinyl chloride	T209	M105	50	µg/kg	M	005
Bromomethane	T209	M105	50	µg/kg	U	005
Chloroethane	T209	M105	50	µg/kg	M	005
Trichlorofluoromethane	T209	M105	50	µg/kg	M	005
1,1-Dichloroethylene	T209	M105	50	µg/kg	M	005
Dichloromethane	T209	M105	50	µg/kg	U	005
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	M	005
1,1-Dichloroethane	T209	M105	50	µg/kg	M	005
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	M	005
2,2-Dichloropropane	T209	M105	50	µg/kg	U	005
Chloroform	T209	M105	50	µg/kg	M	005
Bromochloromethane	T209	M105	50	µg/kg	M	005
1,1,1-Trichloroethane	T209	M105	50	µg/kg	M	005
1,1-Dichloropropene	T209	M105	50	µg/kg	M	005
Carbon tetrachloride	T209	M105	50	µg/kg	M	005
1,2-Dichloroethane	T209	M105	50	µg/kg	M	005
1,2-Dichloropropane	T209	M105	50	µg/kg	M	005
Trichloroethene	T209	M105	50	µg/kg	M	005

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Bromodichloromethane	T209	M105	50	µg/kg	M	005
Dibromomethane	T209	M105	50	µg/kg	M	005
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	M	005
Toluene	T209	M105	10	µg/kg	M	005
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	M	005
1,1,2-Trichloroethane	T209	M105	50	µg/kg	M	005
1,3-Dichloropropane	T209	M105	50	µg/kg	M	005
Tetrachloroethene	T209	M105	50	µg/kg	M	005
Chlorodibromomethane	T209	M105	50	µg/kg	M	005
1,2-dibromoethane	T209	M105	50	µg/kg	M	005
Chlorobenzene	T209	M105	50	µg/kg	M	005
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	M	005
O Xylene	T209	M105	10	µg/kg	M	005
Styrene	T209	M105	50	µg/kg	U	005
Bromoform	T209	M105	50	µg/kg	M	005
Isopropyl benzene	T209	M105	50	µg/kg	M	005
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	U	005
1,2,3-Trichloropropane	T209	M105	50	µg/kg	U	005
n-Propylbenzene	T209	M105	50	µg/kg	M	005
Bromobenzene	T209	M105	50	µg/kg	M	005
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	M	005
T-Butylbenzene	T209	M105	50	µg/kg	M	005
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	M	005
S-Butylbenzene	T209	M105	50	µg/kg	M	005
p-Isopropyltoluene	T209	M105	50	µg/kg	M	005
2-Chlorotoluene	T209	M105	50	µg/kg	U	005
4-Chlorotoluene	T209	M105	50	µg/kg	U	005
1,3-Dichlorobenzene	T209	M105	50	µg/kg	M	005
1,4-Dichlorobenzene	T209	M105	50	µg/kg	M	005
1,2-Dichlorobenzene	T209	M105	50	µg/kg	M	005
Benzene	T209	M105	10	µg/kg	M	005
EthylBenzene	T209	M105	10	µg/kg	M	005
M/P Xylene	T209	M105	10	µg/kg	M	005
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	005
TPH (C5-C6 aliphatic)	T209	M105	100	µg/kg	N	005
TPH (C6-C8 aliphatic)	T209	M105	100	µg/kg	N	005
TPH (C8-C10 aliphatic)	T209	M105	100	µg/kg	N	005
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	M	005
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	M	005
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	M	005
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	M	005
TPH (Aliphatic) total	T85	M105		mg/kg	N	005
TPH (C6-C7 aromatic)	T209	M105	100	µg/kg	N	005
TPH (C7-C8 aromatic)	T209	M105	100	µg/kg	N	005
TPH (C8-C10 aromatic)	T209	M105	100	µg/kg	N	005
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	M	005
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	M	005
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	M	005
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	M	005
TPH (Aromatic) total	T85	M105		mg/kg	N	005
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N	005
Acenaphthene Recovery	T434	AR	1	%	N	006
Acenaphthylene Recovery	T434	AR	1	%	N	006
Anthracene Recovery	T434	AR	1	%	N	006
Benzo(a)Anthracene Recovery	T434	AR	1	%	N	006
Benzo(a)Pyrene Recovery	T434	AR	1	%	N	006
Benzo(b)fluoranthene Recovery	T434	AR	1	%	N	006
Benzo(b/k)Fluoranthene Recovery	T434	AR	1	%	N	006
Benzo(ghi)Perylene Recovery	T434	AR	1	%	N	006
Benzo(k)fluoranthene Recovery	T434	AR	1	%	N	006
Phenanthrene Recovery	T434	AR	1	%	N	006
Dibenzo(ah)Anthracene Recovery	T434	AR	1	%	N	006
Fluoranthene Recovery	T434	AR	1	%	N	006
Fluorene Recovery	T434	AR	1	%	N	006
Indeno(123-cd)Pyrene Recovery	T434	AR	1	%	N	006
Naphthalene Recovery	T434	AR	1	%	N	006
As Recovery	T750	AR	1	%	N	006
Cd Recovery	T750	AR	1	%	N	006
Cr Recovery	T750	AR	1	%	N	006
Cu Recovery	T750	AR	1	%	N	006

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Hg Recovery	T751	AR	1	%	N	006
Ni Recovery	T750	AR	1	%	N	006
Pb Recovery	T750	AR	1	%	N	006
Zn Recovery	T750	AR	1	%	N	006
PCB (Total Tri-Hepta) Recovery	T434	AR	1	%	N	006
PCB BZ#101 Recovery	T434	AR	1	%	N	006
PCB BZ#118 Recovery	T434	AR	1	%	N	006
PCB BZ#138 Recovery	T434	AR	1	%	N	006
PCB BZ#153 Recovery	T434	AR	1	%	N	006
PCB BZ#180 Recovery	T434	AR	1	%	N	006
PCB BZ#28 Recovery	T434	AR	1	%	N	006
PCB BZ#52 Recovery	T434	AR	1	%	N	006
Dibutyl tin Recovery	T429	AR	1	%	N	006
Tributyl tin Recovery	T429	AR	1	%	N	006
Total Organic Carbon	T849	AR	1	%	N	006

Appendix 8.3 Whiteford Ground Investigation Report

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St Ola Pier Refurbishment Site Investigation on Pier, Scrabster, Thurso, Scotland

Report No: 1906-18 DRAFT

14th August 2018

This document has been prepared by Whiteford Geoservices Ltd on behalf of

RPS (Consulting Engineers)

and

Scrabster Harbour Trust

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CONTENTS

1	**INTRODUCTION**	**1**
2	**SITE AND GEOLOGY**	**1**
	2.1 The Site	
	2.2 Published Geology	
3	**FIELDWORK**	**4**
	3.1 General	
	3.2 Exploratory Holes	
	3.3 In-situ Testing	
	3.4 Instrumentation and Monitoring	
	3.5 Sampling Regime	
4	**LABORATORY TESTING**	**6**
	4.1 Geotechnical Testing	
	4.2 Environmental Testing	
5	**GROUND CONDITIONS**	**8**
	5.1 Strata	
	5.2 Groundwater	
6	**DISCUSSION**	**10**
	6.1 Introduction	
	6.2 Materials and Strata encountered during the Investigation	
	6.3 Geotechnical Parameters	
	6.4 Excavations	
	6.5 Buried Concrete	
	6.6 Contamination	
7	**REFERENCES**	**18**

APPENDICES

A DRAWINGS

B EXPLORATORY HOLE RECORDS

C IN-SITU TEST RESULTS

D GEOTECHNICAL AND ENVIRONMENTAL LABORATORY TEST RESULTS

E PHOTOGRAPHS

1 INTRODUCTION

During the months of May and June 2018 Whiteford Geoservices Ltd was commissioned by Scrabster Harbour Trust to undertake ground investigation works at the existing St Ola Pier in Scrabster Harbour, Scrabster, Thurso Bay, Scotland. The Scrabster Harbour Trust intends to refurbish the existing pier and the investigation campaign was required to obtain preliminary ground information to inform design work.

1.1 Purpose of the Investigation

The investigation was required to obtain additional geotechnical information, with the main objectives being:

1. To analyse the composition of the existing pier and the properties of the soils underlying it.
2. To identify and map the depth to bedrock, recover cores and determine competence / excavatability of this rock.

1.2 Timescale

The investigation was performed in accordance with the relevant standards (see References) and the major portion of the fieldwork was carried out between 29th May and 15th June 2018

This report presents the factual records of the fieldwork together with an interpretation of the results.

2 SITE AND GEOLOGY

2.1 The Site

All ground investigation works were undertaken on the existing St Ola's Pier within Scrabster Harbour.

All exploratory holes were initially set out according to the Exploratory Hole Plan provided as part of the tendering process, but were adjusted on site to ensure that they avoided buried tie rods and other obvious sub surface structures.

2.2 Published Geology

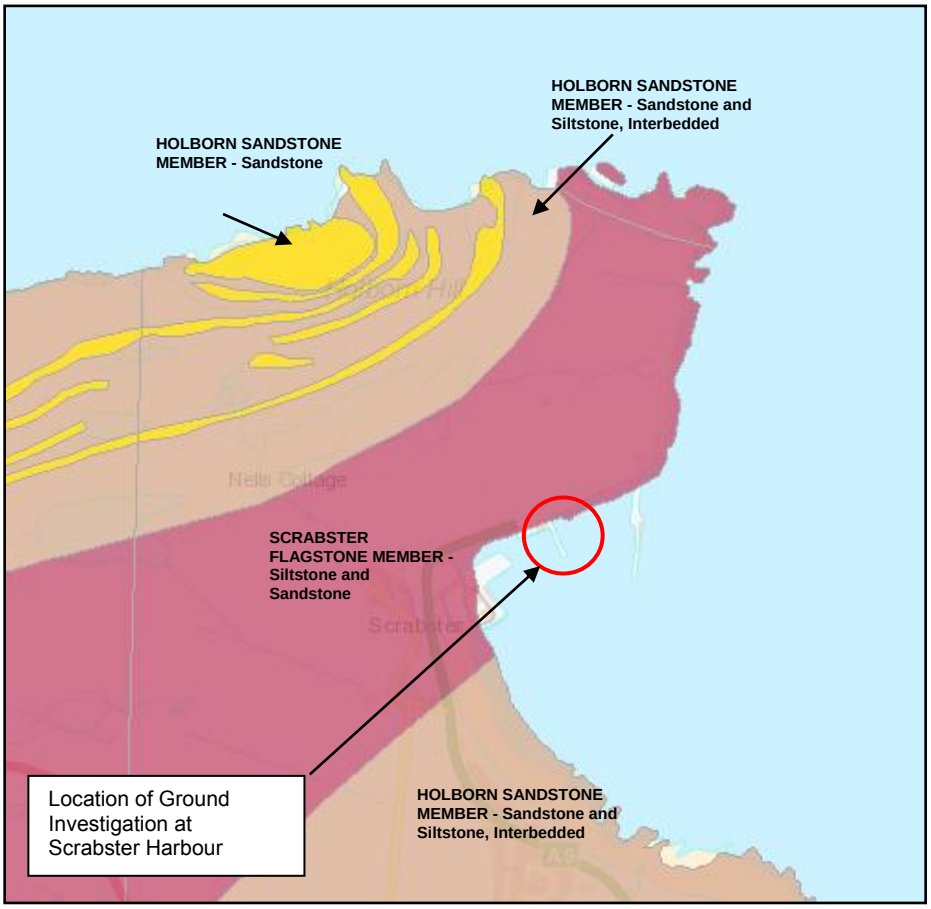


Figure 1 - Geology of the Site (Solid Geology)

Reproduced from British Geological Survey, "Geology of Britain Viewer", Copyright "NERC"

The published geological maps of the area (*British Geological Survey – Bedrock 1:625 000 and 1:50 000 scale solid and drift geology maps of Great Britain*) indicate that the ***solid geology*** consists of Devonian Age rocks.

These rocks can generally be described as Sandstone, Siltstone and Mudstone. Sedimentary Bedrock formed approximately 385 to 407 million years ago in the Devonian Period when the local environment was probably dominated by lakes, rivers and alluvial fans.

The same mapping indicates the following ***superficial geology*** description:-

Superficial geology consisting of ***Till – Diamicton*** (Superficial Deposits formed up to 3 million years ago during the Quaternary Period) and ***Marine Sand Deposits*** (Shingle, sand, silt and clay; may be bedded or chaotic; beach deposits may be in the form of dunes, sheets or banks; in association with the marine environment).

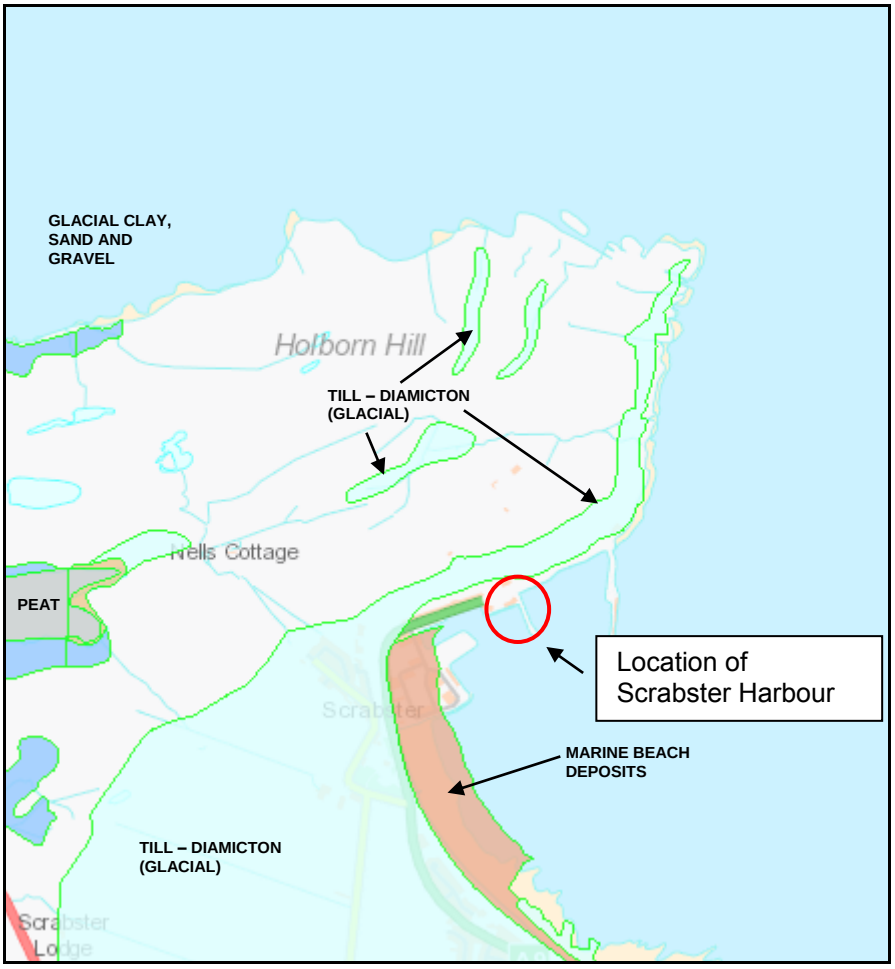


Figure 2 – Geology of the Site (Drift Geology)

Reproduced from "British Geological Survey, GEOINDEX Copyright NERC"

These soils overly siltstone and sandstone rocks of the Scrabster Flagstone Member that are intermittently exposed as a line of cliffs and mantled by the marine sands.

A significant thickness of the soils underlying the St Ola Pier is anticipated to consist of imported granular and cohesive fill material.

3 FIELDWORK

3.1 General

The fieldwork was carried out in general accordance with BS 5930 (2015), BS EN 1997-2 (2007) and BS EN ISO 22475-1 (2006) and related standards.

Please refer to Appendix A for drawings depicting the “as-built” locations of boreholes undertaken as part of the project.

All exploratory hole and in-situ test locations were surveyed to Ordnance Survey Great Britain (OSGB) geographic coordinate system, with all elevations recorded relative to Chart Datum Invergordon.

3.2 Exploratory Holes

The exploratory holes are detailed within the following table.

METHOD	QUANTITY	MAXIMUM DEPTH (m)	REMARKS
Percussive Boreholes	5	18.20	BH01, BH02, BH03, BH04 and BH05 were sunk using a Dando 4000 cable tool rig with a maximum boring diameter of 200mm.
Rotary Boreholes	5	35	As follow on to:- BH01, BH02, BH03, BH04 and BH05. Undertaken using a Comacchio 205 drilling rig.

The engineering logs contained within Appendix B provide descriptions of the strata encountered, together with observations made during excavation and drilling works.

3.3 In-situ Testing

The in-situ testing works carried out are detailed within the table presented below:-

TYPE	QUANTITY	MAXIMUM DEPTH (m)	REMARKS
Standard Penetration Tests (CP)	33	17.0m	BS 5930 (2015)
Standard Penetration tests (Rotary)	17	25.5m	

Standard Penetration Tests

Standard Penetration Tests (SPT) were undertaken within each cable percussion and rotary borehole in accordance with the relevant standards to determine the ground bearing capacity of the existing sub-soils.

3.4 Instrumentation and Monitoring

[NOT REQUIRED]

3.5 Sampling Regime

Percussive Boreholes

Bulk and small-disturbed samples were recovered at 1.50m intervals and / or at every change in strata thereafter.

Where cohesive deposits were encountered, undisturbed samples were attempted, where possible, by use of a driven open-tube sampler (U100), capable of obtaining a sample of a minimum diameter of 100mm.

These samples were to be of 450mm length and 100mm diameter, complying with BS EN ISO 22475-1: 2006 Clause 6.4.2.3.2.

Rotary Boreholes

Bulk and small-disturbed samples were recovered at 1.50m intervals and / or at every change in strata thereafter. Where cohesive deposits were encountered, undisturbed samples were initially taken by use of a driven open-tube sampler (U100) as for cable percussion boring.

4 LABORATORY TESTING

4.1 Geotechnical Testing

The testing was scheduled by Whiteford Geoservices Ltd with the assistance of RPS (Consulting Engineers) and carried out in accordance with BS 1377 (1990), BS 1881 (1986), BRE Digest and ISRM (2007) by Materials Testing Centre, Queens University Belfast, Construction Testing Services Ltd, Derwentside Testing Services Ltd and Whiteford Geoservices Ltd.

The testing is summarised in the table below and the results are presented within Appendix D.

TYPE	QUANTITY	REMARKS
Atterberg Limits	9	BS 1377- Part 2 (1990) : Section 2
Moisture Content	9	BS 1377- Part 2 (1990) : Section 2
Particle Size Distribution	15	BS 1377- Part 2 (1990) : Section 2
Chloride Content	5	BS 1377- Part 2 (1990) : Section 3
pH	5	BS 1377- Part 2 (1990) : Section 3
Sulphate Content	5	BS 1377- Part 2 (1990) : Section 3
Organic Matter Content	2	BS 1377- Part 2 (1990) : Section 3
QU Triaxial Single Stage	1	BS 1377- Part 2 (1990) : Section 7
QU Triaxial Multi Stage	1	BS 1377- Part 2 (1990) : Section 7
Shear Box (60mm x 60mm)	3	BS 1377- Part 2 (1990) : Section 5 (Peak and Residual)
Shear Box (100mm x 100mm)	3	BS 1377- Part 2 (1990) : Section 5 (Peak and Residual)
Porosity and Density (Rock)	3	
Unconfirmed Compressive Strength (UCS)	16	ASTM Standard Test Method D2938-80
Point Load (Rock)	4	ISRM - Commission on testing Methods. Working Group on Revision of the Point Load Test Method. "Suggested Method for Determining Point Load Strength", Int. Journal Rock Mech. Min. Sc. Vol.22,No.2,pp.51-60 1985

4.2 Environmental Testing

The testing was scheduled by Whiteford Geoservices Ltd with the assistance of RPS (Consulting Engineers) and carried out in accordance with the relevant standards by Derwentside Environmental Testing Services Ltd (DETS).

The testing is summarised in the table below and the results are presented within Appendix D.

TYPE	QUANTITY	REMARKS
Metals – Antimony, arsenic, barium, beryllium, boron (water soluble), cadmium, chromium III, chromium IV, copper, lead, mercury, molybdenum, nickel, selenium & vanadium. **Inorganics** – Cyanide, free **Organics** – Speciated aliphatic and aromatic hydrocarbons, BTEX, MTBE, PAH, phenols, tributyl tin, VOCs, SVOCs, **Asbestos** - Screen	3	Schedule 5 Contract Requirements Various Guidelines – refer to specific test results for relevant standard used.

5 GROUND CONDITIONS

5.1 Strata

Descriptions of the strata encountered are given on the exploratory borehole records. However, the general downward succession encountered on site can be summarised under seven main headings:-

A. CONCRETE

B. VOID

C. MADE GROUND – clayey, SAND and clayey GRAVEL or sandy, gravelly, CLAY, containing some sub angular cobbles and sub angular boulders. Variable in terms of strength and composition. Contains some boulders; causing CP boring to refuse at BH1 and BH2 and significant chiselling time.

D. GRANULAR GLACIAL TILL – Predominantly granular natural soils, typified by medium dense to dense gravelly SAND. Contains some boulders; causing CP boring to refuse at BH3, BH4 and BH5. Significant chiselling time required to progress boreholes.

E. COHESIVE GLACIAL TILL – Predominantly cohesive natural soils or soils with significant cohesive content, e.g. Stiff, sandy, gravelly, CLAY

F. SILTSTONE pertaining to SCRABSTER FLAGSTONE FORMATION

G. SANDSTONE pertaining to SCRABSTER FLAGSTONE FORMATION

The table below provides a general indication of lithological variation at the exploratory borehole locations.

SUMMARY OF GROUND CONDITIONS

.DESCRIPTION OF SOILS / ROCK	ELEVATION OF TOP OF INDIVIDUAL LITHOLOGIES ENCOUNTERED (M O.D.)				
	BH1	BH2	BH3	BH4	BH5
Top of Pier (Concrete Surface)	4.16	4.13	4.27	4.21	4.22
Void				3.41	2.72
Made Ground	3.66	3.73	3.87	2.01	1.72

.DESCRIPTION OF SOILS / ROCK	ELEVATION OF TOP OF INDIVIDUAL LITHOLOGIES ENCOUNTERED (M O.D.)				
	BH1	BH2	BH3	BH4	BH5
Granular Glacial Till	-4.44	-8.02	-7.63	-7.19	-7.78
Cohesive Glacial Till	-11.84	-14.37	-12.93	-13.29	-14.78
Siltstone Rock	-16.34				
Sandstone Rock		-25.37			
END AT:	**-20.84**	**-26.87**	**-22.73**	**-30.79**	**-18.28**

5.2 Groundwater

Water levels fluctuated significantly during the day and are considered to be tidally influenced. No other pattern could be discerned within the data that would confirm the level of a local groundwater table.

Please refer to the borehole logs contained in Appendix B for observations recorded.

6 DISCUSSION

6.1 Introduction

The following schedule details the exploratory hole information employed in the interpretation of ground conditions at the site:-:

BH1 (CP BH01 and RC BH01)	Top of Pier to 25.0m depth
BH2 (CP BH02 and RC BH02)	Top of Pier to 31.0m depth
BH3-(CP BH03 and RC BH03)	Top of Pier to 27.0m depth
BH4 (CP BH04 and RC BH04)	Top of Pier to 35.0m depth
BH4 (CP BH05 and RC BH05)	Top of Pier to 22.2m depth

The following sections present our interpretation of the ground conditions encountered and contains comments on excavations and recommendations for further investigation works.

6.2 Materials and Strata encountered during the Investigation

6.2.1 BH01

Pier Construction

At this location the Pier is of “solid” construction, where 0.50m of reinforced concrete is supported directly by a sequence of compacted fill overlying the natural stratigraphy.

Cable percussion (CP) boring refused at a depth of 8.60m (-4.44m O.D.) within a sequence of fill material, described on the logs as MADE GROUND. The presence of boulders within this fill material is evident from the record of chiselling within this sequence and resulted ultimately in its refusal and continuation by rotary drilling.

It is thought that a layer of boulders at or close to the base of the fill material (MADE GROUND sequence) was the reason for refusal in this borehole and consequently the soils immediately below are recorded to be natural in origin. It should however, be understood that given the similarity of this fill to natural glacial till soils this assessment is indicative only.

Rotary drilling and coring methods were used to progress the borehole following CP refusal.

Natural Stratigraphy / Sub Base Formation

Between 8.60m (-4.44m O.D) and 16.00m (-11.84m O.D.) depth the samples analysed indicate granular natural till soils and have been identified as medium dense to dense very gravelly SAND. It should, however, be borne in mind that the rotary openhole method of drilling recovers a lower classification of soil samples than the cable percussion method. That being the case it is difficult to predict the number of cobbles or boulders present and confirm the coarseness of the gravel component.

Between 16.0m (-11.84m O.D.) and 20.5m (-16.34m O.D.) a sequence of predominantly cohesive glacial soils is present and mantles the SILTSTONE rock (Scabster Flagstone Member).

Natural Solid Geology

SILTSTONE rock was encountered at 20.5m depth (-16.34m O.D.) This is initially highly weathered and probably extremely weak, but from 23m (-18.84m O.D.) to 25m (-20.84m O.D.) it is confirmed to be medium strong to strong (41.8MPa to 74.0MPa).

6.2.2 BH2

Pier Construction

At this location the Pier is also of “solid” construction. Reinforced concrete, 0.4m thick, is supported directly by a sequence of compacted fill overlying the natural stratigraphy.

Cable percussion (CP) boring refused at a depth of 12.15m (-8.02m O.D.) within a sequence of fill material, described on the logs as MADE GROUND. The presence of boulders within this fill material is evident from the record of chiselling within this sequence and is believed to have ultimately caused its refusal and continuation by rotary drilling.

As for BH01 it is believed that a layer of boulders, at or close to the base of the fill material (MADE GROUND sequence), has caused CP boring to refuse. As for

BH01, the soils immediately below this level are recorded to be natural in origin. This assessment is indicative only and cannot currently be confirmed.

Rotary drilling and coring methods were used to progress the borehole following CP refusal.

Natural Stratigraphy / Sub Base Formation

Between 12.15m (-8.02m O.D) and 18.50m (-14.37m O.D.) depth the samples analysed indicate granular natural till soils and have been identified as very dense very gravelly SAND. (The same caveats apply to rotary soil descriptions as have been previously described for BH01).

Between 18.50m (-14.37m O.D.) and 29.50m (-25.37m O.D.) a sequence of predominantly cohesive glacial soils is present and mantles SANDSTONE rock (Scabster Flagstone Member).

Natural Solid Geology

SANDSTONE rock was encountered at 29.50m depth (-25.37m O.D.) This is initially highly weathered and probably extremely weak, but unlike the rock core recovered from BH01, BH02 rock core was highly fractured and not suitable for UCS strength testing. The rock is generally classified as probably VERY WEAK.

6.2.3 BH3

Pier Construction

At this location the Pier is of “solid” construction. Reinforced concrete, 0.4m thick, is supported directly by a sequence of compacted fill overlying the natural stratigraphy.

Although cable percussion (CP) boring required significant chiselling between 4.40m (-0.13m O.D) and 9.40m (-5.13m O.D.) within the MADE GROUND the hole was progressed through the fill into the natural soils at 11.90m (-7.63m O.D.). The presence of oversized material (possible cobbles or boulders) within this fill material can be inferred from the record of chiselling within this sequence. However in this case it was possible to progress through to the underlying natural soils.

Rotary drilling and coring methods were used to progress the borehole following CP refusal on what is thought to be a boulder at 17.50m (-13.23m O.D.).

Natural Stratigraphy / Sub Base Formation

Between 11.90m (-7.63m O.D) and 16.00m (-11.73m O.D.) the samples analysed indicate granular natural till soils and have been identified as medium dense to very dense clayey, gravelly, SAND. (The same caveats apply to rotary soil descriptions as have been previously described for BH01).

Between 17.20m (-12.93m O.D.) and 17.50m (-13.23m O.D.) a layer of cohesive glacial soil is present. This cohesive layer is underlain by a further 9.50m of granular natural soils from 17.50m (-13.23m O.D.) to 27.00m (-22.73m O.D.) at which point the borehole was terminated.

Natural Solid Geology

No rock was encountered in BH03.

6.2.4 BH4

Pier Construction

At this location the Pier is of "open" construction. Reinforced concrete, 0.8m thick, is supported by a piled foundation and a void is present between the base of the concrete pier deck at 0.80m depth (3.41m O.D.) and 2.20m (2.01m O.D.).

Below the concrete deck the void has been filled with predominantly granular fill. The thickness of this fill material is difficult to define precisely as it is similar to that of the natural granular soils. The boundary between the MADE GROUND and natural soils is recorded on the BH04 log to be at 11.40m (-7.16m O.D.) although it is possible it could apply from 5.80m (-1.59m O.D.).

Although cable percussion (CP) boring required significant chiselling between 8.40m (-4.19m O.D) and 8.60m (-4.39m O.D.) within the MADE GROUND the hole was progressed through the fill to the recorded commencement of natural soils at 11.40m (-7.19m O.D.).

Rotary drilling and coring methods were used to progress the borehole following CP refusal on what is thought to be a boulder at 18.20m (-13.99m O.D.).

Natural Stratigraphy / Sub Base Formation

Between 11.40m (-7.19m O.D) and 17.50m (-13.29m O.D.) the samples analysed indicate granular natural till soils and have been identified as medium dense, clayey, gravelly, SAND.

Between 17.50m (-12.79m O.D.) and 18.20m (-13.99m O.D.) a layer of cohesive glacial soil is present. At this point CP boring refused on a probable boulder and the borehole was progressed using rotary methods. Stiff glacial till soils were recorded to termination depth at 35.00m (-30.79m O.D.).

Natural Solid Geology

No rock was encountered in BH04.

6.2.5 BH5

Pier Construction

At this location the Pier is of "open" construction. Reinforced concrete (possibly included a supporting beam), 1.50m thick, is supported by a piled foundation and a void is present between the base of the concrete at 1.50m depth (2.72m O.D.) and 2.50m (1.72m O.D.).

Below the concrete deck the void has again been filled with predominantly granular fill. The thickness of this fill material is difficult to define precisely as it is similar to that of the natural granular soils. The boundary between the MADE GROUND and natural soils is recorded on the BH05 log to be at 12.00m (-7.76m O.D.) although it is possible this could apply from as early as 6.00m (-1.76m O.D.).

Cable percussion (CP) boring was able to progress through the fill to the recorded commencement of natural soils at 12.00m (-7.78m O.D.) and terminated at 14.30m (-10.08m) on what is thought to have been a boulder.

Rotary drilling and coring methods were used to progress the borehole following CP refusal on what is thought to be a boulder at 14.30m (-10.08m O.D.).

Natural Stratigraphy / Sub Base Formation

Between 12.00m (-7.78m O.D) and 19.00m (-14.78m O.D.) the samples analysed indicate granular natural till soils and have been identified as dense, sandy, GRAVEL and gravelly, SAND.

Between 19.00 (-14.78m O.D.) and termination depth of 22.20m (-18.28m O.D.) soils with significant cohesive content were encountered.

Natural Solid Geology

No rock was encountered in BH05.

6.3 Geotechnical Parameters

Applicable Geotechnical Parameters	**Existing Pier Construction**			
	Fill material identified on logs as MADE GROUND	**Granular Glacial Till Soils**	**Cohesive Glacial Till Soils**	**Rock (SILTSONE / SANDSTONE)**
Estimated Shear Strength (C_u)[1]	165 – 285kPa	-	151 - 216	
Peak Angle of Friction	40 - 48	35	-	
Ultimate Angle of Friction	35 - 46	33	32 - 36	
Bulk Density (kN/m3)	17.04 – 23.67	18.97 – 21.20	18.97 – 22.96	24.9 – 25.2
Unconfined Compressive Strength				41.8 – 74.0 MPa

6.4 Excavations

As excavations within the marine soils, above the rock, have the potential for side wall instability, the author recommends that all excavations be adequately supported. In the case of excavations at Scrabster Harbour the formation of sheet piled cofferdam should be considered if enabling works are required and the new pier cannot alternatively be piled.

[1] Using Sivikaya & Togrol (2002)

Where interlocking sheet piles are to be employed for the purpose of creating a cofferdam care should be taken to ensure that existing structures are not destabilised. In this case vibro-driven piling is recommended over standard hammer driven piling.

Where piles are to be employed to support a new pier deck bored piles are considered more viable and less disruptive than driven piles and are therefore recommended.

In both cases it will be important to ensure that the following protocols are followed, in order to minimise any preventable harm to the existing structures:-

1. A pre-construction structural survey should be undertaken for sensitive structures within the zone of influence of the construction works.
2. Vibration monitoring and monitoring of “tell-take” crack gauges should be undertaken at regular locations and intervals during construction works.
3. Where unacceptable impacts are recorded these impacts should be assessed, works halted if necessary and appropriate remedial / stabilising works undertaken.

6.5 Buried Concrete

The results of laboratory testing for sulphate concentration and pH level in soil samples recovered from the site indicate sulphate content was generally 300 mg/l to 400 mg/l (total SO_4 content) and pH levels of 8.40 to 9.20 (mildly acidic). However, in BH05 total SO_4 content was 2500 mg/l.

Upon analysis of these results, natural soils are anticipated to be moderately aggressive to concrete and as such, a Design Sulphate Class DS-2 and Aggressive Chemical Environment for Concrete Class of AC-2 would normally be appropriate in response to the requirements outlined in BRE Special Digest 1 : 2005.

However, given the level of exposure to the marine environment (as highlighted in the total SO4 result from BH05) additional protective measures will be required. The specification of such APMs is beyond the scope of this report and the reader should consult with the relevant special service provider for further clarification.

6.6 Contamination

6.6.1 Schedule 5 Testing

The results of the laboratory testing were assessed against criteria provided for the re-use of site won material as clean capping material.

There were found to be no exceedances for the SSTLs provided.

7 REFERENCES

BS 1377 : 1990 : Methods of test for soils for civil engineering purposes. British Standards Institution.

BS 5930 : 2015 : Code of practice for site investigations. British Standards Institution.

BS EN 1997-2 : 2007 : Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. British Standards Institution.

BS EN ISO 14688-1 : 2002 : Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description. British Standards Institution.

BS EN ISO 14689-1 : 2003 : Geotechnical investigation and testing - Identification and classification of rock - Part 1 Identification and description. British Standards Institution.

BS EN ISO 22475-1 : 2006 : Geotechnical investigation and testing – Sampling methods and groundwater measurements - Part 1 Technical principles for execution. British Standards Institution.

BS EN ISO 22476-2 : 2005 : Geotechnical investigation and testing - Field testing - Part 2 Dynamic probing. British Standards Institution.

BS EN ISO 22476-3 : 2005 : Geotechnical investigation and testing - Field testing - Part 3 Standard penetration test. British Standards Institution.

ISRM : 2007 : The Complete ISRM Suggested Methods for Rock Characterisation, Testing and Monitoring (1974-2006). Commission on Testing Methods, International Society for Rock Mechanics (Editors Ulusay R & Hudson JA).

ASTM D5731-08 : Standard test method for determination of the point load strength index of rock and application to rock strength

ASTM C215-08 : Standard Test Method for Fundamental Transverse, Longitudinal, and Torsional Frequencies of Concrete Specimens

ASTM C805-08: Standard Test Method for Rebound Number of Hardened Concrete. American Society for Testing and Materials, West Conshohocken, PA.

British Geological Survey: Geology of Britain Viewer
http://mapapps.bgs.ac.uk/geologyofbritain/home.html

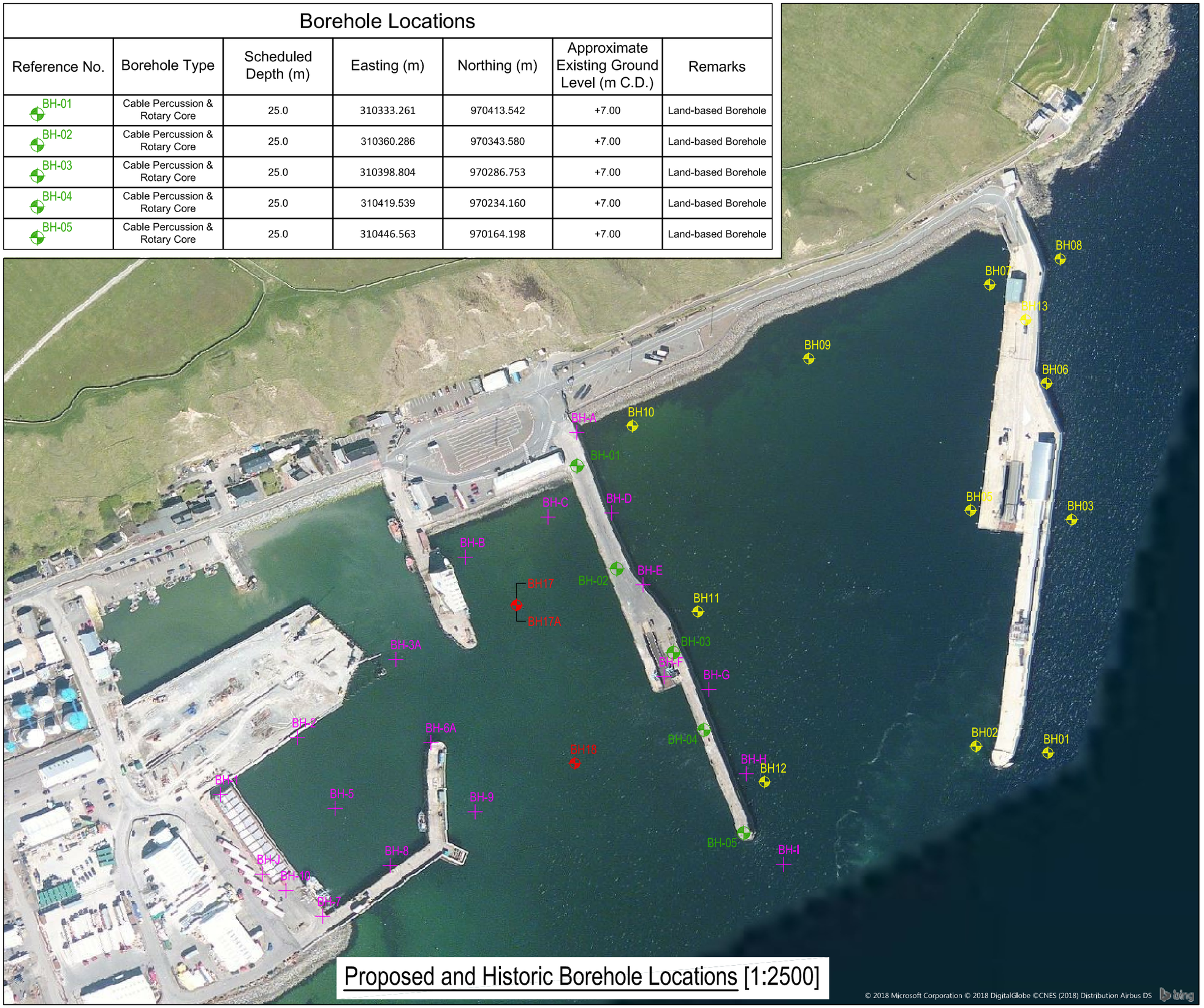
APPENDIX A

DRAWINGS

Scrabster Harbour – Proposed and Historic Borehole Locations:-	1 x A3
Figures A1	
St Orla Pier Reburbishment - Site Investigation on Pier	1 x A3
As-Built Borehole Location Plan:-	
Figure A2	

Borehole Locations

Reference No.	Borehole Type	Scheduled Depth (m)	Easting (m)	Northing (m)	Approximate Existing Ground Level (m C.D.)	Remarks
BH-01	Cable Percussion & Rotary Core	25.0	310333.261	970413.542	+7.00	Land-based Borehole
BH-02	Cable Percussion & Rotary Core	25.0	310360.286	970343.580	+7.00	Land-based Borehole
BH-03	Cable Percussion & Rotary Core	25.0	310398.804	970286.753	+7.00	Land-based Borehole
BH-04	Cable Percussion & Rotary Core	25.0	310419.539	970234.160	+7.00	Land-based Borehole
BH-05	Cable Percussion & Rotary Core	25.0	310446.563	970164.198	+7.00	Land-based Borehole



Proposed and Historic Borehole Locations [1:2500]

NOTES

1. Verifying Dimensions.
   The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
2. Existing Services.
   Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
3. Issue of Drawings.
   Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled Issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.
4. DATUM: Chart Datum

KEY:

- BH-01 — Proposed Land-based Borehole Location
- BH-F — Historic Borehole Location - Murdoch Mackenzie (1972)
- BH11 — Historic Borehole Location - Fugro (2001)
- BH18 — Historic Borehole Location - Glover Site Investigations (2010)

rev	amendments	drawn date	checked date

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Client: Scrabster Harbour Trust

Project: St. Ola Pier Refurbishment

Title: Proposed And Historic Borehole Locations

Drawing Status	Sheet Size	Drawing Scale
Preliminary	A3	1:2500

Drawing Number: M0727-RPS-00-XX-DR-C-0010

Rev -

Project Leader	Drawn By	Date	Initial Review
D.O'L.	E.H.	19/04/2018	S.V.G.

Project Id:	1906-18	Title:	Site Plan
Project Title:	St Ola Pier SI - (Land)	Scale:	1:2500
Location:	Scrabster	Engineer:	RPS
Client:	Scabster Harbour	Contractor:	Whiteford Geoservices

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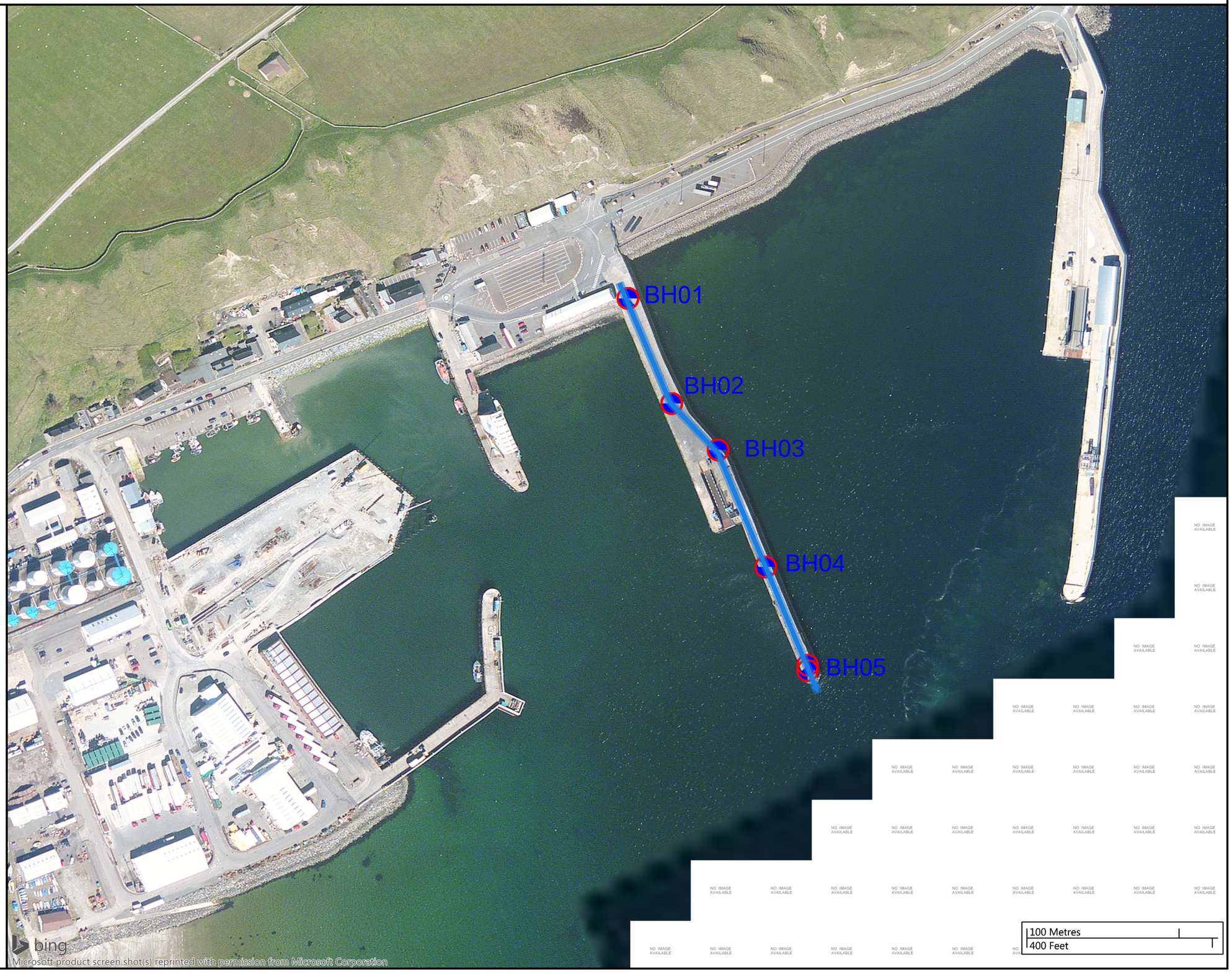
Legend Key

- Sections - Section 1
- Locations By Type - Empty
- Locations By Type - CP
- Locations By Type - RC



APPENDIX B

EXPLORATORY HOLE RECORDS

Cable Percussive Borehole Logs	9 x A4
Rotary Percussive Borehole Logs	17 x A4
Section1 – CP Borehole Logs	1 x A3
Section 1 – RC Borehole Logs	1 x A3

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Borehole Log

Borehole No. **BH-01**
Sheet 1 of 1

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310333E - 970414N	Hole Type CP
Location: Scrabster		Level: 4.16	Scale 1:50
Client: Scabster Harbour		Dates: 29/05/2018	Logged By J. Stothers

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.50	B		0.50	3.66		Grey, reinforced CONCRETE with several layers of re-bar ranging from 15mm to 35mm
		1.00	D					MADE GROUND: Dense, brownish grey, slightly clayey, sandy, GRAVEL with some sub angular COBBLES and BOULDERS. Sand is fine to coarse. Gravel is sub angular fine to coarse
		1.00	SPT	N=50 (21,12/50 for 75mm)				
		1.50	B					
	▼ 2.00	2.00	D		2.00	2.16		MADE GROUND: Medium dense, brownish grey, clayey, sandy, GRAVEL with some sub angular COBBLES and BOULDERS. Sand is fine to coarse. Gravel is sub angular fine to coarse
		2.00	SPT	N=21 (4,5/5,5,5,6)				
		2.50	B					
		3.00	D					
		3.00	SPT	N=29 (7,7/8,7,7,7)				
		3.50	B					
		4.00	D		4.00	0.16		MADE GROUND: Medium dense, brownish grey, clayey, sandy, GRAVEL with some sub angular COBBLES and BOULDERS. Sand is fine to coarse. Gravel is sub angular fine to coarse
		4.00	SPT	N=36 (8,8/8,8,8,12)				
		4.50	B					
		5.00	D					
		5.00	SPT	N=18 (5,5/4,4,5,5)				
		5.50	B					
		6.50	D					
		6.50	SPT	N=52 (8,7/52 for 225mm)				
		7.00	B					
		8.00	D					
		8.00	SPT	N=19 (4,5/5,4,5,5)				
					8.60	-4.44		End of Borehole at 8.600m

1 2 3 4 5 6 7 8 9 10

Remarks:	Termination Details	Rig Details	
	Refusal on probable boulder	Dando 4000	
	8.60m	Contractor	Phoenix Drilling

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Borehole Log

Borehole No. **BH-02**
Sheet 1 of 2

Project Name:	St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310361E - 970344N
Location:	Scrabster		Level: 4.13
Client:	Scabster Harbour		Dates: 01/06/2018

Hole Type: CP
Scale: 1:50
Logged By: J. Stothers

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.40	3.73		Grey, reinforced CONCRETE with several layers of re-bar ranging from 15mm to 35mm
		0.50	B					MADE GROUND: Medium dense, grey, clayey, sandy, GRAVEL with some sub angular COBBLES and occasional BOULDERS. Sand is fine to coarse grained. Gravel is fine to medium, sub angular.
		1.00	D					
		1.00	SPT	N=19 (4,5/5,5,5,4)				
		1.50	B					
		2.00	D					
		2.00	SPT	N=19 (6,5/5,4,4,6)				
		2.50	B					
		3.00	D					
		3.00	SPT	N=31 (4,4/3,6,12,10)				
	▼ 3.60	3.50	B					
		4.00	D					
		4.00	SPT	N=27 (7,7/4,9,9,5)				
		4.50	B					
		5.00	SPT	N=41 (8,8/10,10,10,11)				
					5.20	-1.07		MADE GROUND: Medium dense, grey, slightly clayey, slightly sandy, GRAVEL with some sub angular COBBLES and some BOULDERS. Sand is fine to coarse grained. Gravel is fine to medium, sub angular.
		5.50	B					
		6.50	SPT	N=26 (4,8/8,8,5,5)				
		7.00	B					
		8.00	SPT	N=26 (7,5/5,5,7,9)				
		8.50	B					
		9.50	B					
		9.50	SPT	N=27 (6,5/5,8,5,9)				

1 2 3 4 5 6 7 8 9 10

Remarks:	Termination Details	Rig Details	
	Refusal on probable boulder	Dando 4000	
	12.15m	Contractor	Phoenix Drilling

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Borehole Log

Borehole No.
BH-02
Sheet 2 of 2

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310361E - 970344N	Hole Type CP
Location: Scrabster		Level: 4.13	Scale 1:50
Client: Scabster Harbour		Dates: 01/06/2018	Logged By J. Stothers

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		11.00 11.00	B SPT	N=21 (7,5/5,5,5,6)				MADE GROUND: Medium dense, grey, slightly clayey, slightly sandy, GRAVEL with some sub angular COBBLES and some BOULDERS. Sand is fine to coarse grained. Gravel is fine to medium, sub angular.
		12.00	SPT	N=50 (8,11/50 for 75mm)	12.15	-8.02		End of Borehole at 12.150m

Remarks:	Termination Details	Rig Details	
	Refusal on probable boulder	Dando 4000	
	12.15m	Contractor	Phoenix Drilling

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Borehole Log

Borehole No. **BH-03**

Sheet 1 of 2

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310391E - 970312N	Hole Type CP
Location: Scrabster		Level: 4.27	Scale 1:50
Client: Scabster Harbour		Dates: 07/06/2018	Logged By J. Stothers

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								Grey, reinforced CONCRETE with several layers of re-bar ranging from 15mm to 35mm
		0.50	B		0.40	3.87		MADE GROUND: Loose, dark grey, clayey, sandy, GRAVEL with some sub angular COBBLES and BOULDERS. Sand is fine to coarse grained. Gravel is sub angular, fine to medium.
		1.00	B					
		1.20	D					
		1.20	SPT	N=24 (3,4/4,8,6,6)				
		1.70	B					
		2.20	D					
		2.20	SPT	N=33 (2,5/5,10,9,9)				
		2.70	B					
		3.20	D					
		3.20	SPT	N=28 (4,4/5,5,10,8)				
		3.70	B					
		4.20	D					
		4.20	SPT	N=50 (5,5/10,10,12,18)				
		4.70	B		4.70	-0.43		MADE GROUND: Soft, dark grey, slightly sandy, gravelly CLAY with many sub angular COBBLES and some BOULDERS. Sand is fine to coarse. Gravel is sub angular fine to coarse
		5.20	D					
		5.20	SPT	N=31 (4,8/8,10,7,6)				
	▼ 5.80							
		6.50	SPT	N=61 (10,18/61 for 150mm)				
					7.00	-2.73		MADE GROUND: Dense, dark grey, slightly clayey, sandy, GRAVEL with some sub angular to angular COBBLES and BOULDERS. Sand is fine to coarse. Gravel is sub angular to angular fine to coarse
		7.80	B					
		8.00	SPT	N=29 (6,5/5,10,7,7)				
		8.50	B					
		9.50	SPT	N=32 (8,8/9,8,8,7)				
		10.00	B					

Remarks:	Termination Details	Rig Details	
Rotary Rig set up to break through a boulder at 11.50m / Sands blowing up from 6.50m to 6.20m during the weekend	Refusal on bouldery stiff clay	Dando 4000	
	17.50m	Contractor	Phoenix Drilling

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Borehole Log

Borehole No. **BH-03** Sheet 2 of 2

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310391E - 970312N	Hole Type CP
Location: Scrabster		Level: 4.27	Scale 1:50
Client: Scabster Harbour		Dates: 07/06/2018	Logged By J. Stothers

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		10.00	B					MADE GROUND: Dense, dark grey, slightly clayey, sandy, GRAVEL with some sub angular to angular COBBLES and BOULDERS. Sand is fine to coarse. Gravel is sub angular to angular fine to coarse
		11.00	SPT	N=50 (10,10/50 for 150mm)				
		11.90	B		11.90	-7.63		
		11.90	ES					Medium dense, greyish black, gravelly SAND with occasional sub angular COBBLES and some shell fragments. Sand is fine to coarse. Gravel in sub angular fine to coarse
		12.50	D		12.50	-8.23		
		12.50	SPT	N=15 (2,4/4,4,3,4)				Dense, greyish black, clayey, gravelly, SAND and some shell fragments. Sand is fine to coarse grained. Gravel is sub rounded, fine to medium.
		13.00	B					
		14.00	D					
		14.00	SPT	N=15 (2,2/3,3,4,5)				
		14.50	B					
		15.50	D					
		15.50	SPT	N=32 (4,5/8,8,7,9)				
		16.00	B		16.00	-11.73		Very dense, greyish black, slightly clayey, very gravelly SAND with some sub rounded COBBLES and some shell fragments. Sand is fine grained. Gravel in sub rounded fine to medium.
		17.00	SPT	N=50 (9,10/50 for 75mm)				
		17.20	B		17.20	-12.93		Stiff, dark grey, slightly sandy, slightly gravelly, CLAY with some sub rounded COBBLES. Sand is fine to coarse. Gravel is sub rounded, fine to medium.
					17.50	-13.23		End of Borehole at 17.500m

Remarks:	Termination Details	Rig Details	
Rotary Rig set up to break through a boulder at 11.50m / Sands blowing up from 6.50m to 6.20m during the weekend	Refusal on bouldery stiff clay	Dando 4000	
	17.50m	Contractor	Phoenix Drilling

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Borehole Log

Borehole No. **BH-04**
Sheet 1 of 2

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310420E - 970234N	Hole Type CP
Location: Scrabster		Level: 4.21	Scale 1:50
Client: Scabster Harbour		Dates: 05/06/2018	Logged By J. Stothers

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.80	3.41		Grey, reinforced CONCRETE with several layers of re-bar ranging from 15mm to 35mm
								VOID
	▼ 2.20	2.20	B		2.20	2.01		
		2.20	SPT	N=5 (1,1/1,2,1,1)				MADE GROUND: Medium dense, reddish brown, slightly clayey, gravelly, SAND. Sand is medium to coarse grained. Gravel is sub angular, fine to medium.
		3.20	SPT	N=15 (2,2/3,3,5,4)				
		3.70	B					
		4.20	SPT	N=12 (2,3/3,3,3,3)				
		4.70	B					
		5.20	SPT	N=14 (3,3/4,4,3,3)				
		5.80	B		5.80	-1.59		
		6.50	SPT	N=17 (2,2/5,4,4,4)				MADE GROUND: Medium dense, reddish brown, clayey, gravelly, SAND with some sub angular COBBLES. Sand is medium to coarse grained. Gravel is sub angular, fine to medium.
		7.00	B					
		8.00	SPT	N=25 (4,4/6,6,7,6)				
		8.50	B					
		9.50	SPT	N=12 (3,3/2,2,4,4)				
		10.00	B					

1 2 3 4 5 6 7 8 9 10

Remarks:	Termination Details	Rig Details	
Sands blowing up from 15.00m to 11.30m during the night	Refusal on bouldery stiff clay	Dando 4000	
	18.20m	Contractor	Phoenix Drilling

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Borehole Log

Borehole No. **BH-04** Sheet 2 of 2

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310420E - 970234N	Hole Type CP
Location: Scrabster		Level: 4.21	Scale 1:50
Client: Scabster Harbour		Dates: 05/06/2018	Logged By J. Stothers

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		11.00	SPT	N=11 (3,2/2,2,3,4)				MADE GROUND: Medium dense, reddish brown, clayey, gravelly, SAND with some sub angular COBBLES. Sand is medium to coarse grained. Gravel is sub angular, fine to medium.
		11.40	ES		11.40	-7.19		
		11.50	B					Medium dense, greyish black, clayey, gravelly, SAND with occasional sub angular COBBLES and some shell fragments. Sand is fine to medium grained. Gravel is sub angular fine to medium.
		12.50	D					
		12.50	SPT	N=25 (3,4/6,4,7,8)				
		13.00	B					
		14.00	D					
		14.00	SPT	N=18 (2,4/4,5,5,4)				
		14.50	B					
		15.50	D					
		15.50	SPT	N=18 (3,4/4,4,5,5)				
		16.00	B					
		17.00	D		17.00	-12.79		
		17.00	SPT	N=39 (5,5/7,9,9,14)				Dense, greyish black, gravelly SAND with occasional sub angular COBBLES and some shell fragments. Sand is fine to coarse. Gravel in sub angular fine to coarse
		17.50	B		17.50	-13.29		Stiff, dark grey, slightly sandy, gravelly CLAY with some sub rounded COBBLES and occasional BOULDERS. Sand is fine to coarse grained. Gravel is sub rounded, fine to medium.
					18.20	-13.99		End of Borehole at 18.200m

11 12 13 14 15 16 17 18 19 20

Remarks:	Termination Details	Rig Details	
Sands blowing up from 15.00m to 11.30m during the night	Refusal on bouldery stiff clay	Dando 4000	
	18.20m	Contractor	Phoenix Drilling

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Borehole Log

Borehole No. **BH-05**

Sheet 1 of 2

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310446E - 970169N	Hole Type CP
Location: Scrabster		Level: 4.22	Scale 1:50
Client: Scabster Harbour		Dates: 12/06/2018	Logged By J. Stothers

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Grey, reinforced CONCRETE with several layers of re-bar ranging from 15mm to 35mm
					1.50	2.72		VOID
		2.50	B		2.50	1.72		MADE GROUND: Medium dense, greyish brown, slightly clayey, gravelly SAND with some shell fragments. Sand is medium to coarse grained. Gravel is sub rounded, fine to medium.
		3.10	D					
		3.20	SPT	N=12 (2,2/3,3,3,3)				
		3.70	B					
		4.20	D					
		4.20	SPT	N=16 (3,3/4,4,3,5)	4.30	-0.08		MADE GROUND: Medium dense, brown, slightly clayey, very sandy, GRAVEL with some shell fragments. Sand is medium to coarse grained. Gravel is sub rounded, fine to coarse.
		4.70	B					
		5.20	D					
		5.20	SPT	N=20 (3,3/3,5,5,7)				
		5.70	B					
	▼ 6.10				6.00	-1.78		MADE GROUND: Medium dense, greyish black, sandy, GRAVEL with sub angular to sub rounded COBBLES and some shell fragments. Sand is medium to coarse grained. Gravel is sub rounded, fine to medium.
		6.35	D					
		6.50	SPT	N=23 (5,5/4,4,8,7)				
		7.00	B					
		7.75	D					
		8.00	ES					
		8.00	SPT	N=19 (3,2/2,5,6,6)				
		8.50	B					
		9.00	D					
		9.50	B					
		9.50	SPT	N=20 (3,5/5,5,4,6)				

Remarks:	Termination Details	Rig Details	
Sands blowing up from 9.00m to 6.30m during the night	Refusal on probable boulder	Dando 4000	
	14.30m	Contractor	Phoenix Drilling

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Borehole Log

Borehole No. **BH-05** Sheet 2 of 2

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310446E - 970169N	Hole Type CP
Location: Scrabster		Level: 4.22	Scale 1:50
Client: Scabster Harbour		Dates: 12/06/2018	Logged By J. Stothers

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		10.25	D					MADE GROUND: Medium dense, greyish black, sandy, GRAVEL with sub angular to sub rounded COBBLES and some shell fragments. Sand is medium to coarse grained. Gravel is sub rounded, fine to medium.
		11.00 11.00	B SPT	N=20 (4,4/4,6,5,5)				
		12.00	D		12.00	-7.78		Dense, greyish black, very sandy, GRAVEL with sub angular to sub rounded COBBLES and some shell fragments. Sand is medium to coarse grained. Gravel is sub rounded, fine to coarse.
		12.50	SPT	N=37 (8,8/9,10,10,8)				
		13.00	B					
		14.00	SPT	N=60 (10,12/60 for 150mm)				
					14.30	-10.08		End of Borehole at 14.300m

11 12 13 14 15 16 17 18 19 20

Remarks:	Termination Details	Rig Details	
Sands blowing up from 9.00m to 6.30m during the night	Refusal on probable boulder	Dando 4000	
	14.30m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-01-Rotary follow on
Sheet 1 of 3

Project Name:	St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords:	310333.25 - 970413.68	Hole Type RC
Location:	Scrabster		Level:	4.16m OD	Scale 1:50
Client:	Scabster Harbour		Dates:	31/05/2018 - 01/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
									Boring undertaken by Cable Percussion (See BH-01 Cable Percussion Log)		
						8.60	-4.44		Medium dense, greyish black, very gravelly SAND and some shell fragments. Sand is fine to coarse. Gravel in sub rounded fine to medium		

1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

Remarks:	Termination Details	Rig Details	
BH-01 Rotary Follow on		Comacchio 305	
	25.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-01-Rotary follow on
Sheet 2 of 3

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310333.25 - 970413.68	Hole Type RC
Location: Scrabster		Level: 4.16m OD	Scale 1:50
Client: Scabster Harbour		Dates: 31/05/2018 - 01/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
									Medium dense, greyish black, very gravelly SAND and some shell fragments. Sand is fine to coarse. Gravel in sub rounded fine to medium	10.20 N=42 (5,5/5,9,12,16)	
										11.70 N=18 (2,2/2,3,5,8)	
						13.00	-8.84		Dense, greyish black, very gravelly SAND and some shell fragments. Sand is fine to coarse. Gravel in sub rounded fine to medium	13.20 N=21 (2,2/3,4,7,7)	
										14.70 N=239 (5,7/239 for 225mm)	
						16.00	-11.84		Stiff, dark grey, slightly sandy, gravelly CLAY with some sub rounded COBBLES. Sand is fine to coarse. Gravel is sub rounded fine to coarse	16.20 N=61 (6,6/61 for 225mm)	
										17.70 N=0 (23,45/0 for 0mm)	
										19.20 N=50 (27,24/50 for 75mm)	

11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0

Remarks:	Termination Details	Rig Details	
BH-01 Rotary Follow on		Comacchio 305	
	25.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-01-Rotary follow on
Sheet 3 of 3

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310333.25 - 970413.68	Hole Type RC
Location: Scrabster		Level: 4.16m OD	Scale 1:50
Client: Scabster Harbour		Dates: 31/05/2018 - 01/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	SCR	RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
						20.50	-16.34		Stiff, dark grey, slightly sandy, gravelly CLAY with some sub rounded COBBLES. Sand is fine to coarse. Gravel is sub rounded fine to coarse		
	20.50 - 22.00		33	5	0				Probable, very weak, brownish grey, fine grained, SILTSTONE, highly weathered, highly fractured. (recovered as cobbles and gravel)		
						22.00	-17.84				
	22.00 - 23.50		80	56	36				Probable, very weak, brownish grey, fine grained, SILTSTONE, weathered.		
	23.50 - 25.00		86	76	65						
						25.00	-20.84		End of Borehole at 25.000m		

21.0 22.0 23.0 24.0 25.0 26.0 27.0 28.0 29.0

Remarks:	Termination Details	Rig Details	
BH-01 Rotary Follow on		Comacchio 305	
	25.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-02-Rotary follow on
Sheet 1 of 4

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310360.63 - 970343.66	Hole Type RC
Location: Scrabster		Level: 4.13m OD	Scale 1:50
Client: Scabster Harbour		Dates: 05/06/2018 - 06/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) / Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
									Boring undertaken by Cable Percussion (See BH-02 Cable Percussion Log)		

1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

Remarks:	Termination Details	Rig Details	
BH-02 Rotary Follow on / Blowing sands (4.7m) for STP at14.7m and (2.5m) for SPT at 16.2 making the test un doable		Comacchio 305	
	31.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-02-Rotary follow on
Sheet 2 of 4

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310360.63 - 970343.66	Hole Type RC
Location: Scrabster		Level: 4.13m OD	Scale 1:50
Client: Scabster Harbour		Dates: 05/06/2018 - 06/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
									Boring undertaken by Cable Percussion (See BH-02 Cable Percussion Log)		
						12.15	-8.02		Very dense, greyish black, very gravelly SAND with some sub rounded COBBLES, occasional BOULDERS and some shell fragments. Sand is fine to coarse. Gravel in sub rounded fine to medium	13.20 N=44 (14,11/12,12,10 ,10)	
										14.70 N=0 (0 for 0mm/0 for 0mm)	
										16.20 N=0 (0 for 0mm/0 for 0mm)	
										17.70 N=50 (15,23/50 for 75mm)	
						18.50	-14.37		Stiff, grey, slightly sandy, gravelly CLAY, with some sub rounded COBBLES	19.20 N=55 (17,21/55 for 150mm)	

11.0 12.0 13.0 14.0 15.0 16.0 17.0 18.0 19.0

Remarks:	Termination Details	Rig Details	
BH-02 Rotary Follow on / Blowing sands (4.7m) for STP at14.7m and (2.5m) for SPT at 16.2 making the test un doable		Comacchio 305	
	31.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-02-Rotary follow on
Sheet 3 of 4

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310360.63 - 970343.66	Hole Type RC
Location: Scrabster		Level: 4.13m OD	Scale 1:50
Client: Scabster Harbour		Dates: 05/06/2018 - 06/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
									Stiff, grey, slightly sandy, gravelly CLAY, with some sub rounded COBBLES	20.70 N=0 (34,50/0 for 0mm)	
										22.20 N=81 (21,43/81 for 150mm)	
						23.70	-19.57		Stiff, grey, slightly sandy, gravelly CLAY, with some sub rounded COBBLES and occasional BOULDERS, with bands of gravel.		
	25.20 - 27.00		13	0	0						
	27.00 - 27.75		0	0	0						
	27.75 - 28.50		10	0	0						
						29.50	-25.37		Very weak, greyish white, fine to medium grained SANDSTONE, weathered,		

21.0 22.0 23.0 24.0 25.0 26.0 27.0 28.0 29.0

Remarks:	Termination Details	Rig Details	
BH-02 Rotary Follow on / Blowing sands (4.7m) for STP at14.7m and (2.5m) for SPT at 16.2 making the test un doable		Comacchio 305	
	31.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-02-Rotary follow on
Sheet 4 of 4

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310360.63 - 970343.66	Hole Type RC
Location: Scrabster		Level: 4.13m OD	Scale 1:50
Client: Scabster Harbour		Dates: 05/06/2018 - 06/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
	29.50 - 31.00		53	20	0	31.00	-26.87		Very weak, greyish white, fine to medium grained SANDSTONE, weathered, fractured End of Borehole at 31.000m		

31.0
32.0
33.0
34.0
35.0
36.0
37.0
38.0
39.0

Remarks:	Termination Details	Rig Details	
BH-02 Rotary Follow on / Blowing sands (4.7m) for STP at14.7m and (2.5m) for SPT at 16.2 making the test un doable		Comacchio 305	
	31.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-03-Rotary follow on
Sheet 1 of 3

Project Name:	St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords:	310390.58 - 970312.33	Hole Type RC
Location:	Scrabster		Level:	4.27m OD	Scale 1:50
Client:	Scabster Harbour		Dates:	12/06/2018 - 13/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) / Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
									Boring undertaken by Cable Percussion (See BH-03 Cable Percussion Log)		

1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

Remarks:	Termination Details	Rig Details	
BH-03 Rotary Follow on		Comacchio 305	
	27.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-03-Rotary follow on
Sheet 2 of 3

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310390.58 - 970312.33	Hole Type RC
Location: Scrabster		Level: 4.27m OD	Scale 1:50
Client: Scabster Harbour		Dates: 12/06/2018 - 13/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
									Boring undertaken by Cable Percussion (See BH-03 Cable Percussion Log)		
						17.50	-13.23		Dense, dark grey, clayey, sandy, GRAVEL with some sub rounded COBBLES. Sand is medium to coarse grained. Gravel is sub rounded fine to medium.		

11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0

Remarks:	Termination Details	Rig Details		
BH-03 Rotary Follow on		Comacchio 305		
	27.00m	Contractor	Phoenix Drilling	

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Rotary Core Log

Borehole No.
BH-03-Rotary follow on
Sheet 3 of 3

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310390.58 - 970312.33	Hole Type RC
Location: Scrabster		Level: 4.27m OD	Scale 1:50
Client: Scabster Harbour		Dates: 12/06/2018 - 13/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
	19.50 - 21.00		20	0	0				Dense, dark grey, clayey, sandy, GRAVEL with some sub rounded COBBLES. Sand is medium to coarse grained. Gravel is sub rounded fine to medium.	21.00 N=65 (10,12/65 for 225mm)	
	21.00 - 22.50		4	0	0						
	22.50 - 24.00		0	0	0	22.50	-18.23		Dense, dark grey, clayey, sandy, GRAVEL with some sub rounded COBBLES, with bands of sand. Sand is fine to coarse grained. Gravel is sub rounded, fine.	22.50 N=56 (13,11/56 for 150mm)	
	24.00 - 25.50		0	0	0						
	25.50 - 27.00		0	0	0					25.50 N=36 (11,13/36 for 75mm)	
						27.00	-22.73		End of Borehole at 27.000m		

21.0 22.0 23.0 24.0 25.0 26.0 27.0 28.0 29.0

Remarks:	Termination Details	Rig Details	
BH-03 Rotary Follow on		Comacchio 305	
	27.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-04-Rotary follow on
Sheet 1 of 4

Project Name:	St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords:	310420.35 - 970234.33	Hole Type RC
Location:	Scrabster		Level:	4.21m OD	Scale 1:50
Client:	Scabster Harbour		Dates:	07/06/2018 - 08/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
									Boring undertaken by Cable Percussion (See BH-04 Cable Percussion Log)		

1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

Remarks:	Termination Details	Rig Details	
BH-04 Rotary Follow on / BH-04 Terminated at 18.2m but Rotary follow on starting at 17.7m due to sands blowing in during casing change over		Comacchio 305	
	35.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-04-Rotary follow on
Sheet 2 of 4

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310420.35 - 970234.33	Hole Type RC
Location: Scrabster		Level: 4.21m OD	Scale 1:50
Client: Scabster Harbour		Dates: 07/06/2018 - 08/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
									Boring undertaken by Cable Percussion (See BH-04 Cable Percussion Log)		
						17.70	-13.49		Stiff, dark grey, slightly sandy, gravelly CLAY with some sub rounded COBBLES. Sand is fine to coarse. Gravel is sub rounded fine to coarse	19.20 N=51 (8,12/51 for 150mm)	

11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0

Remarks:	Termination Details	Rig Details	
BH-04 Rotary Follow on / BH-04 Terminated at 18.2m but Rotary follow on starting at 17.7m due to sands blowing in during casing change over		Comacchio 305	
	35.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-04-Rotary follow on
Sheet 3 of 4

Project Name:	St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords:	310420.35 - 970234.33	Hole Type RC
Location:	Scrabster		Level:	4.21m OD	Scale 1:50
Client:	Scabster Harbour		Dates:	07/06/2018 - 08/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) / Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
						21.0			Stiff, dark grey, slightly sandy, gravelly CLAY with some sub rounded COBBLES. Sand is fine to coarse. Gravel is sub rounded fine to coarse	20.70 N=36 (11,13/36 for 75mm) 21.20 N=70 (11,12/15,16,17 ,22)	
						22.0				22.20 N=57 (15,9/57 for 150mm)	
						23.0					
						24.0				23.70 N=44 (17,18/44 for 150mm)	
						25.0				25.20 N=51 (10,15/51 for 150mm)	
						26.0					
						27.0				26.70 N=60 (11,14/60 for 150mm)	
						28.0				28.20 N=78 (12,12/78 for 225mm)	
						29.0				29.70 N=57 (19,23/57 for 150mm)	

Remarks:	Termination Details	Rig Details	
BH-04 Rotary Follow on / BH-04 Terminated at 18.2m but Rotary follow on starting at 17.7m due to sands blowing in during casing change over		Comacchio 305	
	35.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-04-Rotary follow on
Sheet 4 of 4

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310420.35 - 970234.33	Hole Type RC
Location: Scrabster		Level: 4.21m OD	Scale 1:50
Client: Scabster Harbour		Dates: 07/06/2018 - 08/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
									Stiff, dark grey, slightly sandy, gravelly CLAY with some sub rounded COBBLES. Sand is fine to coarse. Gravel is sub rounded fine to coarse	31.70 N=43 (24,22/43 for 75mm)	
										34.20 N=77 (21,26/77 for 150mm)	
						35.00	-30.79		End of Borehole at 35.000m		

31.0
32.0
33.0
34.0
35.0
36.0
37.0
38.0
39.0

Remarks:	Termination Details	Rig Details	
BH-04 Rotary Follow on / BH-04 Terminated at 18.2m but Rotary follow on starting at 17.7m due to sands blowing in during casing change over		Comacchio 305	
	35.00m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-05-Rotary follow on
Sheet 1 of 3

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310446.41 - 970168.85	Hole Type RC
Location: Scrabster		Level: 4.22m OD	Scale 1:50
Client: Scabster Harbour		Dates: 14/06/2018 - 15/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
									Boring undertaken by Cable Percussion (See BH-01 Cable Percussion Log)		

1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0

Remarks:	Termination Details	Rig Details	
BH-05 Rotary Follow on / BH-05 Terminated at 14.3m but Rotary follow on starting at 14.0m due to sands blowing in during casing change over		Comacchio 305	
	22.20m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-05-Rotary follow on
Sheet 2 of 3

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310446.41 - 970168.85	Hole Type RC
Location: Scrabster		Level: 4.22m OD	Scale 1:50
Client: Scabster Harbour		Dates: 14/06/2018 - 15/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
									Boring undertaken by Cable Percussion (See BH-01 Cable Percussion Log)		
						14.00	-9.78		Dense, greyish black, very gravelly SAND with sub angular to sub rounded COBBLES and some shell fragments. Sand is medium to coarse. Gravel is sub rounded fine to coarse		
						19.00	-14.78		Dense, dark grey, clayey, very sandy, GRAVEL with some sub rounded COBBLES. Sand is fine to medium grained. Gravel is sub rounded, fine to	19.20 N=33 (2,2/4,5,10,14)	

11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0

Remarks:	Termination Details	Rig Details	
BH-05 Rotary Follow on / BH-05 Terminated at 14.3m but Rotary follow on starting at 14.0m due to sands blowing in during casing change over		Comacchio 305	
	22.20m	Contractor	Phoenix Drilling

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Rotary Core Log

Borehole No.
BH-05-Rotary follow on
Sheet 3 of 3

Project Name: St Ola Pier SI - (Land)	Project No. 1906-18	Co-ords: 310446.41 - 970168.85	Hole Type RC
Location: Scrabster		Level: 4.22m OD	Scale 1:50
Client: Scabster Harbour		Dates: 14/06/2018 - 15/06/2018	Logged By J. Stothers

Water Strikes	Depth (m) Core Run	FI	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Level (m)	Legend	Stratum Description	SPT	Well
						22.20	-17.98		Dense, dark grey, clayey, very sandy, GRAVEL with some sub rounded COBBLES. Sand is fine to medium grained. Gravel is sub rounded, fine to medium. Becoming stiff, dark grey, very sandy, slightly gravelly, CLAY from approx. 20.0m depth. End of Borehole at 22.200m	20.70 N=0 (50 for 75mm/0 for 0mm) 22.20 N=27 (11,14/27 for 75mm)	

21.0
22.0
23.0
24.0
25.0
26.0
27.0
28.0
29.0

Remarks:	Termination Details	Rig Details	
BH-05 Rotary Follow on / BH-05 Terminated at 14.3m but Rotary follow on starting at 14.0m due to sands blowing in during casing change over		Comacchio 305	
	22.20m	Contractor	Phoenix Drilling

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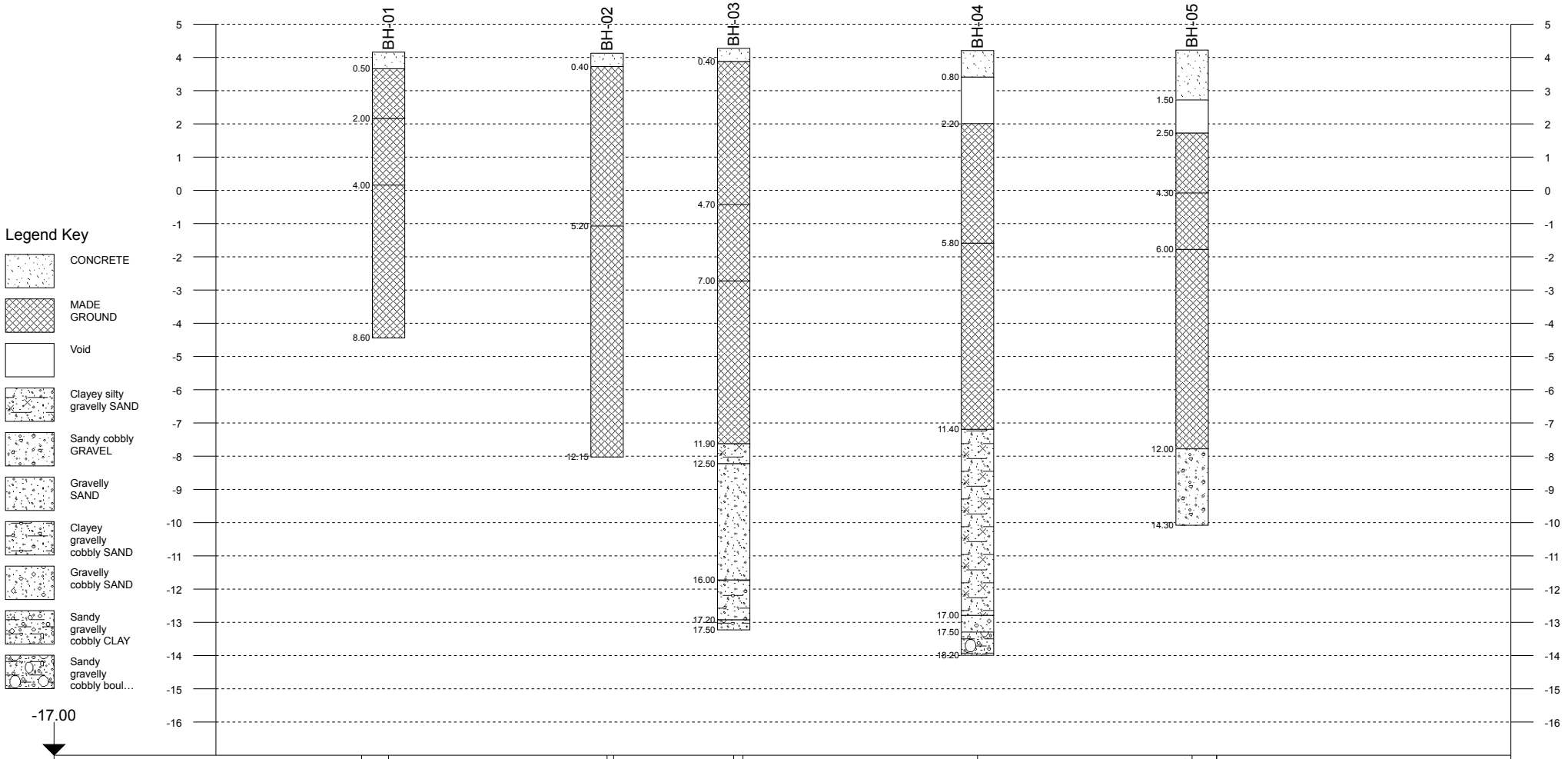
Project Id: 1906-18	Title: Section 1
Project Title: St Ola Pier SI - (Land)	Vertical Scale: 1:175
Location: Scrabster	Horizontal Scale: 1:2000
Client: Scabster Harbour	Engineer: RPS



Chainage (m)	0.00	9.29	84.46	88.72	128.04	131.22	211.93	285.75	294.20
Offset (m)	0.97		0.16		0.27		0.29	0.62	
Elevation (mAOD)	4.16		4.13		4.27		4.21	4.22	

Project Id: 1906-18	Title: Section line 1
Project Title: St Ola Pier SI - (Land)	Vertical Scale: 1:200
Location: Scrabster	Horizontal Scale: 1:1250
Client: Scabster Harbour	Engineer: RPS

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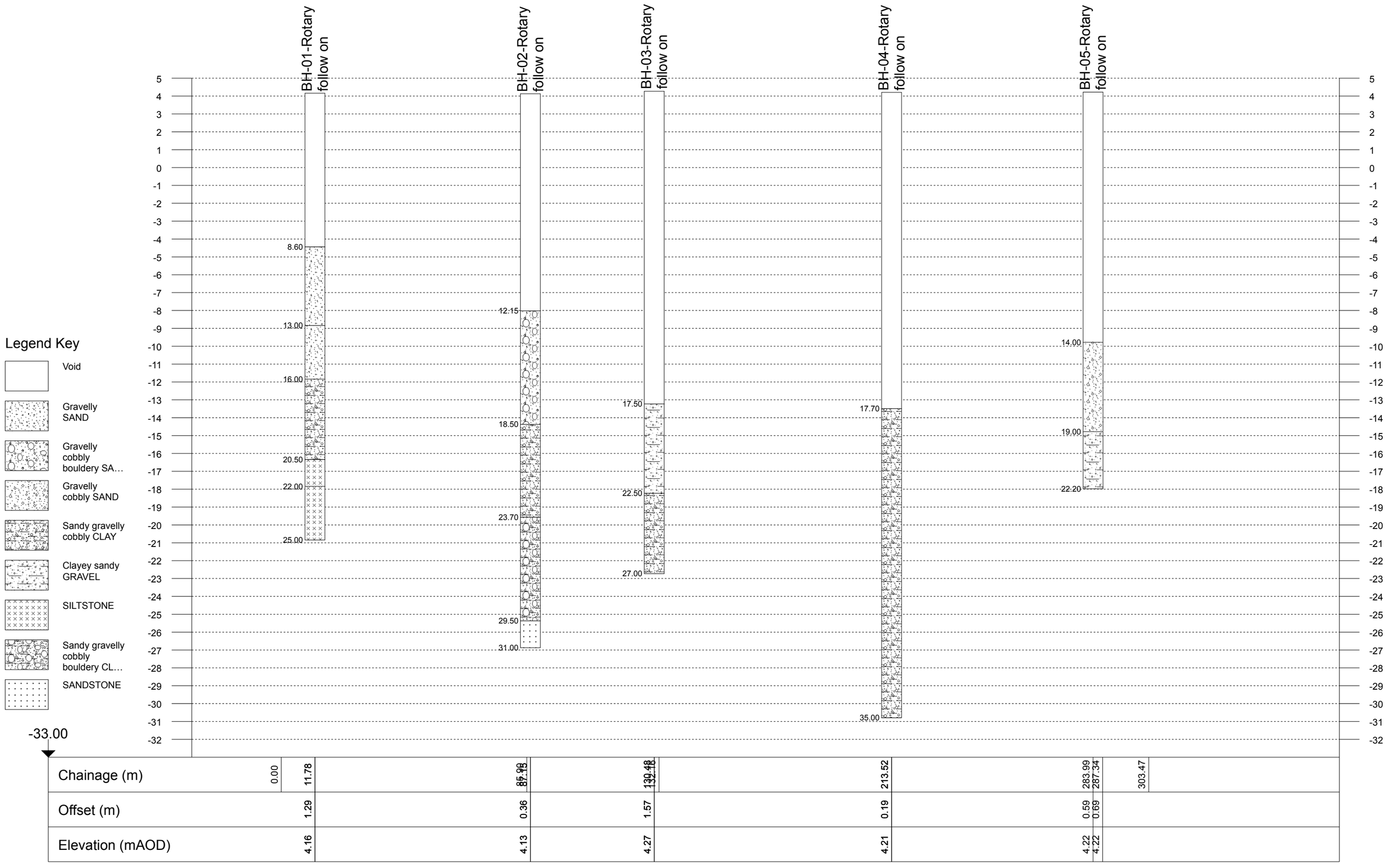

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APPENDIX C
IN-SITU TEST RESULTS

NOT REQUIRED

APPENDIX D
LABORATORY TEST RESULTS

Geotechnical Laboratory Test Results

Soil

Atterberg Limits
Moisture Content
Sulphate Content
Particle Size Distribution
Particle Density

Chloride Content
Moisture Content (Soils)
Moisture Content (Rock)
pH
Organic Matter Content

Unconsolidated Undrained Triaxial (Single stage without measurement of pore water pressure)
Unconsolidated Undrained Triaxial (Multi stage without measurement of pore water pressure)
Shear Box (60mm x 60mm) – Peak and Residual
Shear Box (100mm x 100mm) – Peak and Residual

Rock

Unconfined Compressive Strength
Point Load
Porosity and Density

Environmental Laboratory Test Results

Soil

Metals – Antimony, arsenic, barium, berrylium, boron (water soluble), cadmium, chromium III, chromium IV, copper, lead, mercury, molybdenum, nickel, selenium & vanadium.

Inorganics – Cyanide, free

Organics – Speciated aliphatic and aromatic hydrocarbons, BTEX, MTBE, PAH, phenols, tributyl tin, VOCs, SVOCs,

Asbestos - Screen

Atterberg Limits

Location: St Ola Pier, Scrabster-Site Investigation (Land)

Job No: 1906-18

Client: Scrabster Harbour Trust

Hole ID	LL (%)	PL (%)	PI (%)	Sample References	Results
BH03 1M	24	22	2	Refer to Log	ML
BH03 3.7-4.2M	28	25	3	Refer to Log	ML
BH03 17.2M	22	20	2	Refer to Log	ML
BH04 17.5M	20	19	1	Refer to Log	ML
BH05 19-22M (A)	27	NP	NA	Refer to Log	Non Plastic
BH05 19-22M(B)	24	21	3	Refer to Log	ML
BH05 19-22M (C)	23	21	2	Refer to Log	ML
BH05 19-22M (D)	22	20	2	Refer to Log	ML
		Operator		**Checked**	**Approved**
		RL		JMCN	JW

BS1377: Part 2: 1990

Bulk Density - Water Displacement

Location: St Ola Pier, Scrabster-Site Investigatio (Land)

Client: Scrabster Harbour Trust

Job No: 1906-18

ID	*Depth*	*Density (kN/m3)*
BH01	7.00	24.523
BH01	11.00	24.611
BH01	16.20	26.160
BH02	4.00	26.160
BH02	7.00	24.611
BH02	22.20	24.525
BH03	7.80-8.00	26.063
BH03	22.50	25.697
BH04	5.80	27.983
BH04	34.20	27.036
BH05	5.70	23.003
BH05	13.00	21.899

Operator	Checked	Approved
R.L	JMCN	JW

Moisture Content Results

Location: St Ola Pier SI

Job No: 1906-18

Client: Scrabster Harbour Trust

Sample no:	Depth (m)	Water Content (%)
BH1	0.50	6.56
BH1	2.50	10.34
BH1	5.50	11.18
BH2	0.50	7.10
BH2	2.50	7.92
BH2	5.50	3.28
BH2	11.00	2.70
BH3	0.50	10.97
BH3	2.7-3.2	8.22
BH3	13.0-14.0	31.83
BH3	16.0-17.0	8.03
BH3	17.20	9.71
BH3	18.0-20.0	16.38
BH3 (RC)	19.5-21.0	8.59
BH3 (RC)	20.0-27.0	143.40
BH3 (RC)	22.50	9.23
BH4	2.2	8.16
BH4	3.7	8.41
BH4	5.80	9.04
BH4	10.00	3.74
BH4	14.5	23.34
BH4	17.50	8.68
BH5	2.50	14.59
BH5	3.7	16.47
BH5	5.7	5.69
BH5	9.5	2.19
BH5	13.0	4.09
BH5(A)	19-22	17.77
BH5(B)	19-22	19.61
BH5(C)	19-22	22.79
BH5(D)	19-22	18.90

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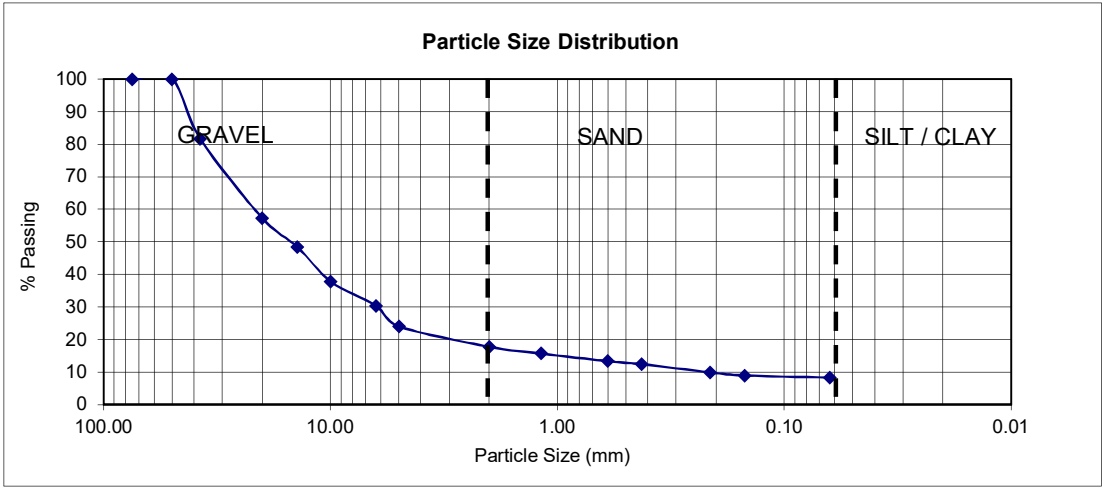
RL	JMcN	JW

BS 1377 : Part 2 1990 : Section 3

Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH01
Soil description:			**Sample no.**	BH01A
Clayey, Sandy, fine to coarse GRAVEL			**Depth**	0.5M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	04/07/2018
Initial dry mass (m1)	1401.47			
Mass of receiver (g)				

BS test sieve (mm)	Mass of dry soil + receiver (g)	Mass of dry soil retained (m2) (g)	Percentage retained (m2/m1)100	Cumulative percentage passing
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		257.33	18.36	81.64
20		340.27	24.28	57.36
14		125.33	8.94	48.42
10		147.58	10.53	37.89
6.3		105.65	7.54	30.35
5		88.08	6.28	24.06
2		88.27	6.30	17.76
1.18		28.78	2.05	15.71
0.6		32.93	2.35	13.36
0.425		13.11	0.94	12.43
0.212		35.09	2.50	9.92
0.15		13.16	0.94	8.98
0.063		9.42	0.67	8.31
Bottom tray		116.47	8.31	0.00



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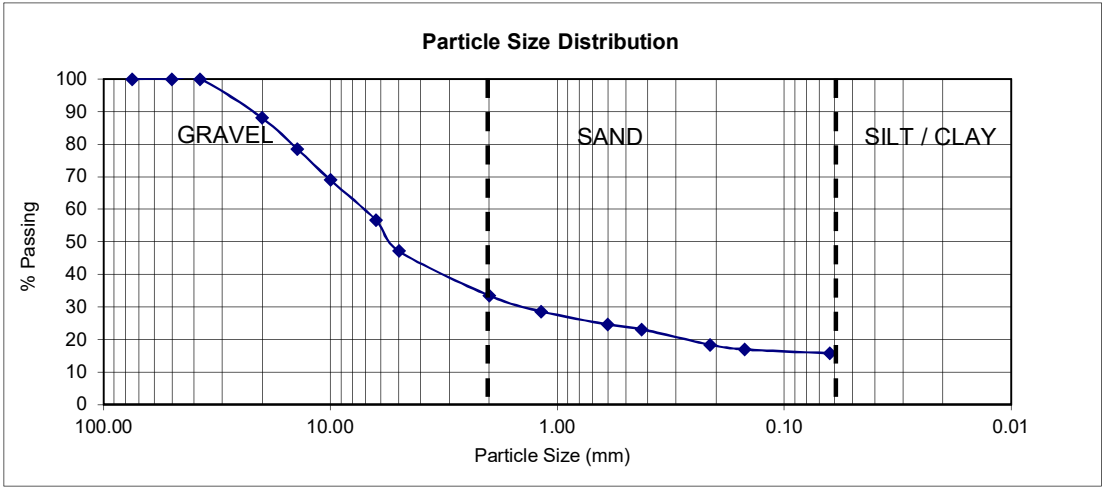
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH01
Soil description:			**Sample no.**	BH01B
Clayey, Sandy, fine to coarse GRAVEL			**Depth**	2.5M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	04/07/2018
Initial dry mass (m1)	1846.90			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		220.93	11.96	88.04
14		175.90	9.52	78.51
10		176.31	9.55	68.97
6.3		227.70	12.33	56.64
5		174.50	9.45	47.19
2		251.99	13.64	33.55
1.18		90.61	4.91	28.64
0.6		73.16	3.96	24.68
0.425		28.16	1.52	23.15
0.212		87.82	4.75	18.40
0.15		26.35	1.43	16.97
0.063		21.31	1.15	15.82
Bottom tray		292.16	15.82	0.00



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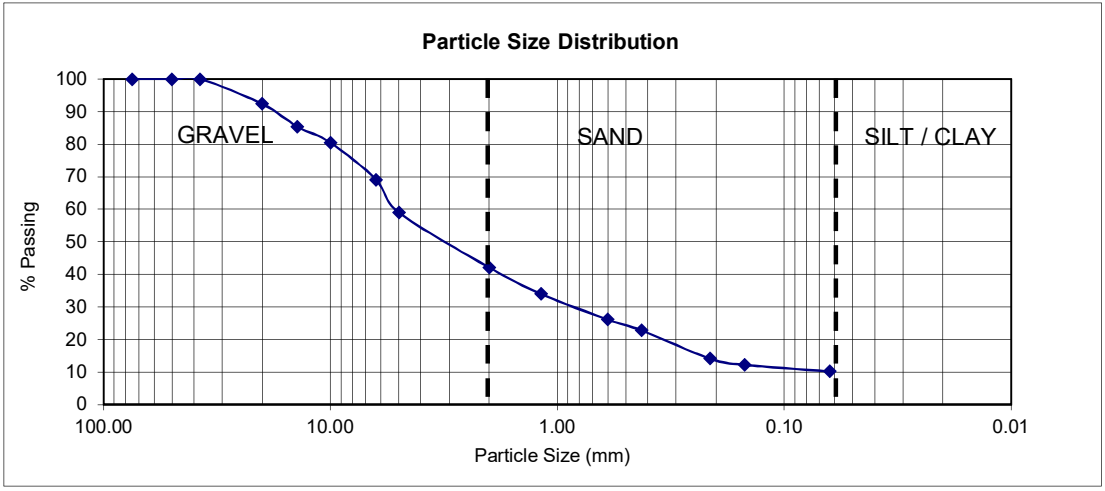
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH01
Soil description:			**Sample no.**	BH01C
Clayey, Sandy, fine to coarse GRAVEL			**Depth**	5.5M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	04/07/2018
Initial dry mass (m1)	1588.02			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		121.13	7.63	92.37
14		111.26	7.01	85.37
10		77.66	4.89	80.48
6.3		180.17	11.35	69.13
5		161.24	10.15	58.98
2		267.41	16.84	42.14
1.18		129.36	8.15	33.99
0.6		124.76	7.86	26.14
0.425		53.30	3.36	22.78
0.212		137.50	8.66	14.12
0.15		29.81	1.88	12.24
0.063		32.14	2.02	10.22
Bottom tray		162.28	10.22	0.00



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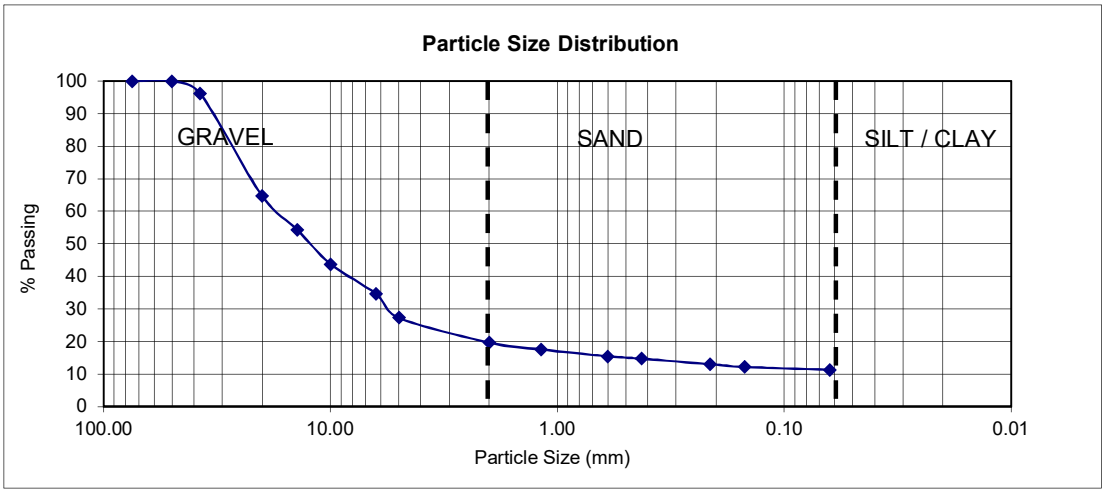
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH02
Soil description:			**Sample no.**	BH02A
Clayey, Sandy, fine to medium GRAVEL			**Depth**	0.5M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	04/07/2018
Initial dry mass (m1)	1262.13			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		49.29	3.91	96.09
20		397.08	31.46	64.63
14		129.67	10.27	54.36
10		133.46	10.57	43.79
6.3		115.80	9.17	34.61
5		92.40	7.32	27.29
2		96.05	7.61	19.68
1.18		26.38	2.09	17.59
0.6		26.57	2.11	15.48
0.425		9.44	0.75	14.74
0.212		21.02	1.67	13.07
0.15		11.08	0.88	12.19
0.063		10.54	0.84	11.36
Bottom tray		143.35	11.36	0.00



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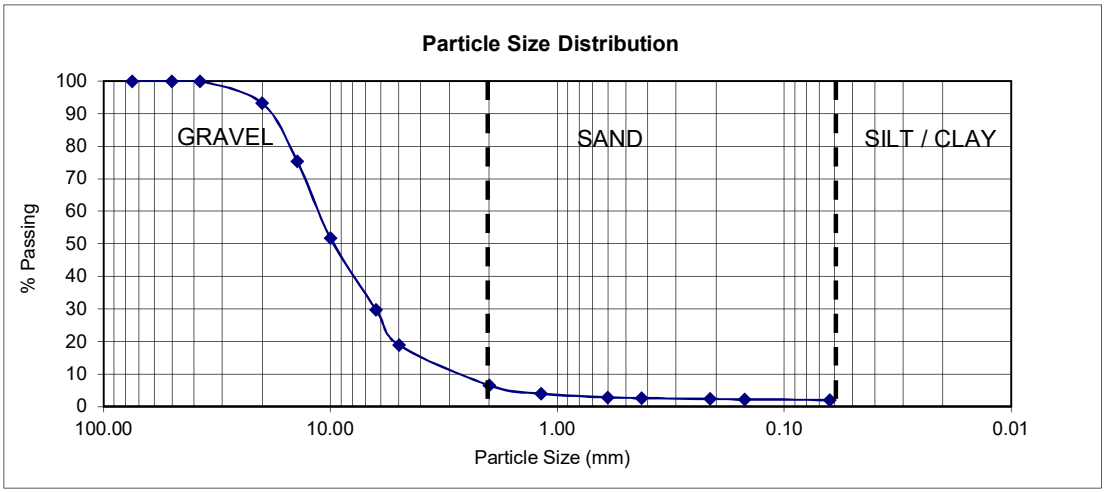
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH02
Soil description:			**Sample no.**	BH02D
Slightly Clayey, slightly Sandy, fine to medium GRAVEL			**Depth**	11M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	04/07/2018
Initial dry mass (m1)	1134.52			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		77.25	6.81	93.19
14		202.59	17.86	75.33
10		268.03	23.62	51.71
6.3		249.13	21.96	29.75
5		122.55	10.80	18.95
2		140.76	12.41	6.54
1.18		28.91	2.55	3.99
0.6		12.50	1.10	2.89
0.425		2.85	0.25	2.64
0.212		3.00	0.26	2.38
0.15		1.34	0.12	2.26
0.063		2.21	0.19	2.06
Bottom tray		23.40	2.06	0.00



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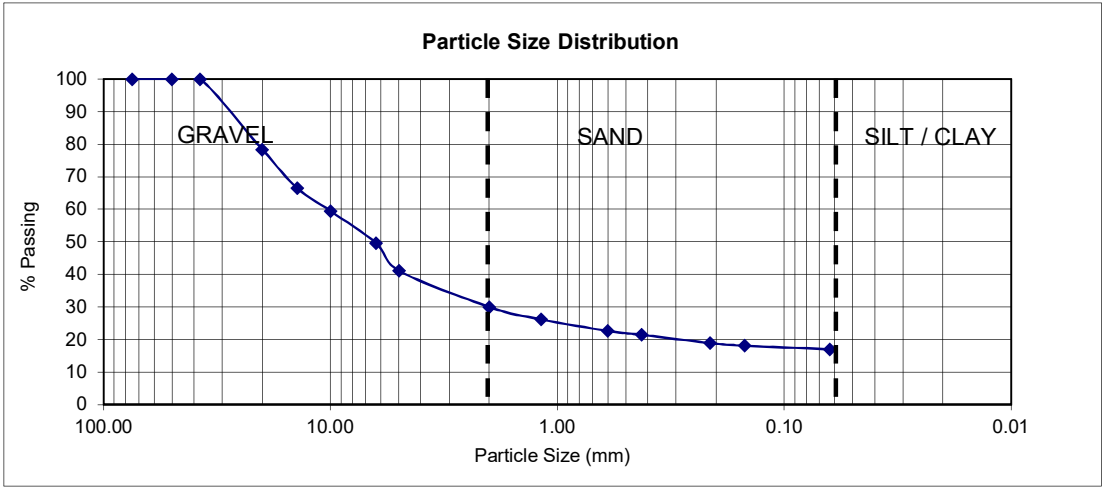
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH02
Soil description:			**Sample no.**	BH02B
Clayey, Sandy, fine to medium GRAVEL			**Depth**	2.5M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	04/07/2018
Initial dry mass (m1)	1460.62			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		315.65	21.61	78.39
14		173.74	11.89	66.49
10		102.72	7.03	59.46
6.3		142.71	9.77	49.69
5		124.77	8.54	41.15
2		162.53	11.13	30.02
1.18		56.23	3.85	26.17
0.6		51.30	3.51	22.66
0.425		17.52	1.20	21.46
0.212		36.91	2.53	18.93
0.15		11.84	0.81	18.12
0.063		16.25	1.11	17.01
Bottom tray		248.45	17.01	0.00



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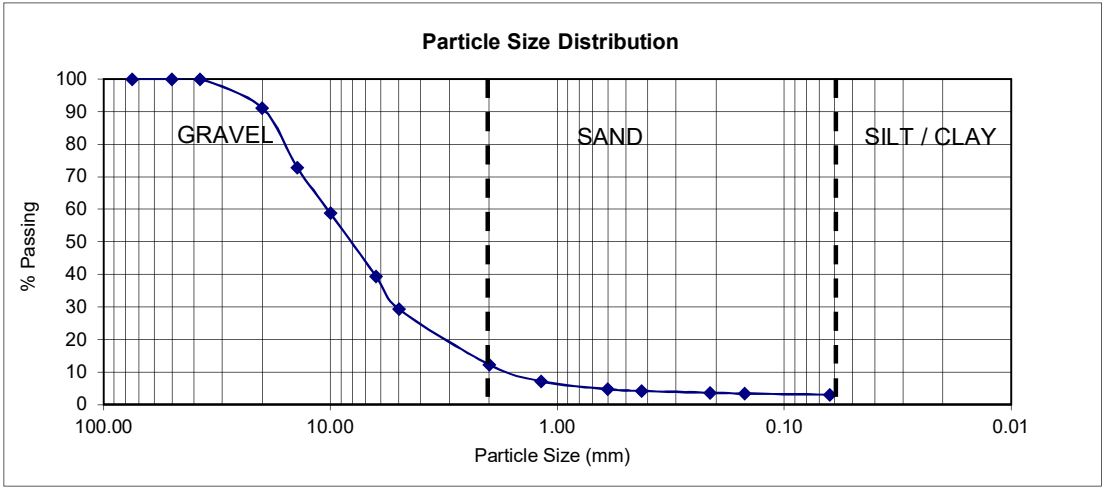
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH02
Soil description:			**Sample no.**	BH02C
Slightly Clayey, Sandy, fine to medium GRAVEL			**Depth**	5.5M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	04/07/2018
Initial dry mass (m1)	1307.71			
Mass of receiver (g)				

BS test sieve (mm)	Mass of dry soil + receiver (g)	Mass of dry soil retained (m2) (g)	Percentage retained (m2/m1)100	Cumulative percentage passing
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		116.20	8.89	91.11
14		240.15	18.36	72.75
10		183.14	14.00	58.75
6.3		252.20	19.29	39.46
5		132.24	10.11	29.35
2		222.56	17.02	12.33
1.18		67.18	5.14	7.19
0.6		31.87	2.44	4.75
0.425		6.97	0.53	4.22
0.212		7.21	0.55	3.67
0.15		3.19	0.24	3.43
0.063		4.32	0.33	3.10
Bottom tray		40.48	3.10	0.00



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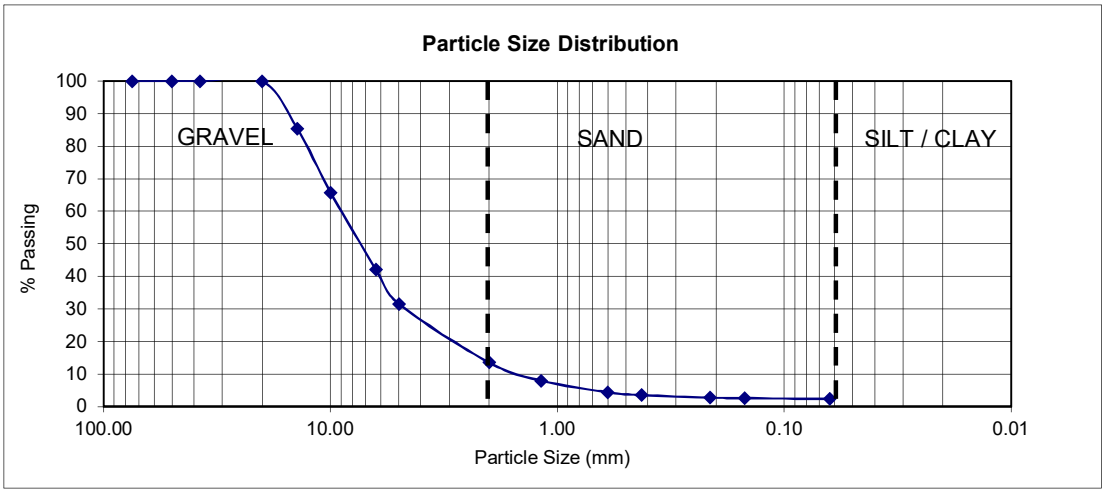
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH04
Soil description:			**Sample no.**	BH04D
Slightly Clayey, slightly Sandy, fine to medium GRAVEL			**Depth**	10M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	04/07/2018
Initial dry mass (m1)	1426.62			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		0.00	0.00	100.00
14		207.73	14.56	85.44
10		280.22	19.64	65.80
6.3		338.51	23.73	42.07
5		149.60	10.49	31.58
2		257.19	18.03	13.55
1.18		79.27	5.56	8.00
0.6		51.20	3.59	4.41
0.425		12.16	0.85	3.56
0.212		10.98	0.77	2.79
0.15		2.43	0.17	2.62
0.063		3.63	0.25	2.36
Bottom tray		33.70	2.36	0.00



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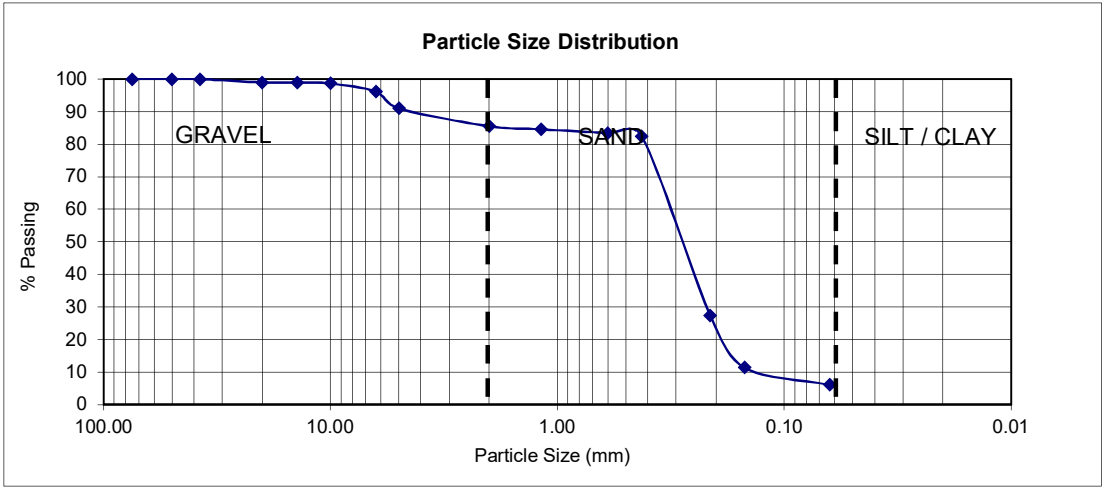
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH04
Soil description:			**Sample no.**	BH04E
Gravelly, Clayey, medium to fine grained SAND			**Depth**	14.5M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	25/07/2018
Initial dry mass (m1)	1330.51			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		13.69	1.03	98.97
14		0.00	0.00	98.97
10		4.39	0.33	98.64
6.3		32.74	2.46	96.18
5		69.18	5.20	90.98
2		72.35	5.44	85.54
1.18		12.69	0.95	84.59
0.6		15.75	1.18	83.41
0.425		12.72	0.96	82.45
0.212		732.84	55.08	27.37
0.15		212.71	15.99	11.38
0.063		70.76	5.32	6.06
Bottom tray		80.69	6.06	0.00



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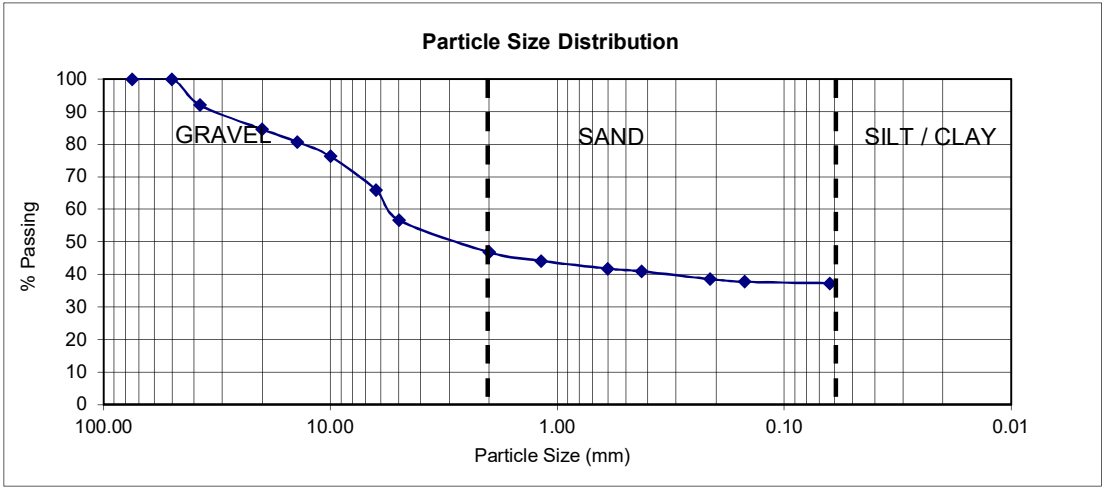
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH04
Soil description:			**Sample no.**	BH04F
Slightly Sandy, Gravelly CLAY			**Depth**	17.5M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	04/07/2018
Initial dry mass (m1)	1365.65			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		109.75	8.04	91.96
20		101.05	7.40	84.56
14		52.86	3.87	80.69
10		60.80	4.45	76.24
6.3		141.06	10.33	65.91
5		125.55	9.19	56.72
2		134.80	9.87	46.85
1.18		36.34	2.66	44.19
0.6		32.74	2.40	41.79
0.425		11.50	0.84	40.95
0.212		32.36	2.37	38.58
0.15		10.97	0.80	37.77
0.063		6.57	0.48	37.29
Bottom tray		509.30	37.29	0.00



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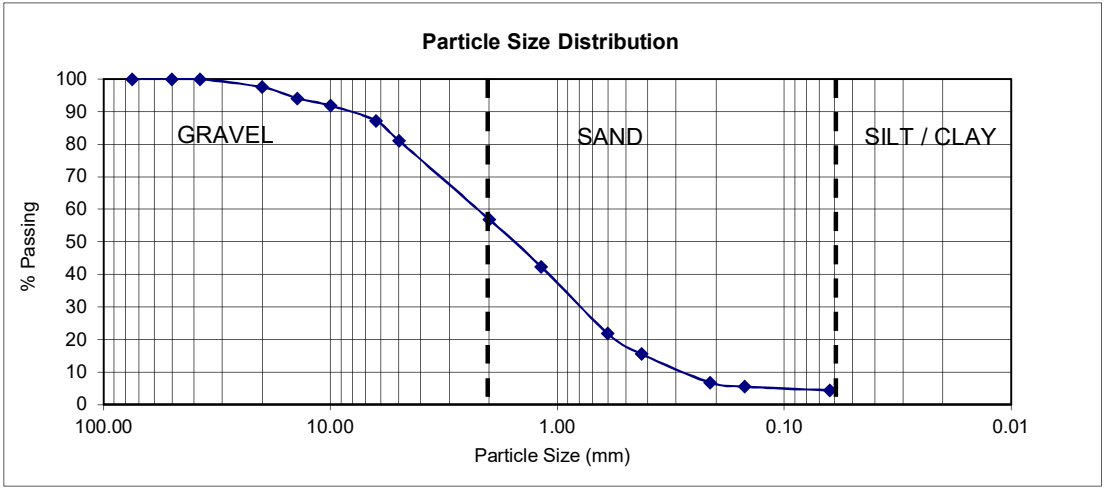
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH04
Soil description:			**Sample no.**	BH04A
Slightly Clayey, Gravelly, medium to coarse grained SAND			**Depth**	2.2M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	04/07/2018
Initial dry mass (m1)	1628.82			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		40.58	2.49	97.51
14		55.49	3.41	94.10
10		36.86	2.26	91.84
6.3		75.16	4.61	87.22
5		99.53	6.11	81.11
2		393.77	24.18	56.94
1.18		236.63	14.53	42.41
0.6		335.28	20.58	21.83
0.425		102.89	6.32	15.51
0.212		142.55	8.75	6.76
0.15		19.49	1.20	5.56
0.063		18.76	1.15	4.41
Bottom tray		71.83	4.41	0.00



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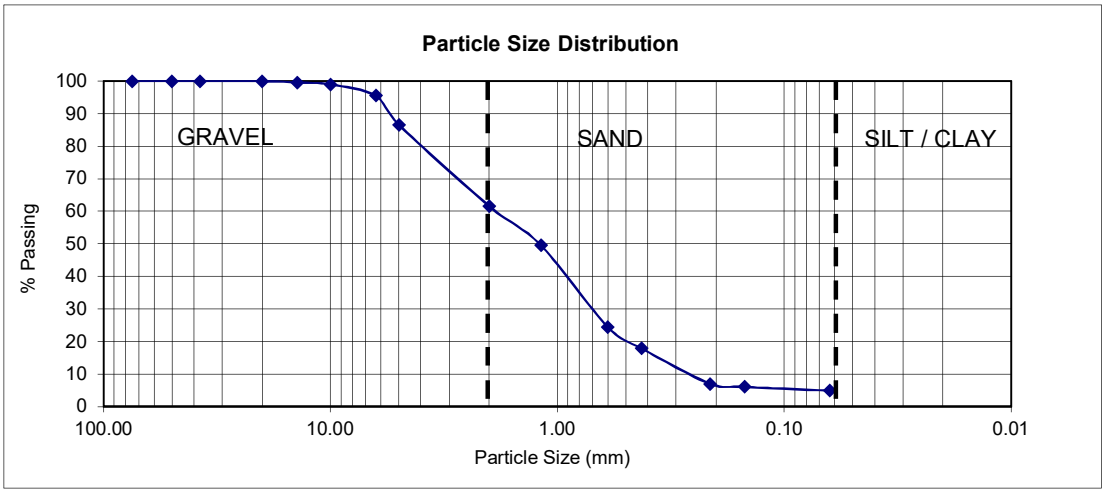
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH04
Soil description:			**Sample no.**	BH04B
Slightly Clayey, Gravelly, medium to coarse grained SAND			**Depth**	3.7M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	04/07/2018
Initial dry mass (m1)	1539.21			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		0.00	0.00	100.00
14		7.22	0.47	99.53
10		8.30	0.54	98.99
6.3		53.85	3.50	95.49
5		136.58	8.87	86.62
2		384.75	25.00	61.62
1.18		186.60	12.12	49.50
0.6		385.99	25.08	24.42
0.425		101.15	6.57	17.85
0.212		166.91	10.84	7.01
0.15		14.30	0.93	6.08
0.063		17.49	1.14	4.94
Bottom tray		76.07	4.94	0.00



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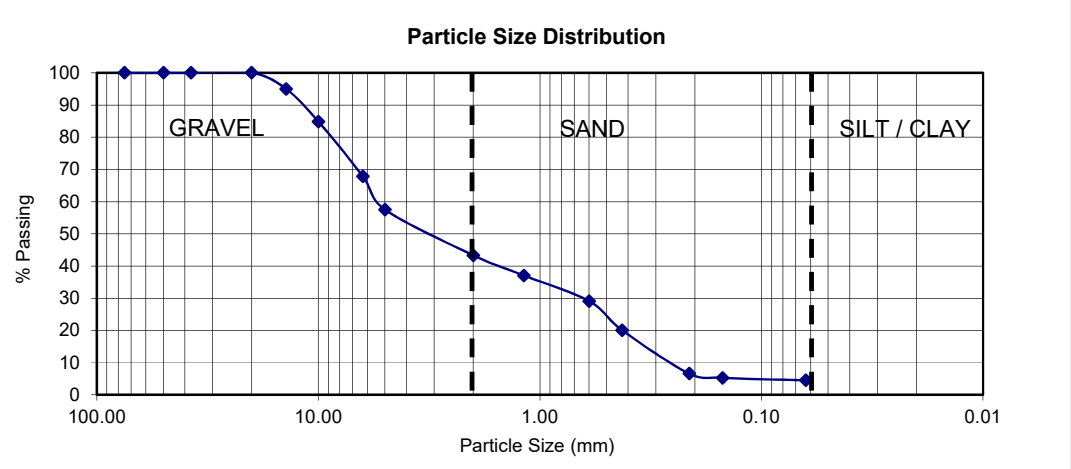
Particle Size Distribution

Location:		Job ref:	1906-18
St Ola Pier, Scrabster-Site Investigation		Borehole/ Pit no.	BH04
Soil description:		Sample no.	BH04C
Slightly Clayey, very Sandy, fine to medium GRAVEL		Depth	5.8M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*		Date	04/07/2018
Initial dry mass (m1)	1448.38		
Mass of receiver (g)			

BS test sieve (mm)	Mass of dry soil + receiver (g)	Mass of dry soil retained (m2) (g)	Percentage retained (m2/m1)100	Cumulative percentage passing
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		0.00	0.00	100.00
14		72.56	5.01	94.99
10		146.43	10.11	84.88
6.3		246.94	17.05	67.83
5		149.77	10.34	57.49
2		205.17	14.17	43.32
1.18		90.93	6.28	37.05
0.6		115.27	7.96	29.09
0.425		131.59	9.09	20.00
0.212		194.68	13.44	6.56
0.15		18.97	1.31	5.25
0.063		10.99	0.76	4.49
Bottom tray		65.08	4.49	0.00



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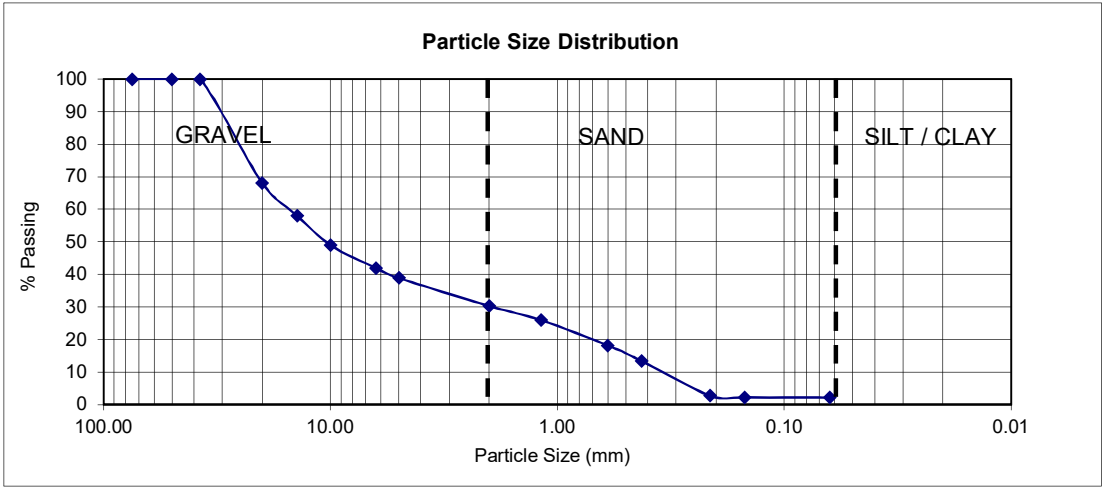
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH05
Soil description:			**Sample no.**	BH05
Very Sandy, medium to fine GRAVEL			**Depth**	13M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	25/07/2018
Initial dry mass (m1)	1244.54			
Mass of receiver (g)				

BS test sieve (mm)	Mass of dry soil + receiver (g)	Mass of dry soil retained (m2) (g)	Percentage retained (m2/m1)100	Cumulative percentage passing
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		397.41	31.93	68.07
14		124.96	10.04	58.03
10		112.14	9.01	49.02
6.3		88.69	7.13	41.89
5		37.29	3.00	38.89
2		106.69	8.57	30.32
1.18		54.16	4.35	25.97
0.6		96.79	7.78	18.19
0.425		59.80	4.80	13.39
0.212		132.65	10.66	2.73
0.15		6.03	0.48	2.24
0.063		1.17	0.09	2.15
Bottom tray		26.76	2.15	0.00



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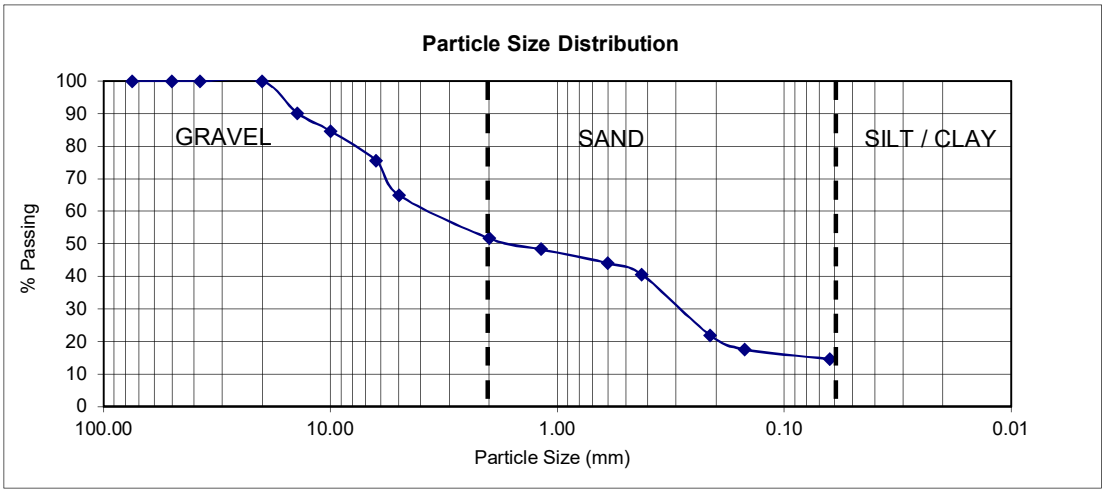
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH05
Soil description:			**Sample no.**	BH05F
Silty / Clayey, very Sandy, medium to fine GRAVEL			**Depth**	19-22M A
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	25/07/2018
Initial dry mass (m1)	978.59			
Mass of receiver (g)				

BS test sieve (mm)	Mass of dry soil + receiver (g)	Mass of dry soil retained (m2) (g)	Percentage retained (m2/m1)100	Cumulative percentage passing
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		0.00	0.00	100.00
14		96.18	9.83	90.17
10		54.04	5.52	84.65
6.3		89.49	9.14	75.50
5		102.88	10.51	64.99
2		130.06	13.29	51.70
1.18		32.97	3.37	48.33
0.6		41.36	4.23	44.11
0.425		34.78	3.55	40.55
0.212		182.35	18.63	21.92
0.15		41.93	4.28	17.63
0.063		29.99	3.06	14.57
Bottom tray		142.56	14.57	0.00



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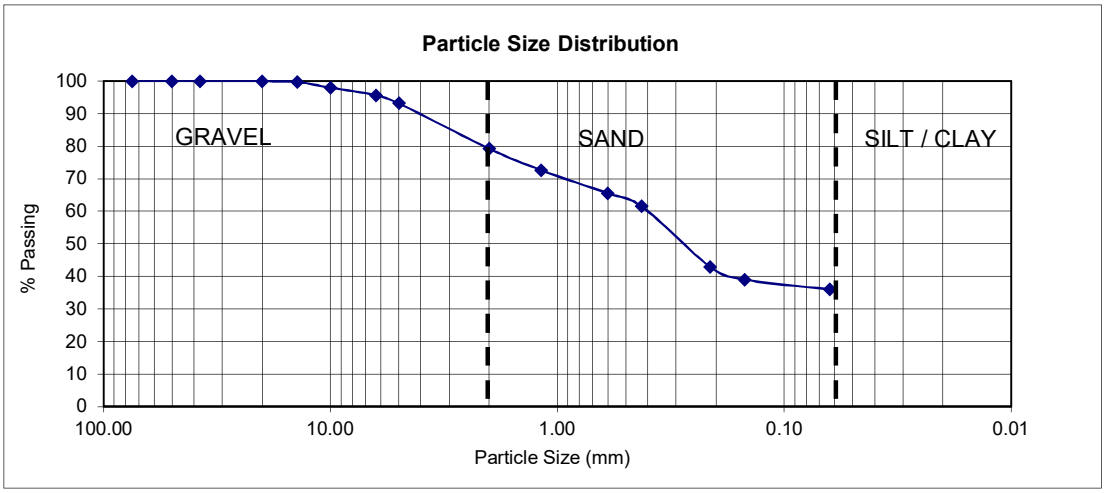
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH05
Soil description:			**Sample no.**	BH05G
Slightly Gravelly, very Sandy, SILT / CLAY			**Depth**	19-22M B
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	25/07/2018
Initial dry mass (m1)	1297.66			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		0.00	0.00	100.00
14		3.79	0.29	99.71
10		22.76	1.75	97.95
6.3		29.88	2.30	95.65
5		32.48	2.50	93.15
2		180.36	13.90	79.25
1.18		85.86	6.62	72.63
0.6		91.63	7.06	65.57
0.425		52.98	4.08	61.49
0.212		241.00	18.57	42.92
0.15		49.89	3.84	39.07
0.063		40.10	3.09	35.98
Bottom tray		466.93	35.98	0.00



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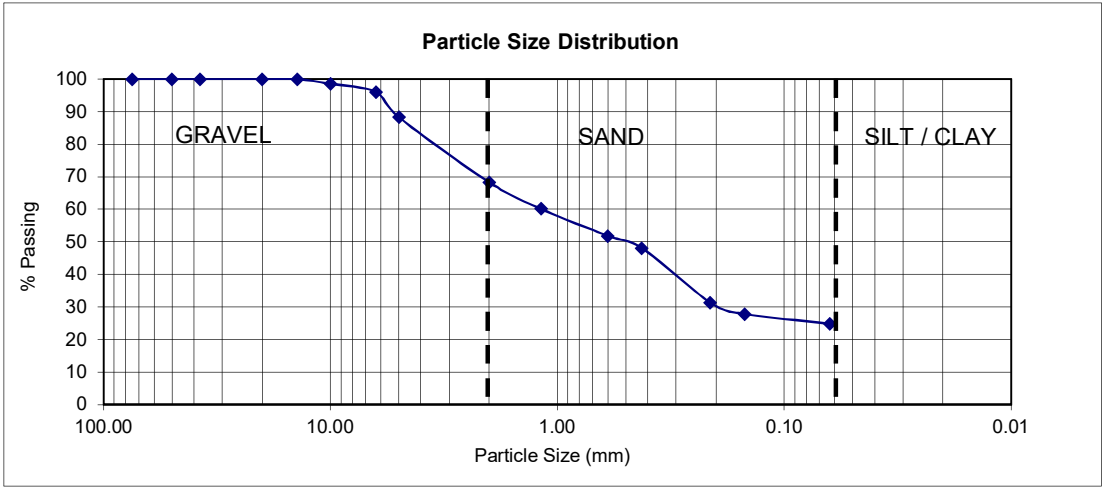
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH05
Soil description:			**Sample no.**	BH05H
Gravelly, Sandy, SILT / CLAY			**Depth**	19-22M C
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	25/07/2018
Initial dry mass (m1)	1479.64			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		0.00	0.00	100.00
14		0.00	0.00	100.00
10		21.67	1.46	98.54
6.3		36.55	2.47	96.07
5		115.33	7.79	88.27
2		295.25	19.95	68.32
1.18		121.24	8.19	60.12
0.6		122.66	8.29	51.83
0.425		55.09	3.72	48.11
0.212		247.82	16.75	31.36
0.15		51.73	3.50	27.86
0.063		44.94	3.04	24.83
Bottom tray		367.36	24.83	0.00



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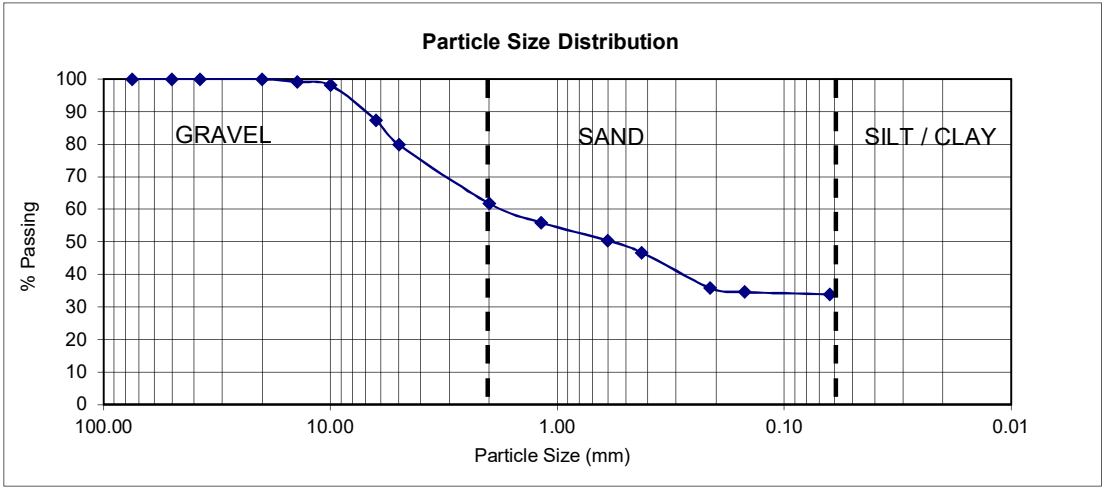
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH05
Soil description:			**Sample no.**	BH05 I
Gravelly, Sandy, CLAY / SILT			**Depth**	19-22M D
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	25/07/2018
Initial dry mass (m1)	1093.01			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		0.00	0.00	100.00
14		9.38	0.86	99.14
10		11.76	1.08	98.07
6.3		116.95	10.70	87.37
5		82.02	7.50	79.86
2		197.39	18.06	61.80
1.18		64.46	5.90	55.91
0.6		59.92	5.48	50.42
0.425		40.46	3.70	46.72
0.212		119.26	10.91	35.81
0.15		13.44	1.23	34.58
0.063		7.27	0.67	33.92
Bottom tray		370.70	33.92	0.00



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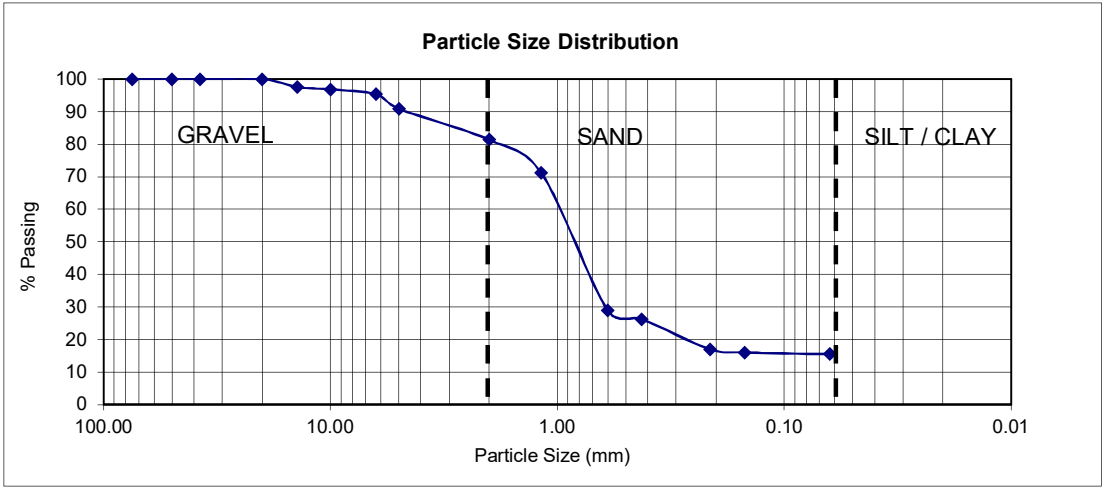
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH05
Soil description:			**Sample no.**	BH05
Clayey, Gravelly, medium to coarse grained SAND			**Depth**	2.5M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	04/07/2018
Initial dry mass (m1)	1972.69			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		0.00	0.00	100.00
14		48.43	2.46	97.54
10		13.62	0.69	96.85
6.3		28.92	1.47	95.39
5		88.82	4.50	90.89
2		187.87	9.52	81.36
1.18		200.11	10.14	71.22
0.6		834.66	42.31	28.91
0.425		52.28	2.65	26.26
0.212		182.78	9.27	16.99
0.15		18.71	0.95	16.04
0.063		10.00	0.51	15.54
Bottom tray		306.49	15.54	0.00



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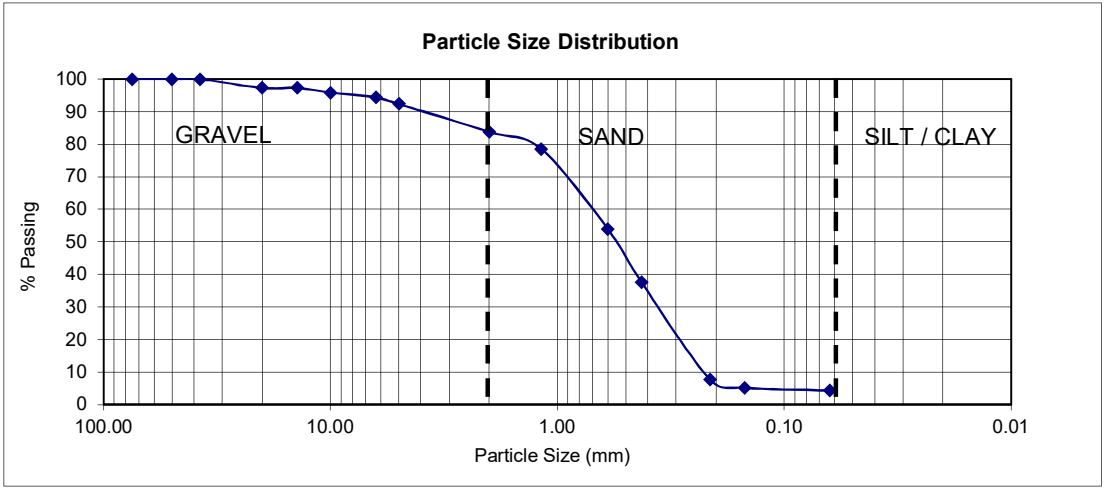
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH05
Soil description:			**Sample no.**	BH05
Gravelly, slightly Clayey, coarse to medium grained SAND			**Depth**	3.7M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	25/07/2018
Initial dry mass (m1)	1110.94			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		30.34	2.73	97.27
14		0.00	0.00	97.27
10		15.50	1.40	95.87
6.3		16.53	1.49	94.39
5		22.60	2.03	92.35
2		95.01	8.55	83.80
1.18		58.09	5.23	78.57
0.6		273.21	24.59	53.98
0.425		182.73	16.45	37.53
0.212		332.06	29.89	7.64
0.15		26.95	2.43	5.21
0.063		9.75	0.88	4.34
Bottom tray		48.17	4.34	0.00



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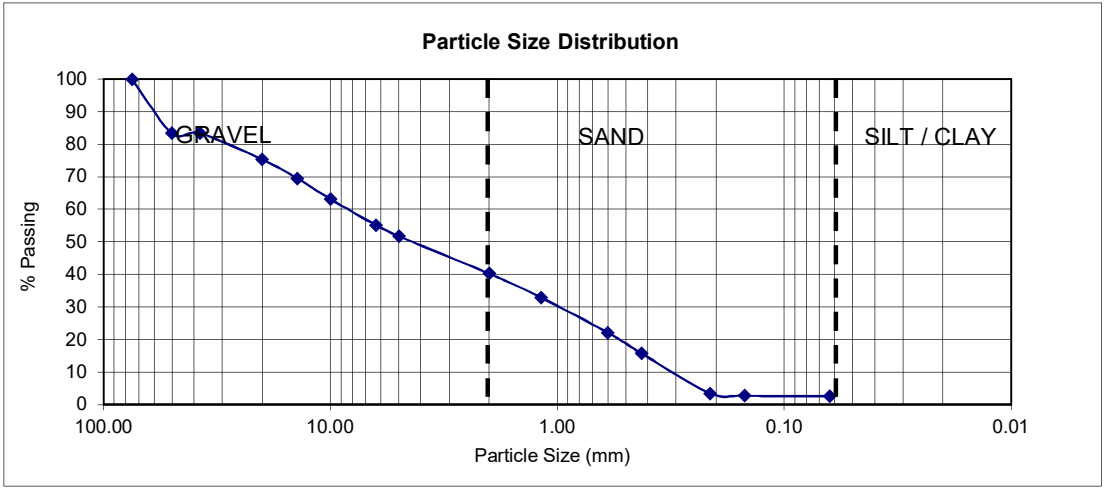
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH05
Soil description:			**Sample no.**	BH05
Slightly Clayey, very Sandy, coarse to fine GRAVEL			**Depth**	5.7M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	25/07/2018
Initial dry mass (m1)	1361.97			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		227.21	16.68	83.32
37.5		0.00	0.00	83.32
20		108.99	8.00	75.32
14		79.70	5.85	69.46
10		86.33	6.34	63.12
6.3		108.80	7.99	55.14
5		46.09	3.38	51.75
2		156.38	11.48	40.27
1.18		100.11	7.35	32.92
0.6		147.32	10.82	22.10
0.425		86.87	6.38	15.73
0.212		166.99	12.26	3.46
0.15		9.56	0.70	2.76
0.063		2.34	0.17	2.59
Bottom tray		35.28	2.59	0.00



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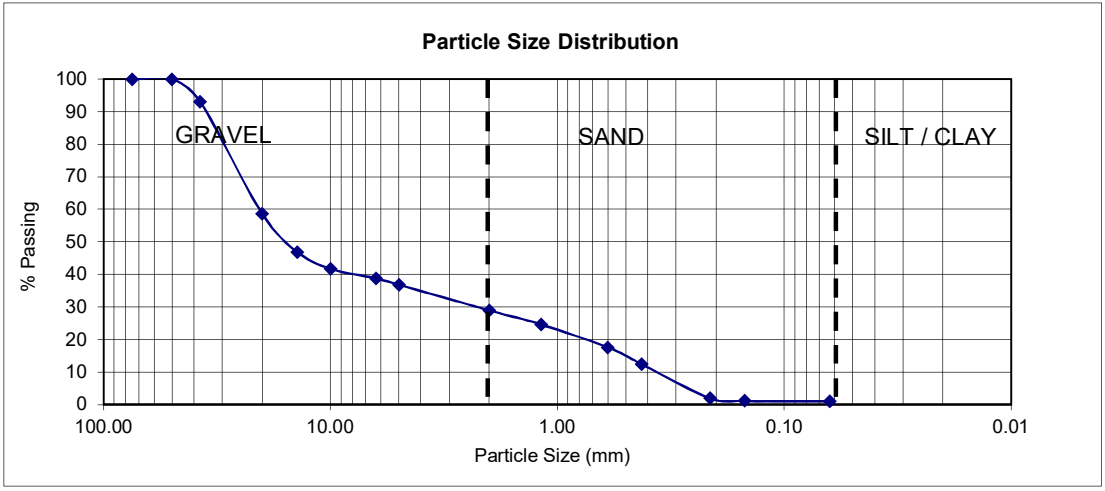
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site Investigation			**Borehole/ Pit no.**	BH05
Soil description:			**Sample no.**	BH05
Sandy, coarse to fine GRAVEL			**Depth**	9.5M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	25/07/2018
Initial dry mass (m1)	1173.99			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		82.54	7.03	92.97
20		403.99	34.41	58.56
14		137.21	11.69	46.87
10		60.64	5.17	41.70
6.3		33.96	2.89	38.81
5		23.05	1.96	36.85
2		92.26	7.86	28.99
1.18		50.98	4.34	24.65
0.6		82.42	7.02	17.63
0.425		61.45	5.23	12.39
0.212		122.83	10.46	1.93
0.15		9.14	0.78	1.15
0.063		1.72	0.15	1.01
Bottom tray		11.80	1.01	0.00



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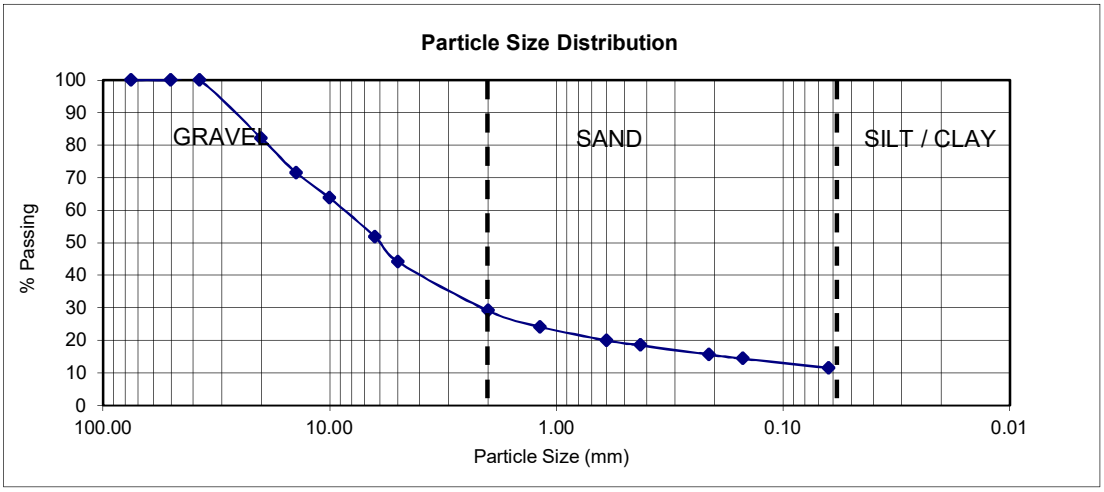
Particle Size Distribution

Location:			**Job ref:**	1906-18
St Ola Pier, Scrabster-Site investigation (Land)			**Borehole/ Pit no.**	BH3
Soil description:			**Sample no.**	BH3A
Clayey, Sandy, fine to medium GRAVEL			**Depth**	0.50M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			**Date**	28/06/2018
Initial dry mass (m1)	1403.80			
Mass of receiver (g)				
BS test sieve (mm)	**Mass of dry soil + receiver (g)**	**Mass of dry soil retained (m2) (g)**	**Percentage retained (m2/m1)100**	**Cumulative percentage passing**
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		251.59	17.92	82.08
14		149.72	10.67	71.41
10		106.80	7.61	63.80
6.3		169.28	12.06	51.75
5		106.87	7.61	44.13
2		210.60	15.00	29.13
1.18		69.70	4.97	24.17
0.6		58.78	4.19	19.98
0.425		21.05	1.50	18.48
0.212		39.67	2.83	15.65
0.15		18.31	1.30	14.35
0.063		38.99	2.78	11.57
Bottom tray		162.44	11.57	0.00



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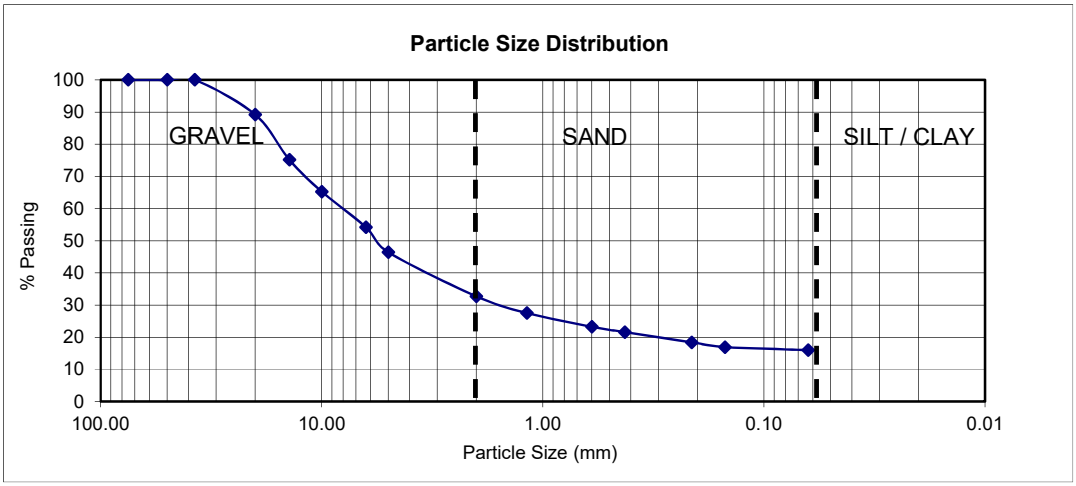
Particle Size Distribution

Location:		Job ref:	1906-18
St Ola Pier, Scrabster-Site investigation (Land)		Borehole/ Pit no.	BH3
Soil description:		Sample no.	BH3B
Clayey, Sandy, fine to medium GRAVEL		Depth	2.70-3.20M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*		Date	28/06/2018
Initial dry mass (m1)	1497.86		
Mass of receiver (g)			

BS test sieve (mm)	Mass of dry soil + receiver (g)	Mass of dry soil retained (m2) (g)	Percentage retained (m2/m1)100	Cumulative percentage passing
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		161.82	10.80	89.20
14		210.62	14.06	75.14
10		148.09	9.89	65.25
6.3		166.17	11.09	54.15
5		115.98	7.74	46.41
2		205.32	13.71	32.70
1.18		78.06	5.21	27.49
0.6		63.91	4.27	23.23
0.425		24.95	1.67	21.56
0.212		47.31	3.16	18.40
0.15		22.08	1.47	16.93
0.063		14.13	0.94	15.98
Bottom tray		239.42	15.98	0.00



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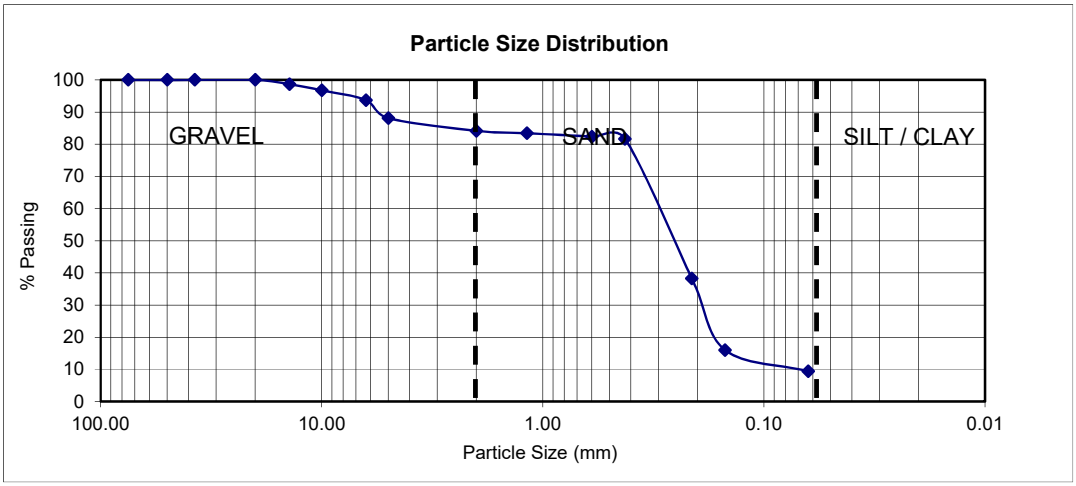
Particle Size Distribution

Location:		Job ref:	1906-18
St Ola Pier, Scrabster-Site investigation (Land)		Borehole/ Pit no.	BH3
Soil description:		Sample no.	BH3C
Clayey, Gravelly, medium grained SAND		Depth	13-14M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*		Date	28/06/2018
Initial dry mass (m1)	1192.14		
Mass of receiver (g)			

BS test sieve (mm)	Mass of dry soil + receiver (g)	Mass of dry soil retained (m2) (g)	Percentage retained (m2/m1)100	Cumulative percentage passing
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		0.00	0.00	100.00
14		16.02	1.34	98.66
10		22.86	1.92	96.74
6.3		36.20	3.04	93.70
5		66.77	5.60	88.10
2		47.01	3.94	84.16
1.18		9.01	0.76	83.40
0.6		12.62	1.06	82.34
0.425		8.73	0.73	81.61
0.212		516.80	43.35	38.26
0.15		265.01	22.23	16.03
0.063		78.74	6.60	9.43
Bottom tray		112.37	9.43	0.00



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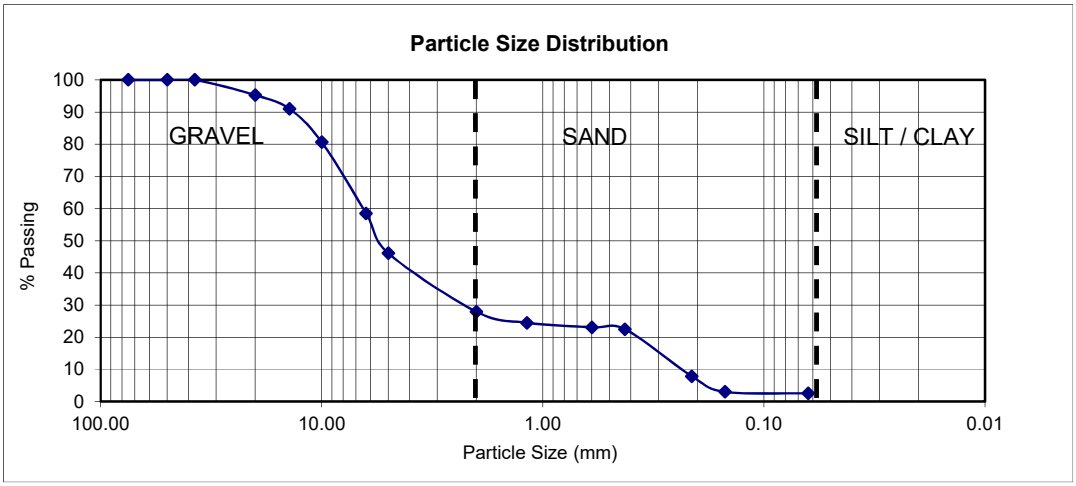
Operator	Checked	Approved
RL	JMCN	JW

Particle Size Distribution

Location:		Job ref:	1906-18
St Ola Pier, Scrabster-Site investigation (Land)		Borehole/ Pit no.	BH3
Soil description:		Sample no.	BH3D
Slightly Clayey, very Gravelly, medium grained SAND		Depth	16-17M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*		Date	28/06/2018
Initial dry mass (m1)	1450.87		
Mass of receiver (g)			

BS test sieve (mm)	Mass of dry soil + receiver (g)	Mass of dry soil retained (m2) (g)	Percentage retained (m2/m1)100	Cumulative percentage passing
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		68.62	4.73	95.27
14		62.17	4.29	90.99
10		150.39	10.37	80.62
6.3		321.01	22.13	58.49
5		179.72	12.39	46.11
2		263.87	18.19	27.92
1.18		49.80	3.43	24.49
0.6		20.76	1.43	23.06
0.425		8.31	0.57	22.48
0.212		212.30	14.63	7.85
0.15		70.27	4.84	3.01
0.063		7.28	0.50	2.51
Bottom tray		36.37	2.51	0.00



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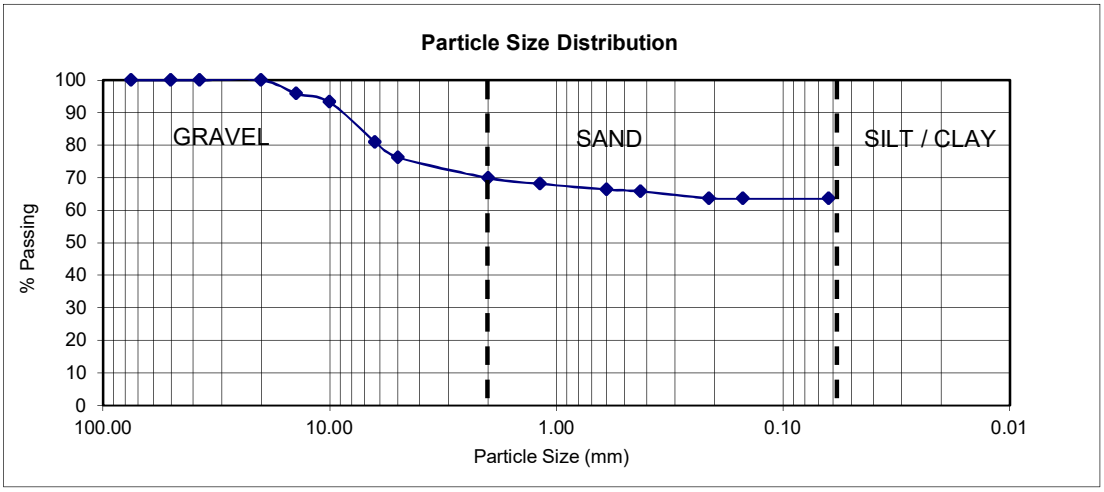
Operator	Checked	Approved
RL	JMCN	JW

Particle Size Distribution

Location:			Job ref:	1906-18
St Ola Pier, Scrabster-Site investigation (Land)			Borehole/ Pit no.	BH3
Soil description:			Sample no.	BH3E
Slightly Sandy, slightly Gravelly, CLAY			Depth	17.2M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*			Date	28/06/2018
Initial dry mass (m1)	1209.22			
Mass of receiver (g)				

BS test sieve (mm)	Mass of dry soil + receiver (g)	Mass of dry soil retained (m2) (g)	Percentage retained (m2/m1)100	Cumulative percentage passing
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		0.00	0.00	100.00
14		50.33	4.16	95.84
10		31.34	2.59	93.25
6.3		148.83	12.31	80.94
5		56.28	4.65	76.28
2		77.03	6.37	69.91
1.18		21.50	1.78	68.14
0.6		21.02	1.74	66.40
0.425		7.33	0.61	65.79
0.212		25.31	2.09	63.70
0.15		2.14	0.18	63.52
0.063		0.00	0.00	63.52
Bottom tray		768.11	63.52	0.00



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Operator	Checked	Approved
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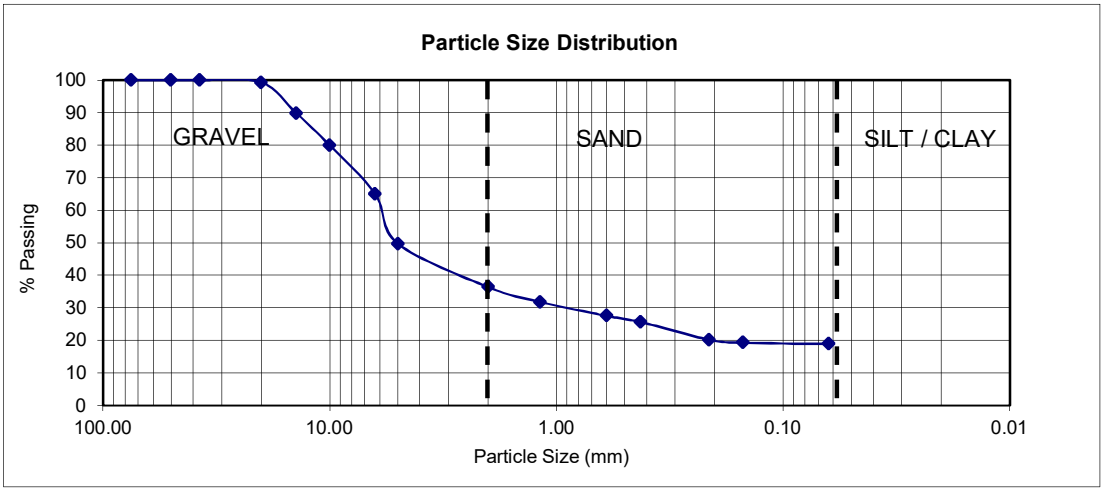
Particle Size Distribution

Location:		Job ref:	1906-18
St Ola Pier, Scrabster-Site investigation (Land)		Borehole/ Pit no.	BH3
Soil description:		Sample no.	BH3F
Clayey, Sandy, fine to medium GRAVEL		Depth	18-20M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*		Date	28/06/2018
Initial dry mass (m1)	1732.12		
Mass of receiver (g)			

BS test sieve (mm)	Mass of dry soil + receiver (g)	Mass of dry soil retained (m2) (g)	Percentage retained (m2/m1)100	Cumulative percentage passing
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		11.97	0.69	99.31
14		165.41	9.55	89.76
10		169.22	9.77	79.99
6.3		259.81	15.00	64.99
5		264.65	15.28	49.71
2		230.96	13.33	36.38
1.18		78.92	4.56	31.82
0.6		74.47	4.30	27.52
0.425		32.60	1.88	25.64
0.212		94.39	5.45	20.19
0.15		15.68	0.91	19.29
0.063		6.70	0.39	18.90
Bottom tray		327.34	18.90	0.00



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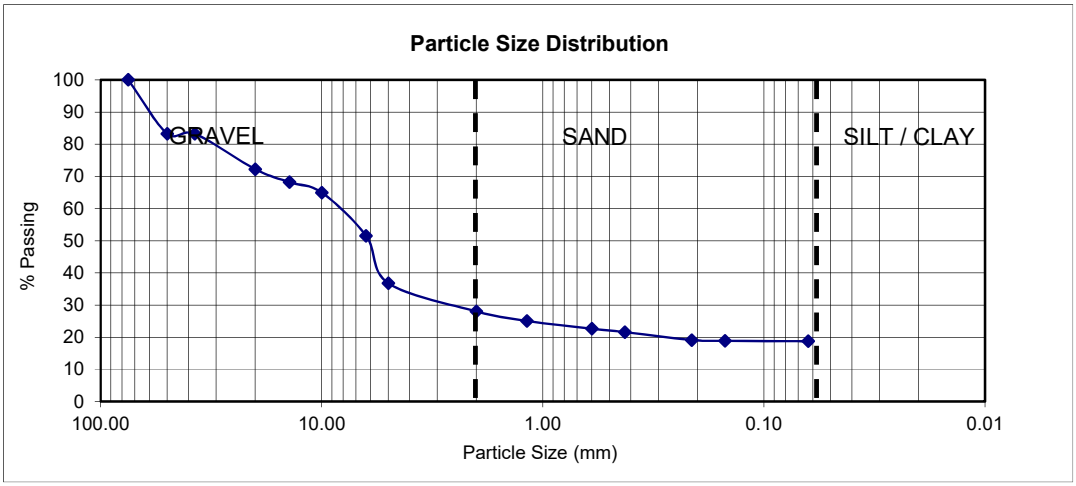
Particle Size Distribution

Location:		Job ref:	1906-18
St Ola Pier, Scrabster-Site investigation (Land)		Borehole/ Pit no.	BH3
Soil description:		Sample no.	BH3G
Clayey, Sandy, medium to coarse GRAVEL		Depth	19.50-21M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*		Date	28/06/2018
Initial dry mass (m1)	1849.76		
Mass of receiver (g)			

BS test sieve (mm)	Mass of dry soil + receiver (g)	Mass of dry soil retained (m2) (g)	Percentage retained (m2/m1)100	Cumulative percentage passing
75		0.00	0.00	100.00
50		309.76	16.75	83.25
37.5		0.00	0.00	83.25
20		204.08	11.03	72.22
14		74.65	4.04	68.19
10		59.82	3.23	64.95
6.3		248.62	13.44	51.51
5		272.20	14.72	36.80
2		162.01	8.76	28.04
1.18		55.39	2.99	25.04
0.6		44.62	2.41	22.63
0.425		19.56	1.06	21.57
0.212		45.56	2.46	19.11
0.15		4.41	0.24	18.87
0.063		2.62	0.14	18.73
Bottom tray		346.46	18.73	0.00

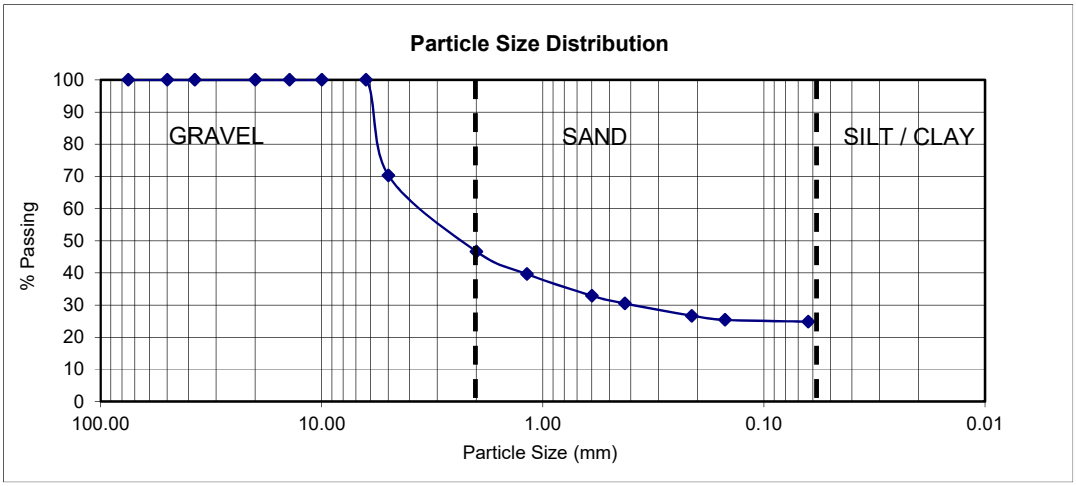


Operator	Checked	Approved
RL	JMCN	JW

Particle Size Distribution

Location:		Job ref:	1906-18
St Ola Pier, Scrabster-Site investigation (Land)		Borehole/ Pit no.	BH3
Soil description:		Sample no.	BH3H
Clayey, Sandy, fine GRAVEL		Depth	20-27M
Test method BS 1377-2:1990:9.2/9.3/9.4/9.5*		Date	28/06/2018
Initial dry mass (m1)	352.11		
Mass of receiver (g)			

BS test sieve (mm)	Mass of dry soil + receiver (g)	Mass of dry soil retained (m2) (g)	Percentage retained (m2/m1)100	Cumulative percentage passing
75		0.00	0.00	100.00
50		0.00	0.00	100.00
37.5		0.00	0.00	100.00
20		0.00	0.00	100.00
14		0.00	0.00	100.00
10		0.00	0.00	100.00
6.3		0.00	0.00	100.00
5		104.58	29.70	70.30
2		83.21	23.63	46.67
1.18		24.84	7.05	39.61
0.6		23.71	6.73	32.88
0.425		8.52	2.42	30.46
0.212		13.33	3.79	26.67
0.15		4.52	1.28	25.39
0.063		2.02	0.57	24.82
Bottom tray		87.38	24.82	0.00



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Operator	Checked	Approved
RL	JMCN	JW

Organic Content Results

Location: St Ola Pier SI

Job No: 1906-18

Client: Scrabster Harbour Trust

Sample no:	Depth (m)	Organic Content (%)
BH03	17.00	0.01
BH03	21.00	0.01

Operator	Checked	Approved
RL	JMcN	JW

BS 1377 Part 2: 1990

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					Loading 90/180/360 kPa	
Ref:	St OlaPier		Size mm	100	Initial wet mass g	631
BH	BH-01		Thickness mm	33.25	Bulk Density mg/m3	1897
Depth m	13.2-19.2m					
Our Ref	38			σ'_v kPa		
Soil type	SAND					
Rate of shearing mm/min			0.5	90		
>10 mm removed				180		
				360		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
90		90	66
180		180	123
360		360	236

Peak angle of internal friction
Cohesion kPa
Ultimate angle of internal friction **33**

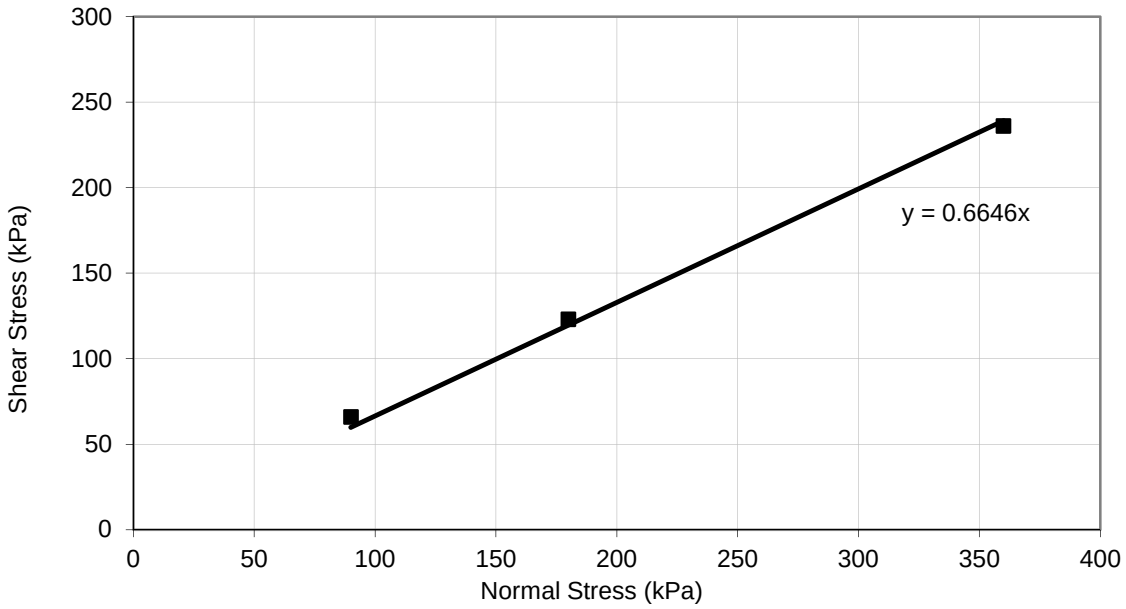
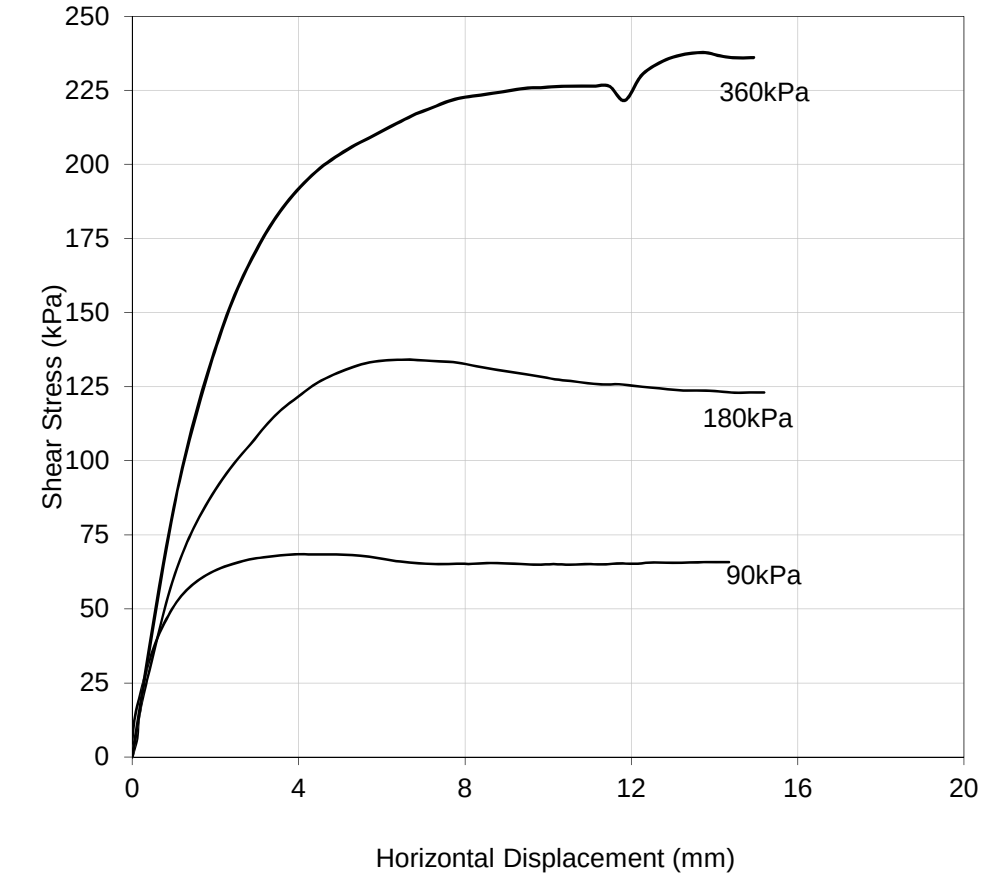


Figure 1 Failure Envelope



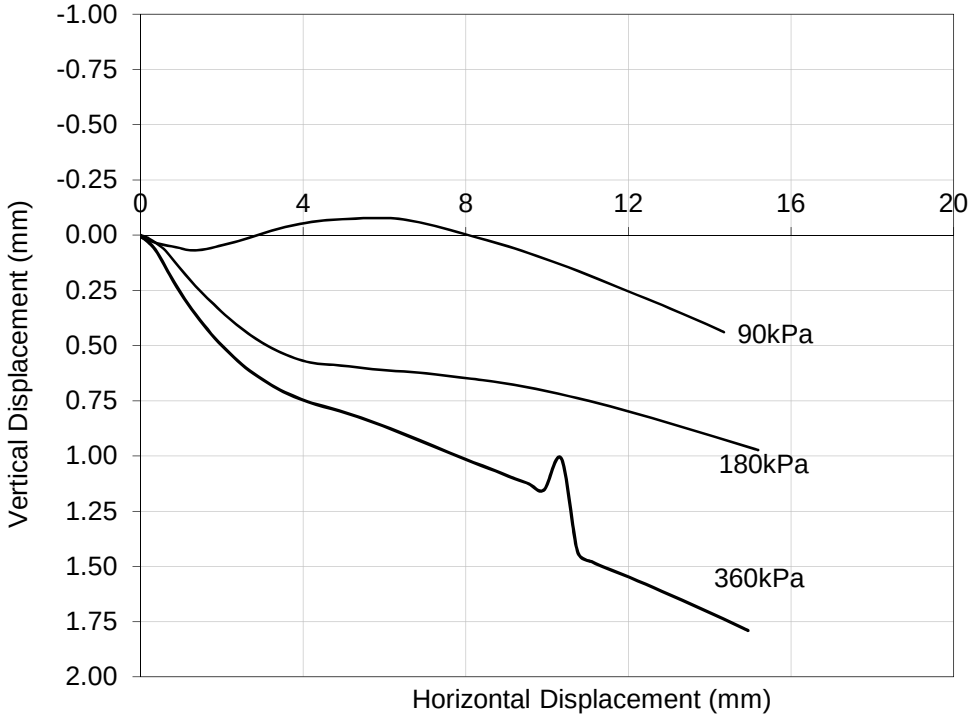


Figure 2 Stress-strain behaviour

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Ref:	St OlaPier		Size mm	100	
BH	BH-01		Thickness mm	36.75	
Depth m	3.5m				
Our Ref	34			σ'_v kPa	
Soil type	Silty sandy GRAVEL				
Rate of shearing mm/min			0.04	40	
				80	
				160	

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
40	56	40	46
80	97	80	82
160	187	160	153

Peak angle of internal friction	**48**
Cohesion kPa	
Ultimate angle of internal friction	**44**

Loading 40 kPa	
Initial wet mass g	870
Bulk Density mg/m3	2367
Final wet mass g	865
Dry mass g	761
Initial water content %	14.3
Final water content %	13.7
Loading 80 kPa	
Initial wet mass g	868
Bulk Density mg/m3	2367
Final wet mass g	856
Dry mass g	762
Initial water content %	13.9
Final water content %	12.3
Loading 160 kPa	
Initial wet mass g	868
Bulk Density mg/m3	2367
Final wet mass g	863
Dry mass g	767
Initial water content %	13.2
Final water content %	12.5

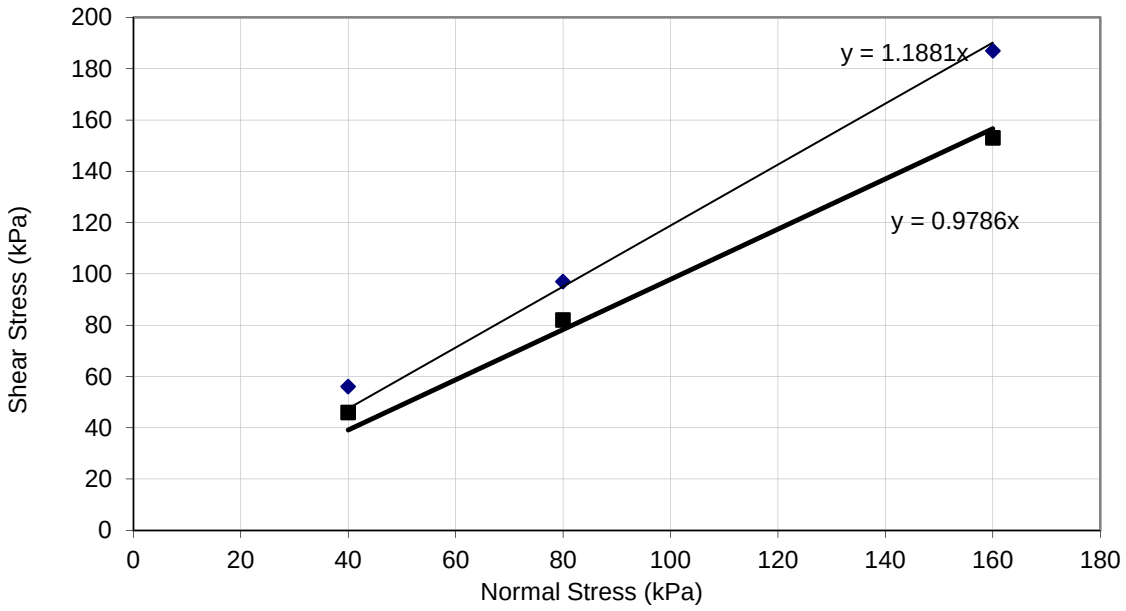
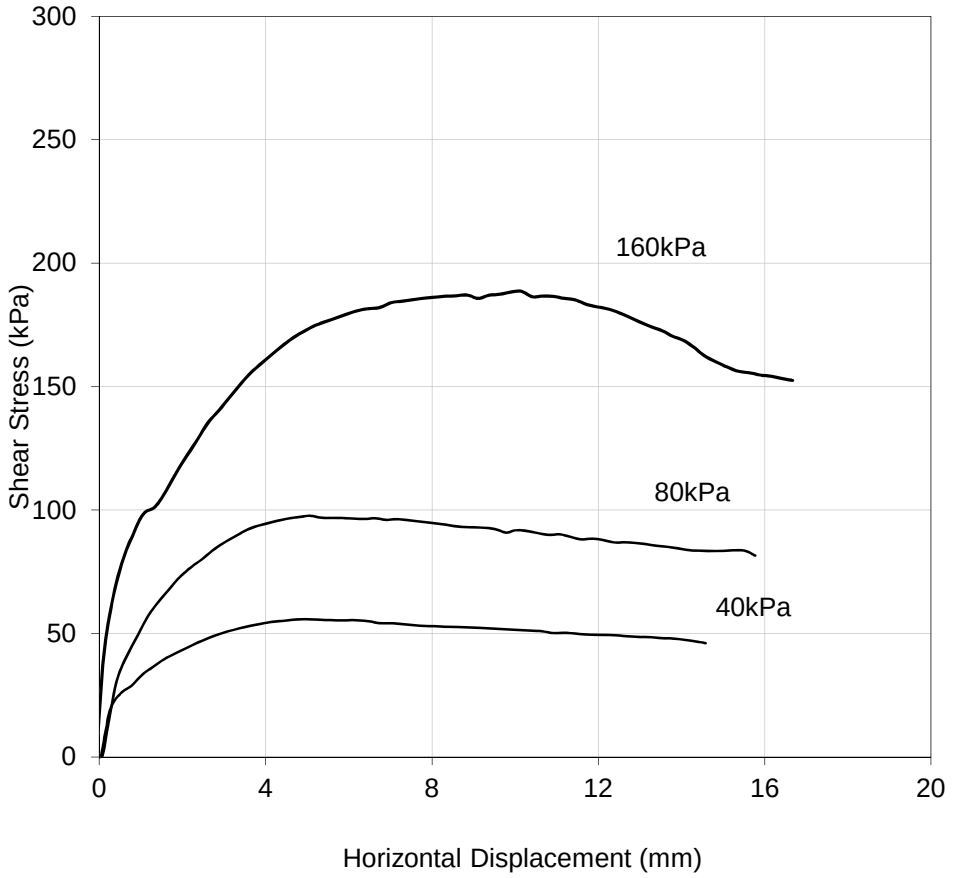


Figure 1 Failure Envelope



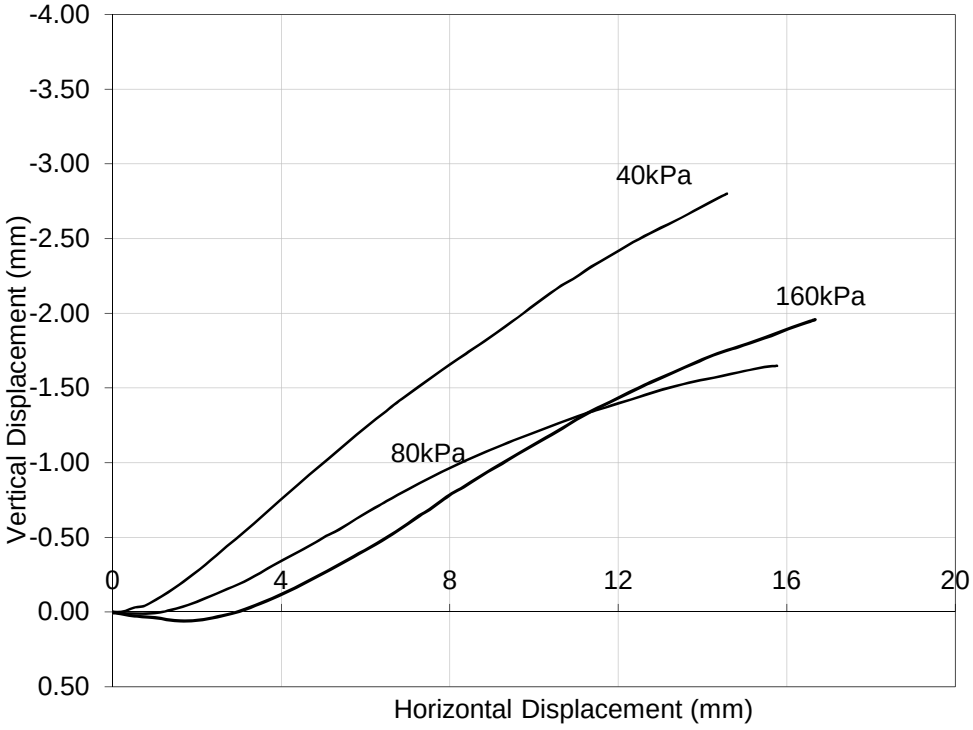


Figure 2 Stress-strain behaviour

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					Loading 40/80/160 kPa	
Ref:	St OlaPier		Size mm	100	Initial wet mass g	785
BH	BH-01		Thickness mm	34.25	Bulk Density mg/m3	2291
Depth m	4.5m					
Our Ref	4			σ'_v kPa		
Soil type	Silty sandy GRAVEL					
Rate of shearing mm/min			0.25	40		
>10 mm removed				80		
				160		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
40		40	49
80		80	81
160		160	172

Peak angle of internal friction
Cohesion kPa
Ultimate angle of internal friction **46**

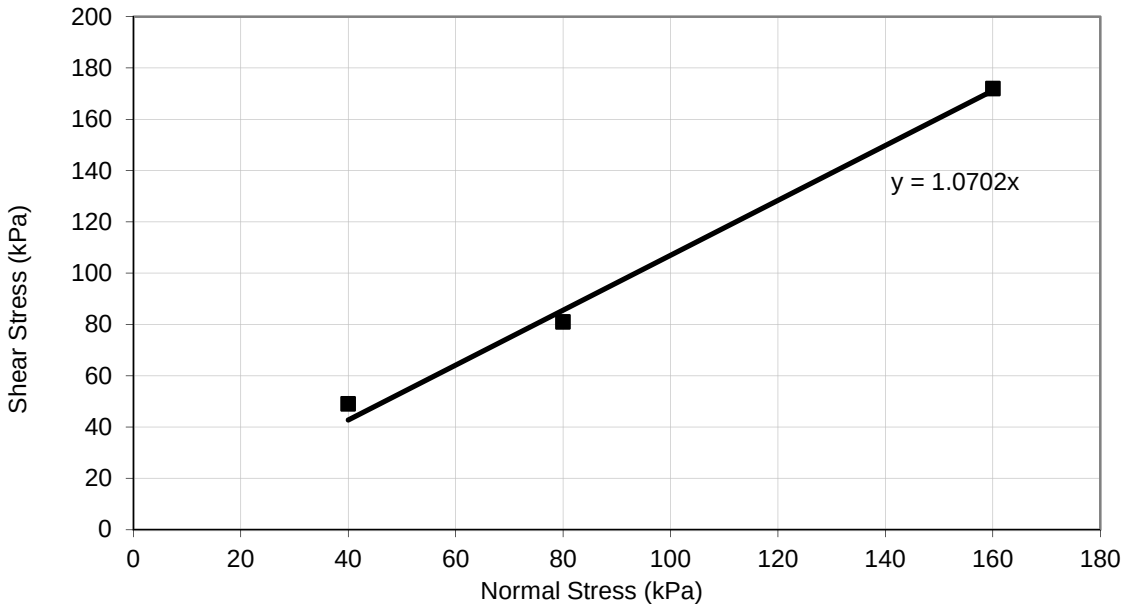
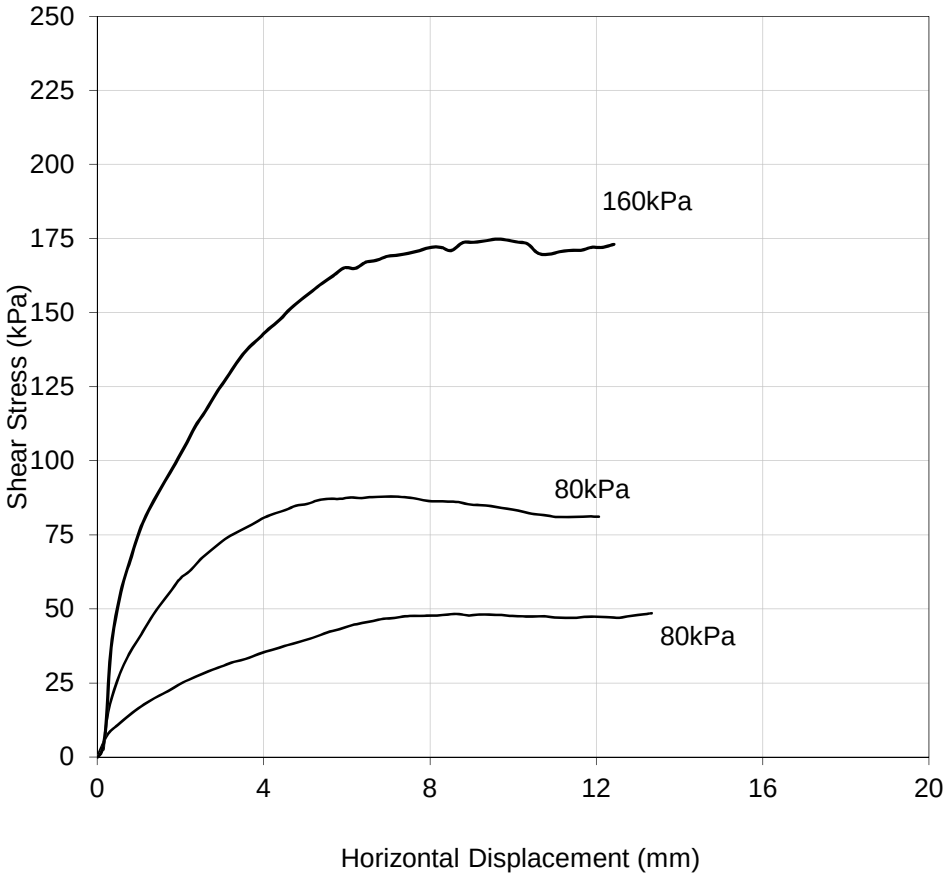


Figure 1 Failure Envelope



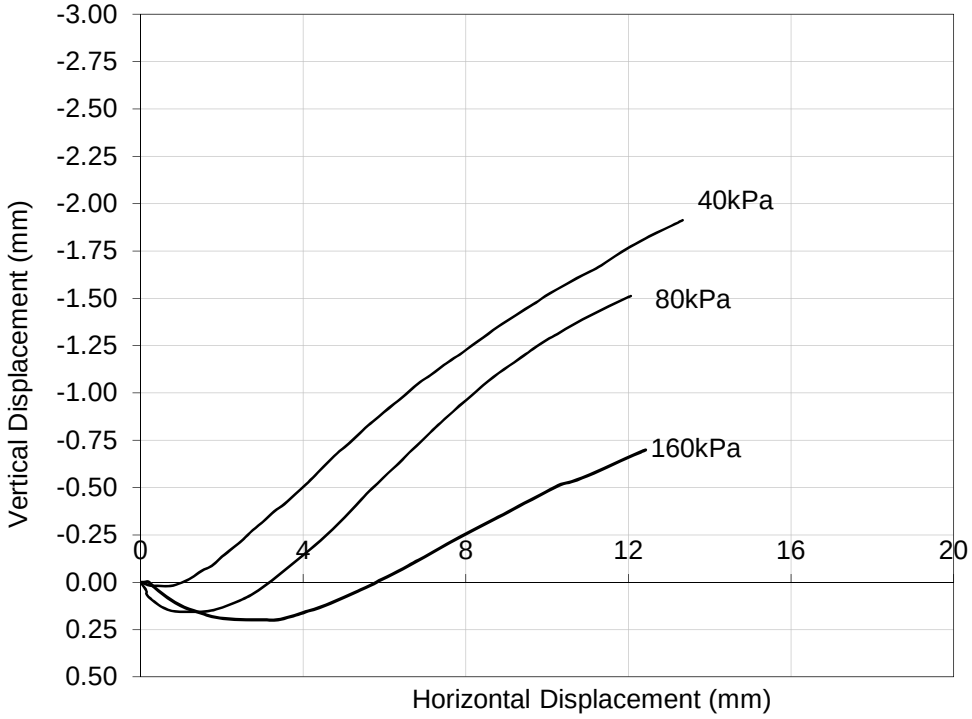


Figure 2 Stress-strain behaviour

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					Loading 40/80/160 kPa	
Ref:	St OlaPier		Size mm	100	Initial wet mass g	651
BH	BH-01		Thickness mm	33.75	Bulk Density mg/m3	1928
Depth m	7.0m					
Our Ref	17			σ'_v kPa		
Soil type	Gravel					
Rate of shearing mm/min			0.5	40		
>10 mm removed				80		
				160		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
40	53	40	35
80	101	80	73
160	172	160	164

Peak angle of internal friction **47**
Cohesion kPa
Ultimate angle of internal friction **44**

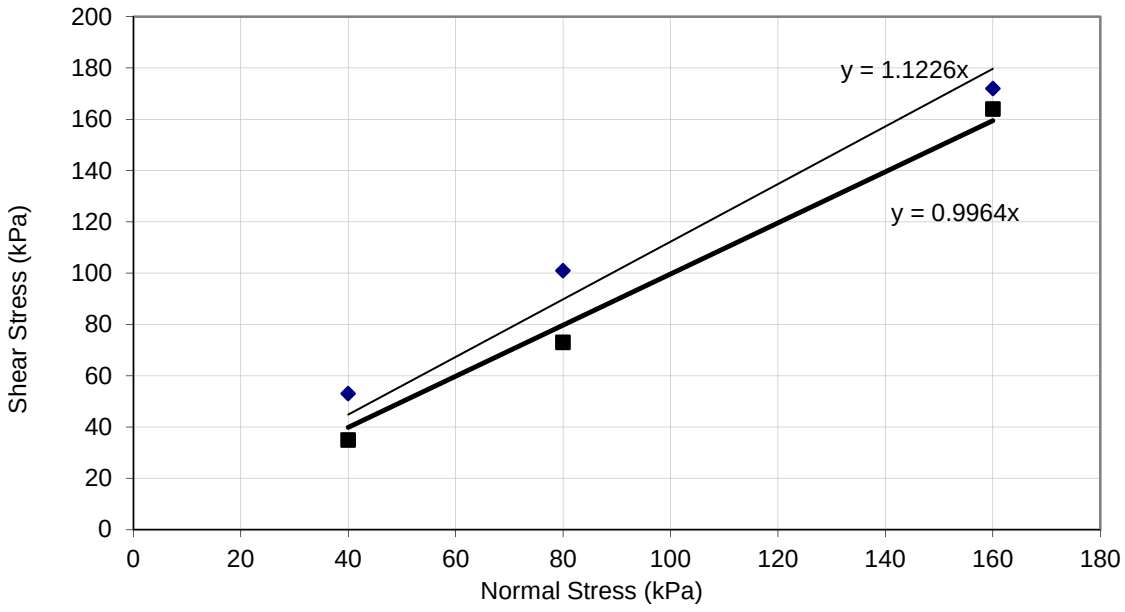
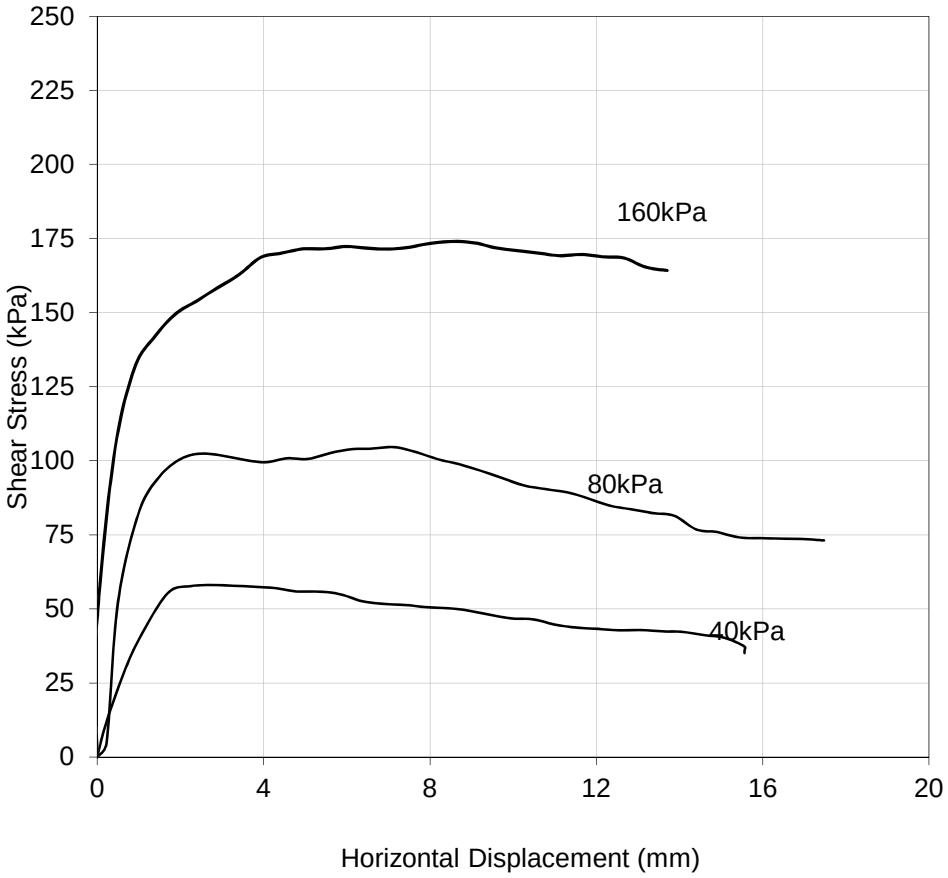


Figure 1 Failure Envelope



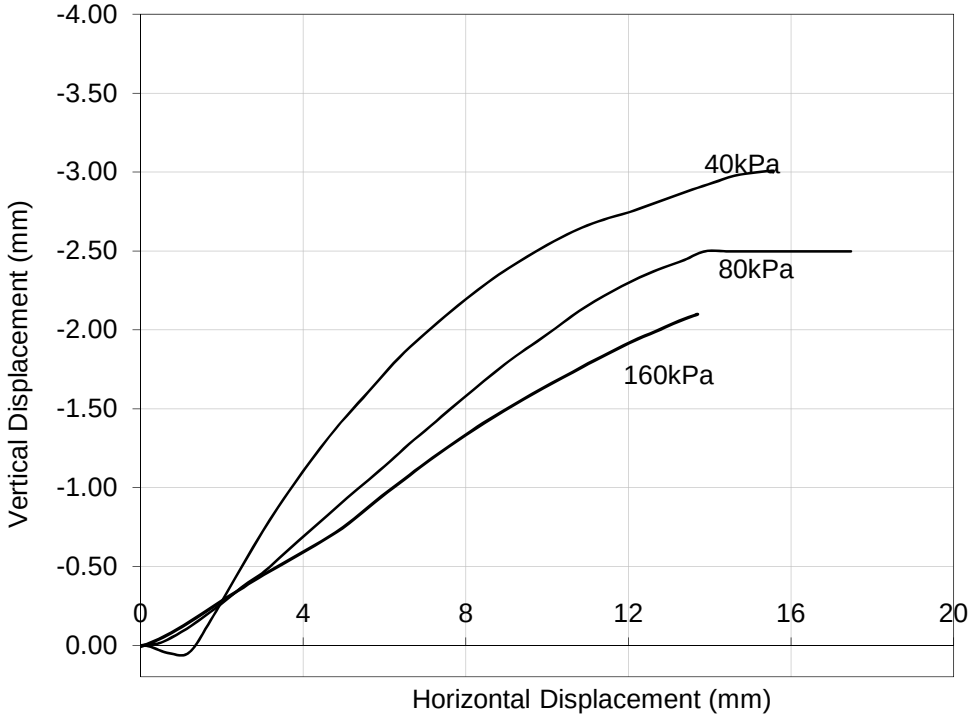


Figure 2 Stress-strain behaviour

Unconsolidated Undrained test (BS1377:1990 7/8)				
Location&Ref	1906-18			
Borehole/sample no.	BH-02			
Depth	1.5m			
Soil type	Grey gravelly sandy silt			
Sampling	Compaction			
Stage No.		1	2	3
Diameter	mm	105		
Height	mm	200		
Initial moisture content	%	10.8		
Initial bulk density	kg/m3	2260		
Dry density	kg/m3	2040		
Cell pressure	kPa	100		
Rate of strain	%/min	1.00		
CONDITIONS AT FAILURE				
Mem. and side drains corrections	kPa	3		
Maximum deviator stress	kPa	573		
c_u			285 kPa	
Mode of failure			Bulging	
Checked and approved by V Sivakumar				

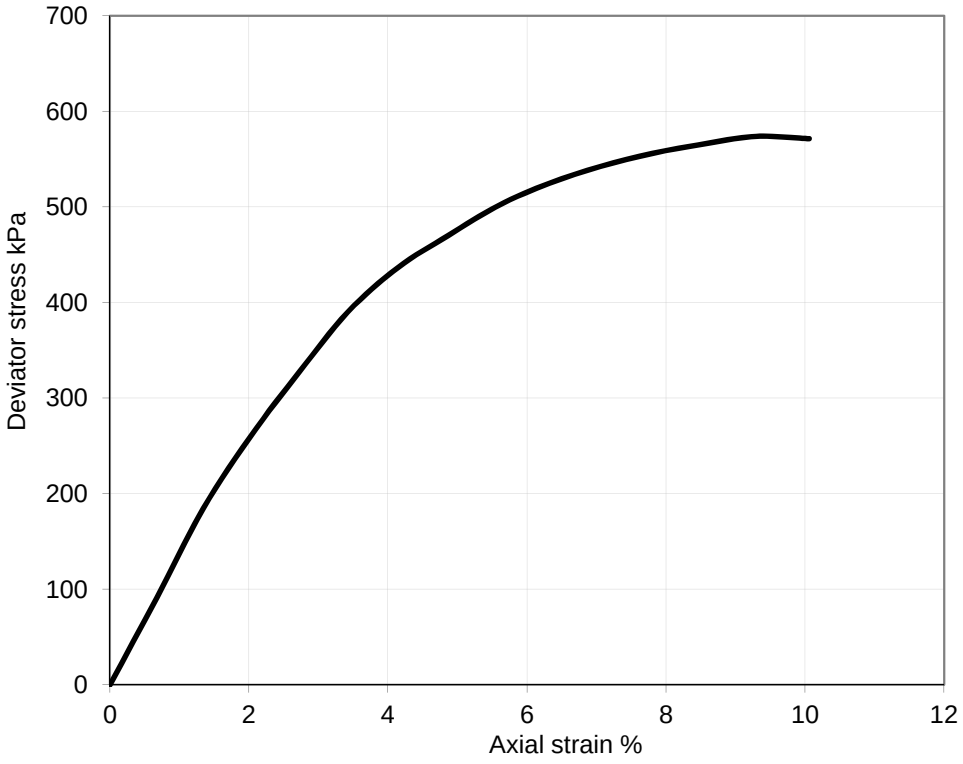


Figure 1 Deviator stress vs axial strain

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						Loading 40 kPa	
Ref:	St OlaPier		Size mm		100	Initial wet mass g	790
BH	BH-02		Thickness mm		36.75	Bulk Density mg/m3	2150
Depth m	1.5m					Final wet mass g	790
Our Ref	36			σ'_v kPa		Dry mass g	703
Soil type	Silty sandy GRAVEL					Initial water content %	12.4
Rate of shearing mm/min			0.04	40		Final water content %	12.4
				40		Loading 160 kPa	
				160		Initial wet mass g	820
Peak		Ultimate				Bulk Density mg/m3	2150
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa			Final wet mass g	830
40		40	53			Dry mass g	741
40		40	53			Initial water content %	10.7
160		160	165			Final water content %	12.0

ONLY TWO LOADINGS

Peak angle of internal friction	**48**
Cohesion kPa	
Ultimate angle of internal friction	**44**

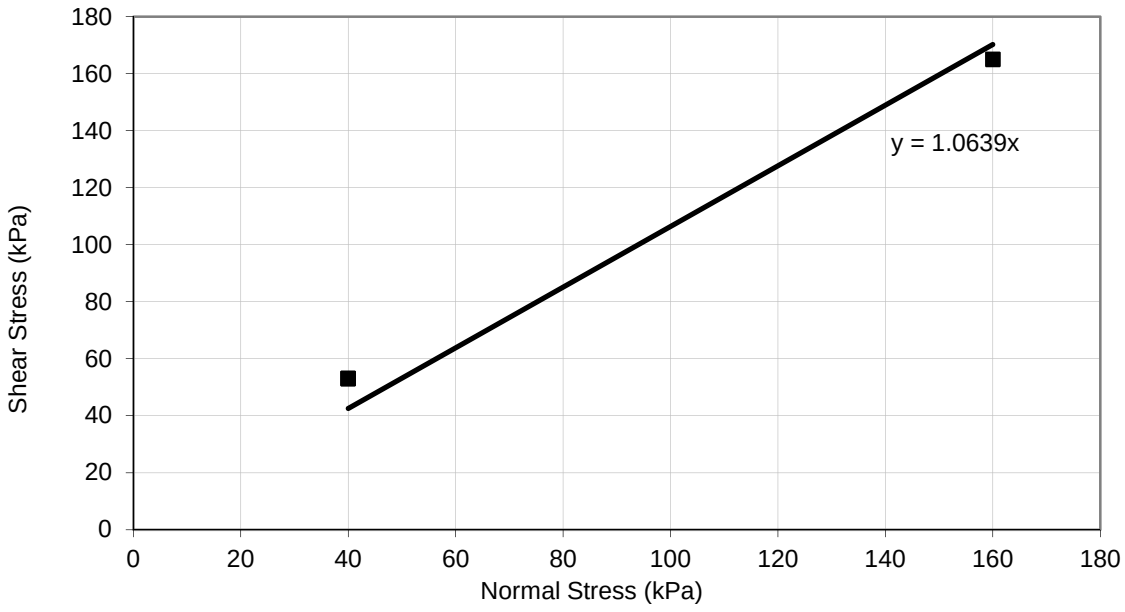
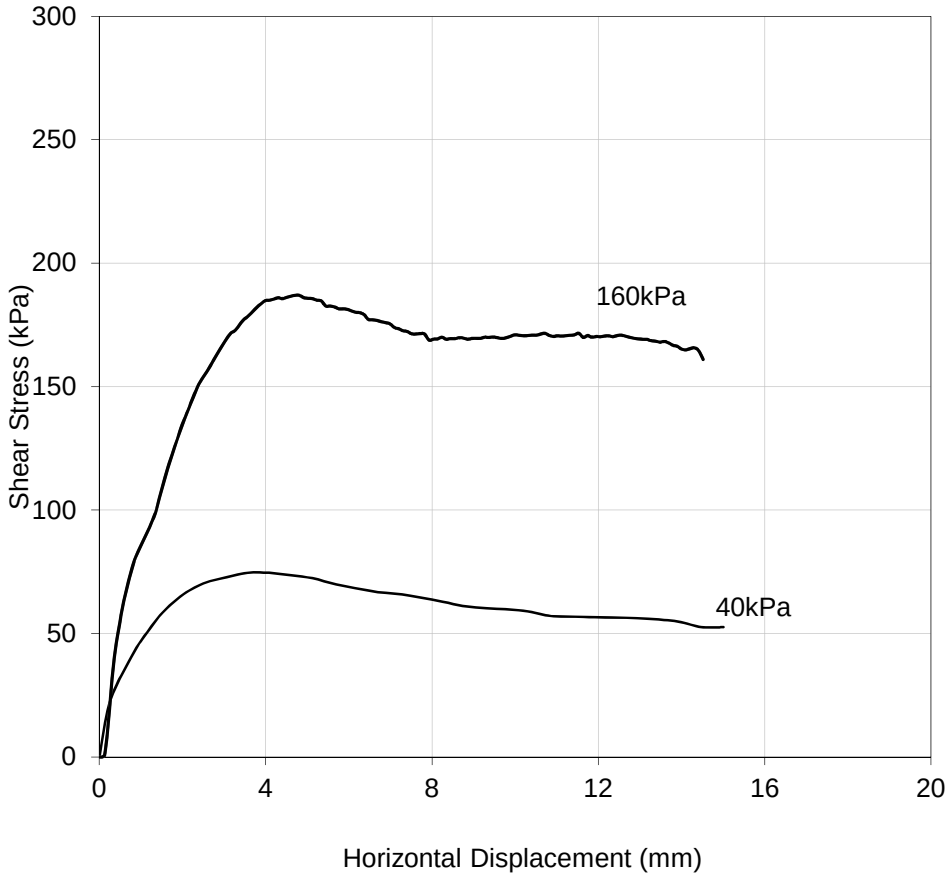


Figure 1 Failure Envelope



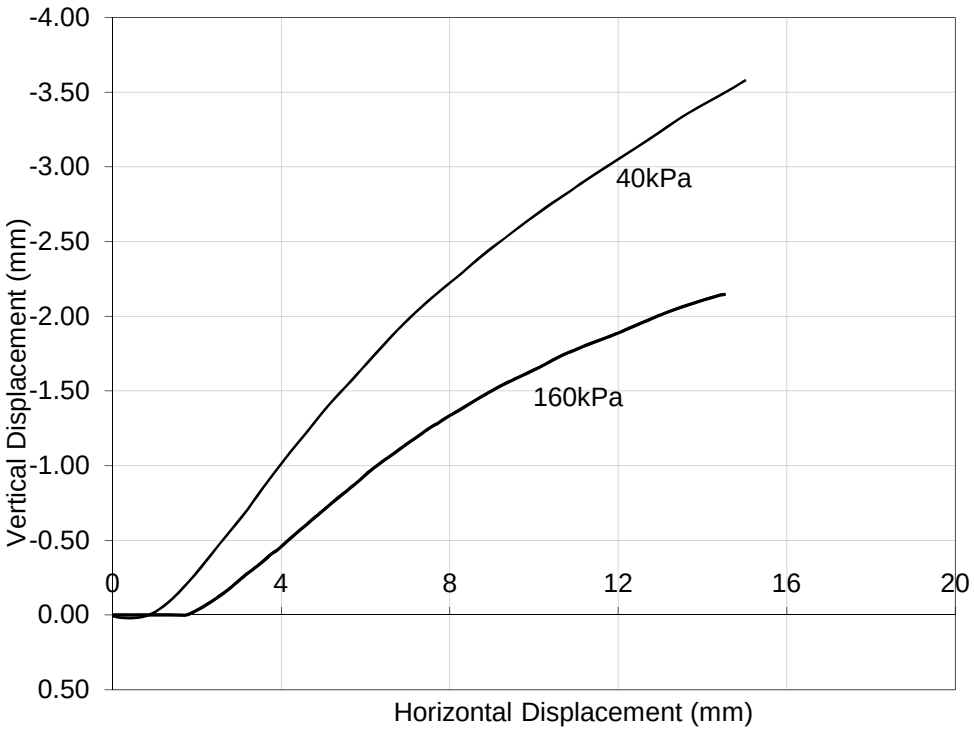


Figure 2 Stress-strain behaviour

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						Loading 200 kPa	
Ref:	St OlaPier		Size mm	100		Initial wet mass g	657
BH	BH-02		Thickness mm	30.75		Bulk Density mg/m3	2136
Depth m	19.2-27.0m					Final wet mass g	660
Our Ref	37			σ'_v kPa		Dry mass g	574
Soil type	Sandy SILT					Initial water content %	14.5
Rate of shearing mm/min				0.5		Final water content %	15.0
>10 mm removed							
					200		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
0		0	
0		0	
200		200	132

ONLY ONE LOADING

Peak angle of internal friction
Cohesion kPa
Ultimate angle of internal friction **33**

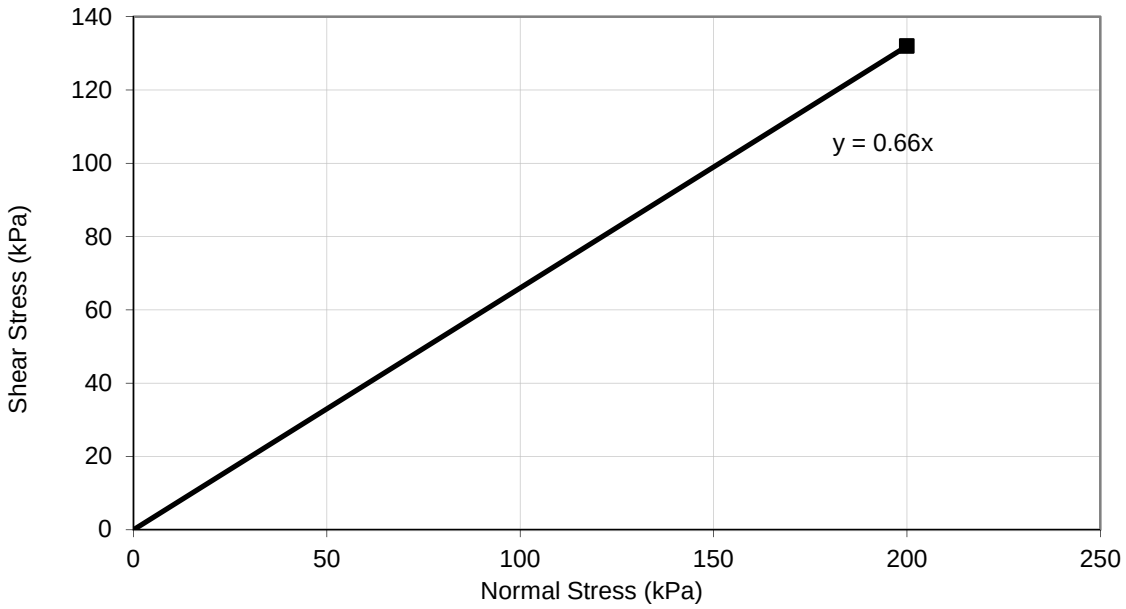

Figure 1 Failure Envelope

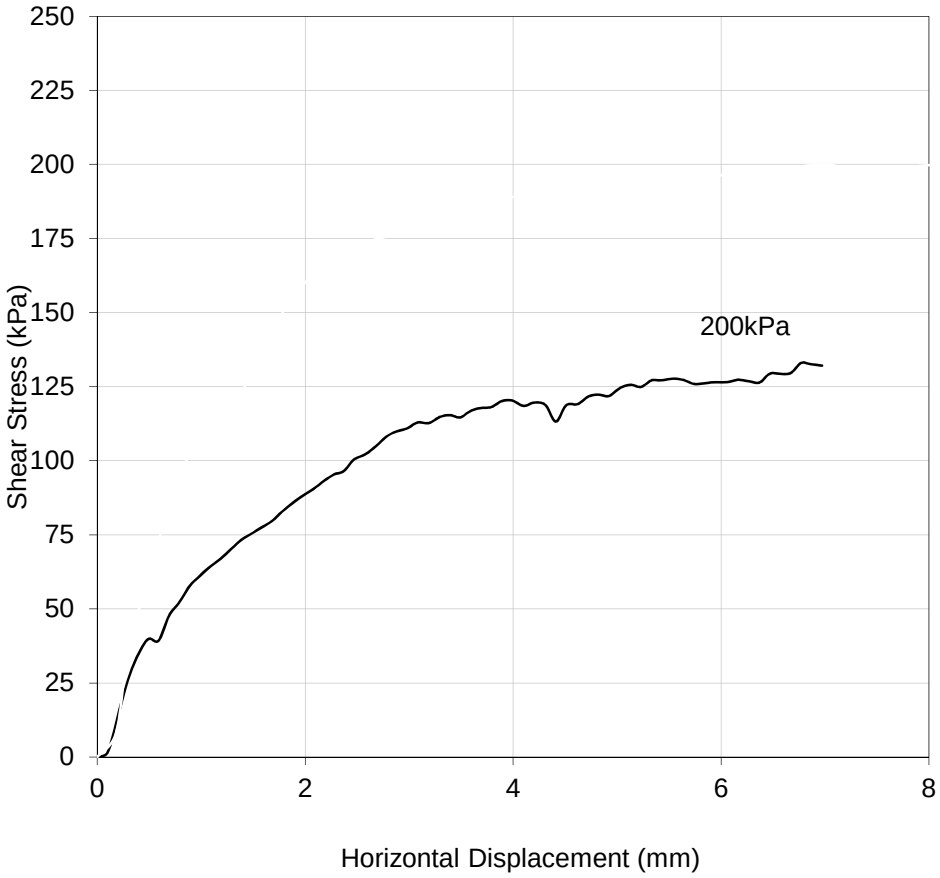

Figure 2 Stress-strain behaviour

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					Loading 40/80/160 kPa	
Ref:	St OlaPier		Size mm	100	Initial wet mass g	642
BH	BH-02		Thickness mm	35.25	Bulk Density mg/m3	1821
Depth m	5.5m					
Our Ref	30			σ'_v kPa		
Soil type	Gravel					
Rate of shearing mm/min			0.5	40		
>10 mm removed				80		
				160		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
40	57	40	45
80	98	80	85
160	177	160	161

Peak angle of internal friction **48**
Cohesion kPa
Ultimate angle of internal friction **45**

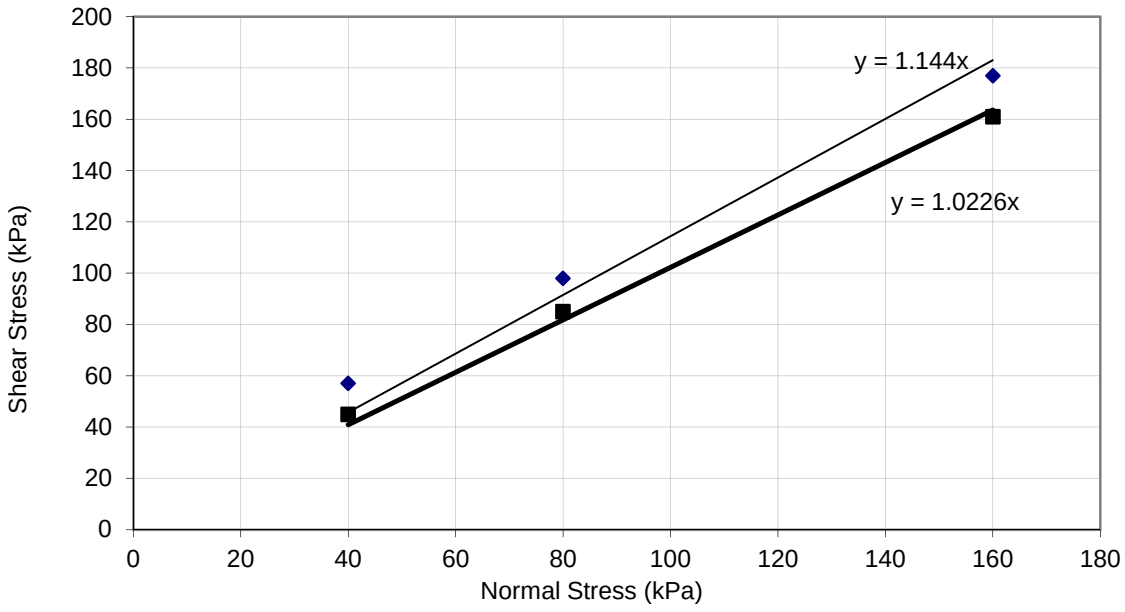
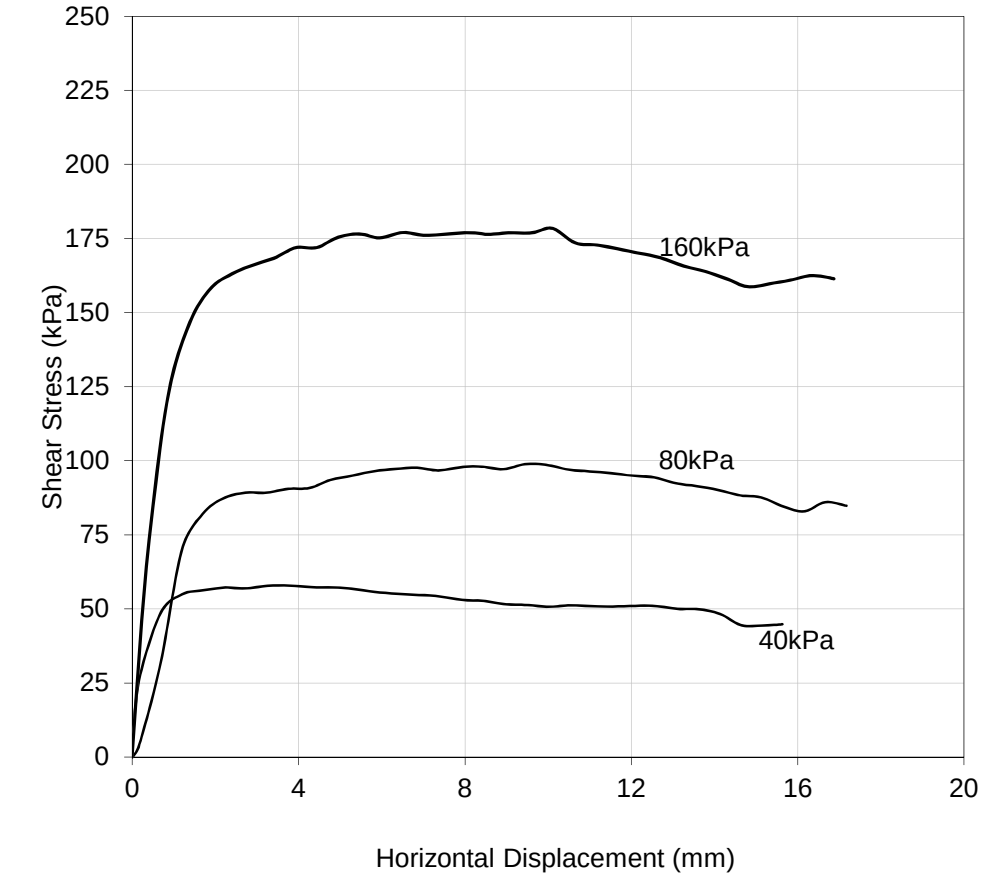


Figure 1 Failure Envelope



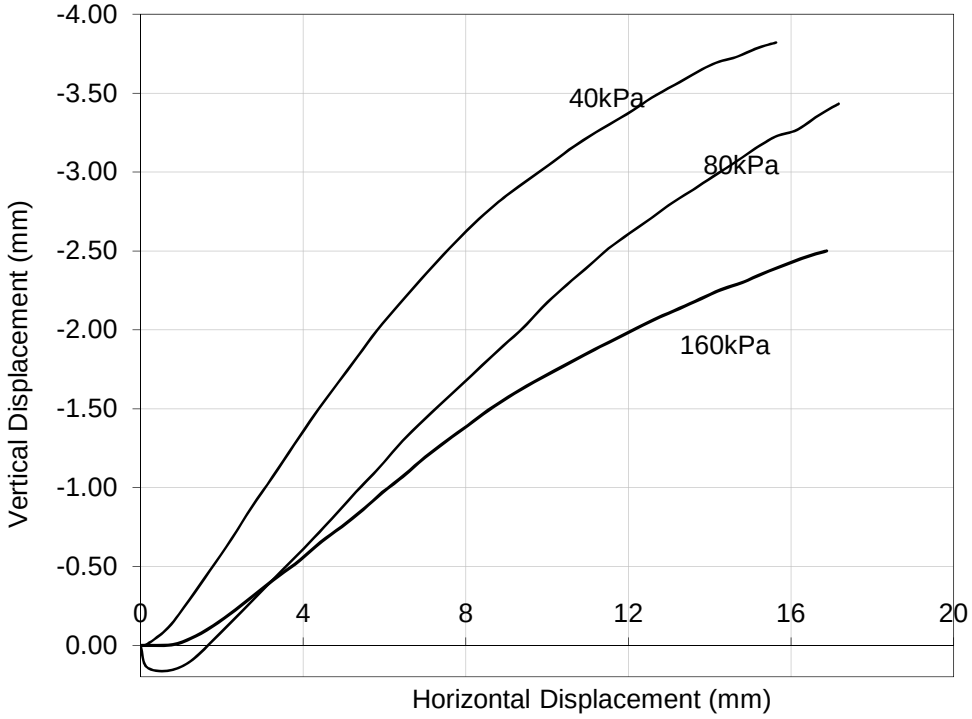


Figure 2 Stress-strain behaviour

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						Loading 50/100/200 kPa	
Ref:	St OlaPier		Size mm		100	Initial wet mass g	618
BH	BH-02		Thickness mm		36.25	Bulk Density mg/m3	1704
Depth m	9.5m						
Our Ref	10			σ'_v kPa			
Soil type	Sandy Gravel						
Rate of shearing mm/min			0.5		50		
>10 mm removed					100		
					200		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
50	63	50	46
100	113	100	99
200	200	200	197

Peak angle of internal friction	**45**
Cohesion kPa	
Ultimate angle of internal friction	**44**

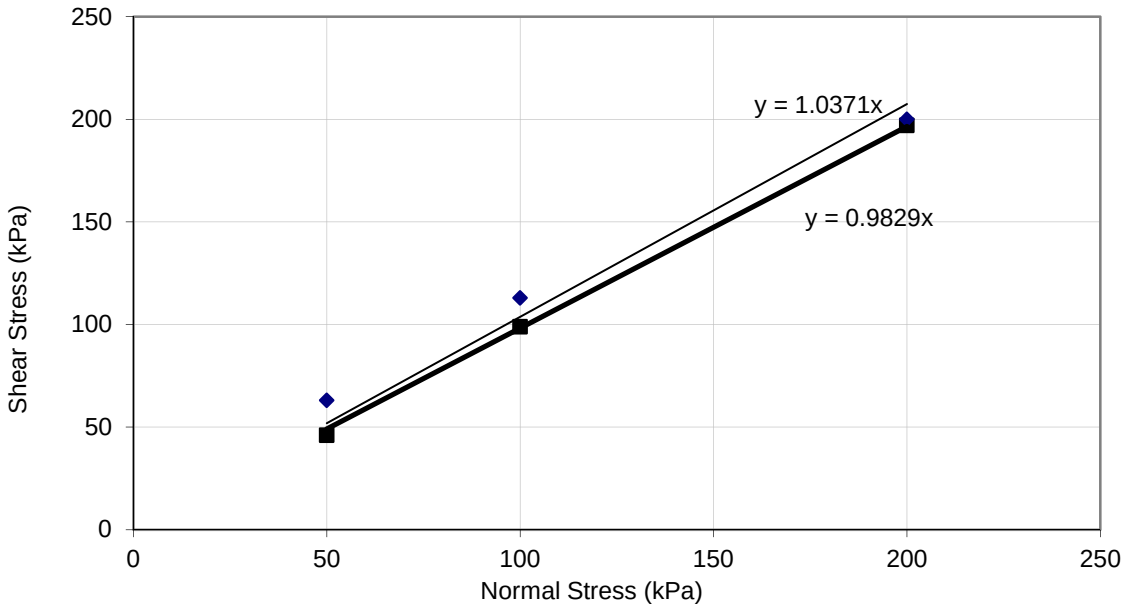
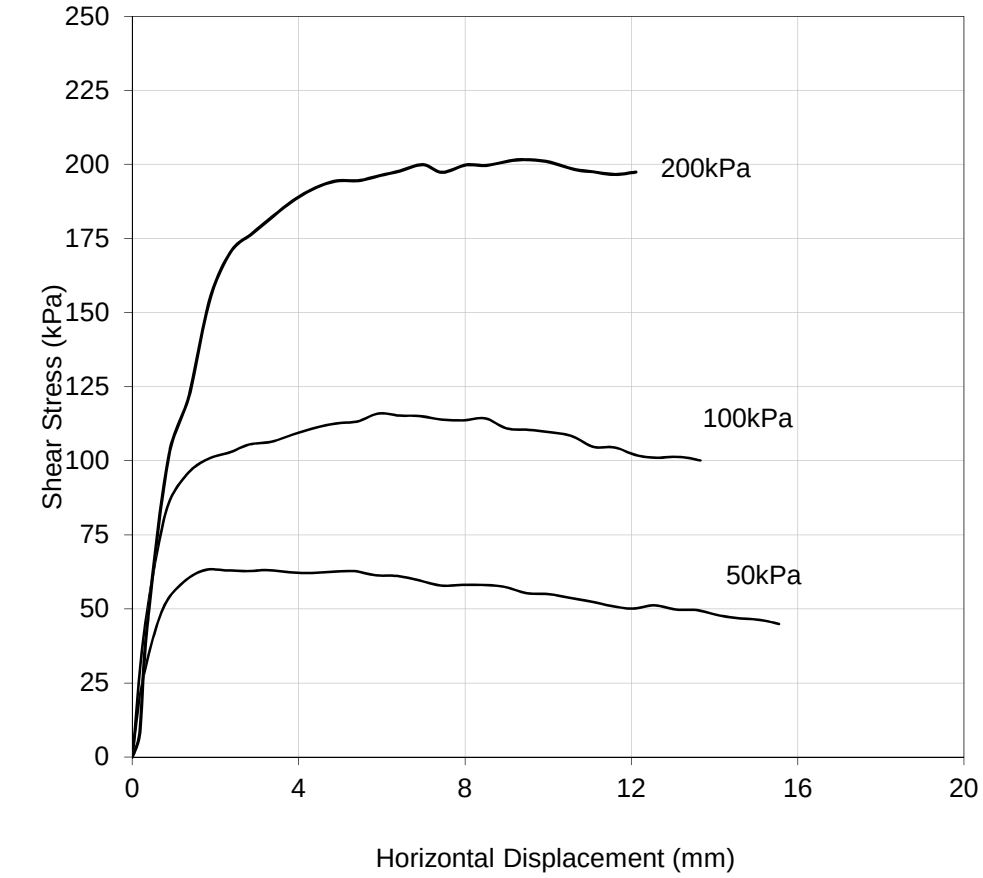


Figure 1 Failure Envelope



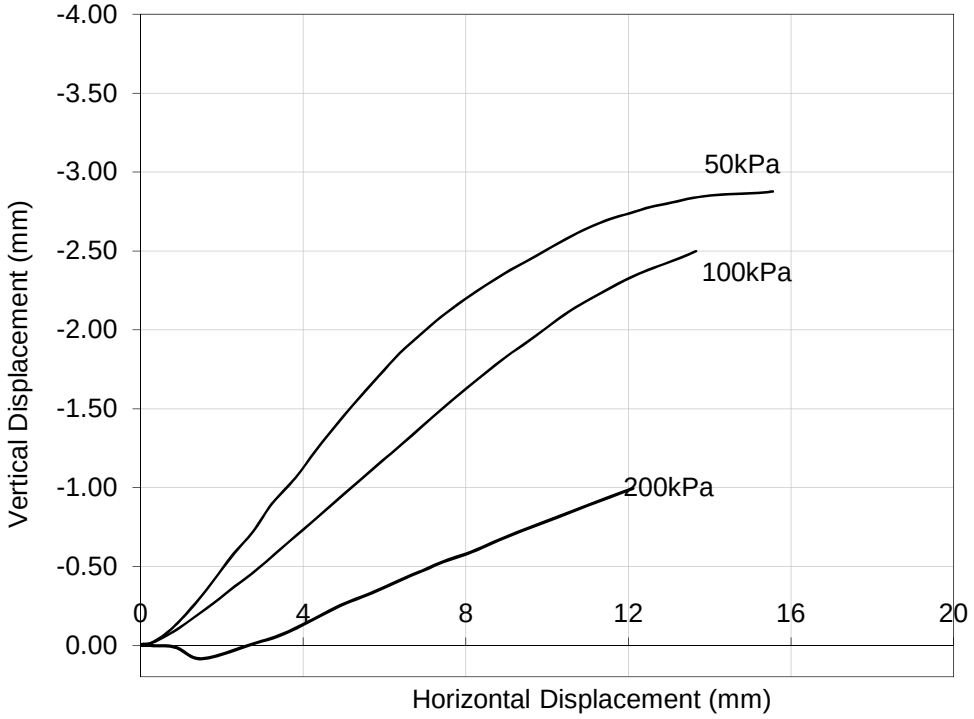


Figure 2 Stress-strain behaviour

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					Loading 100/200/400 kPa	
Ref:	St OlaPier		Size mm	100	Initial wet mass g	705
BH	BH-03		Thickness mm	33.25	Bulk Density mg/m3	2120
Depth m	11.9m					
Our Ref	14			σ'_v kPa		
Soil type	Silty SAND					
Rate of shearing mm/min			0.5	100		
>10 mm removed				200		
				400		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
100	85	100	76
200	153	200	139
400	277	400	256

Peak angle of internal friction	**35**
Cohesion kPa	
Ultimate angle of internal friction	**33**

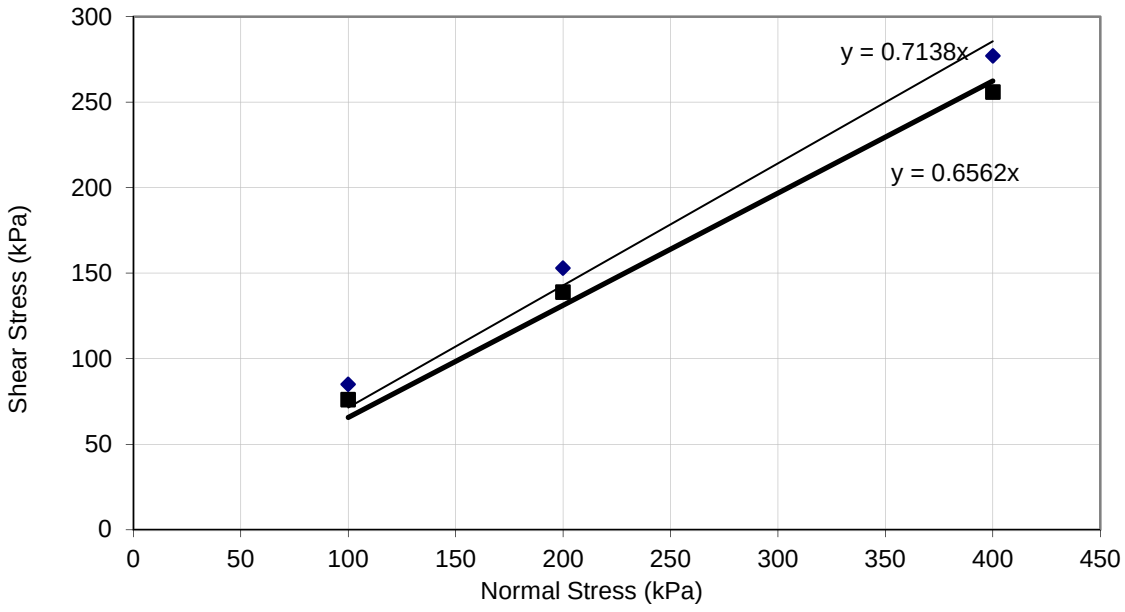
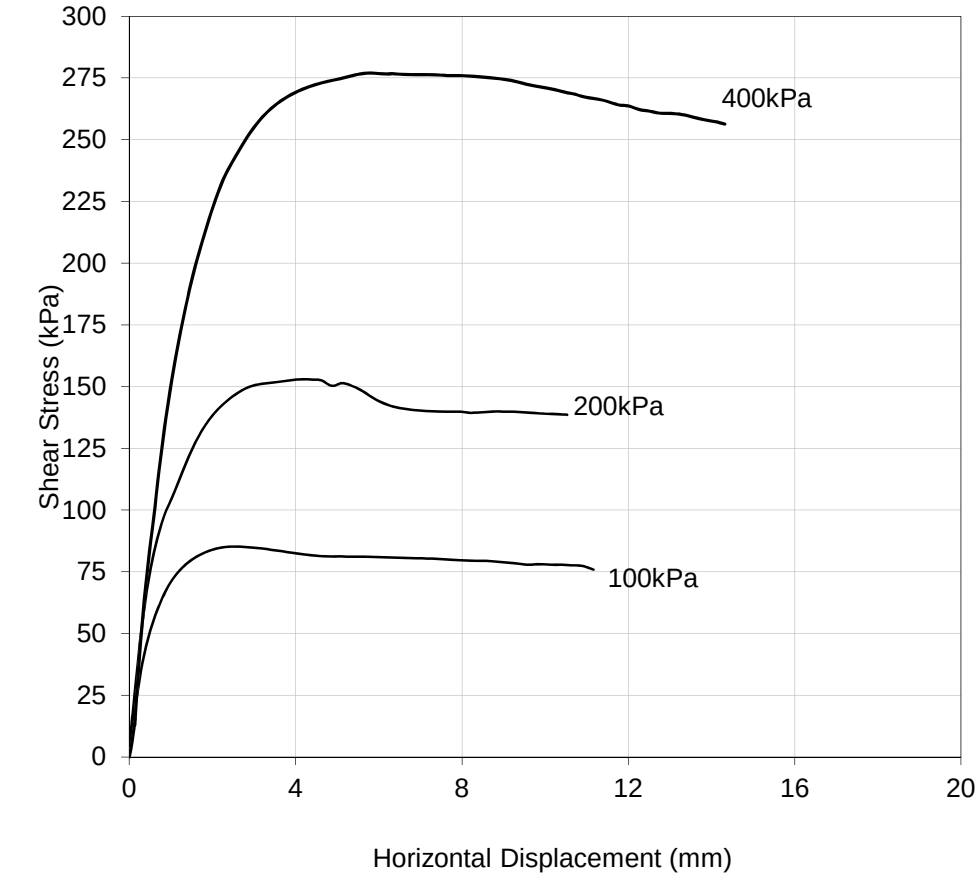


Figure 1 Failure Envelope



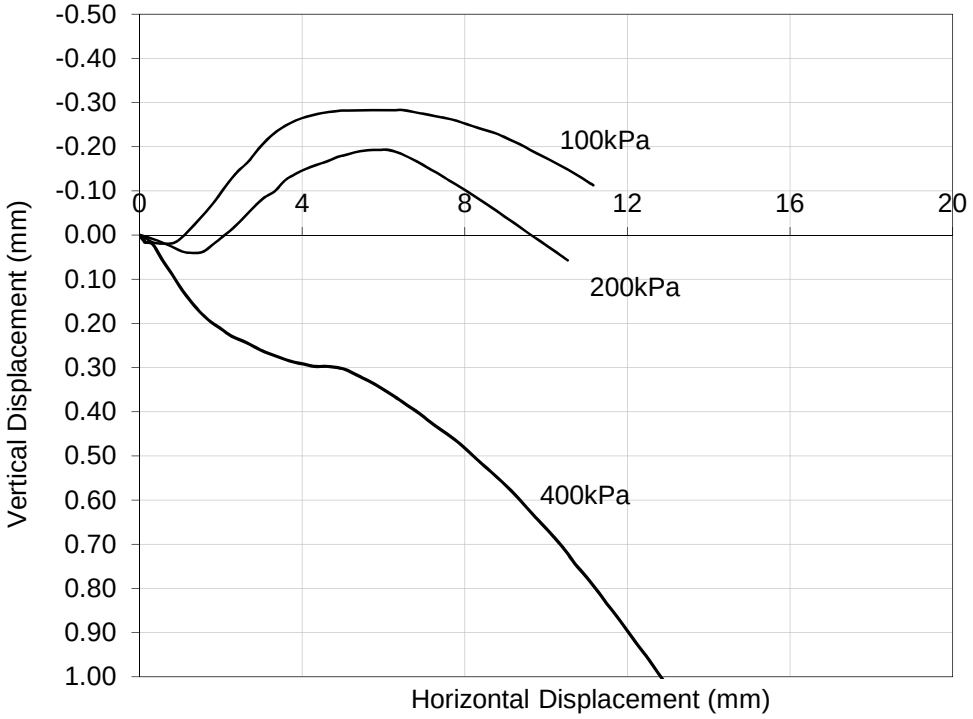


Figure 2 Stress-strain behaviour

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						Loading 70/140/280 kPa	
Ref:	St OlaPier		Size mm	100	Initial wet mass g	758
BH	BH-03		Thickness mm	36.75	Bulk Density mg/m3	2062
Depth m	14.5m					
Our Ref	19			σ'_v kPa		
Soil type	SAND					
Rate of shearing mm/min			0.5	70		
>10 mm removed				140		
				280		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
70	56	70	46
140	102	140	96
280	196	280	177

Peak angle of internal friction	**35**
Cohesion kPa	
Ultimate angle of internal friction	**33**

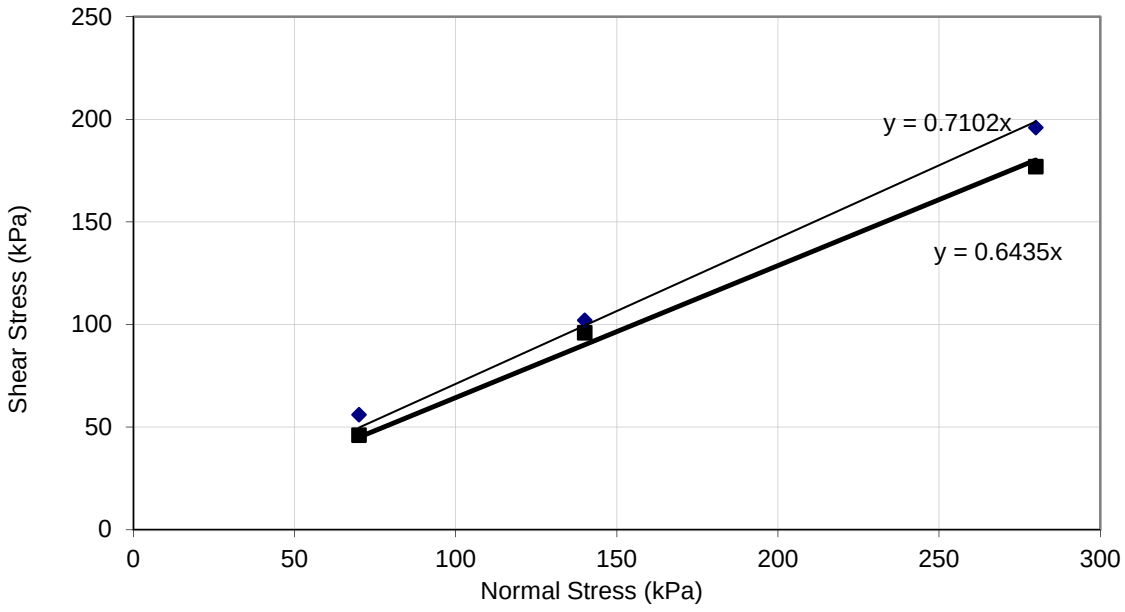
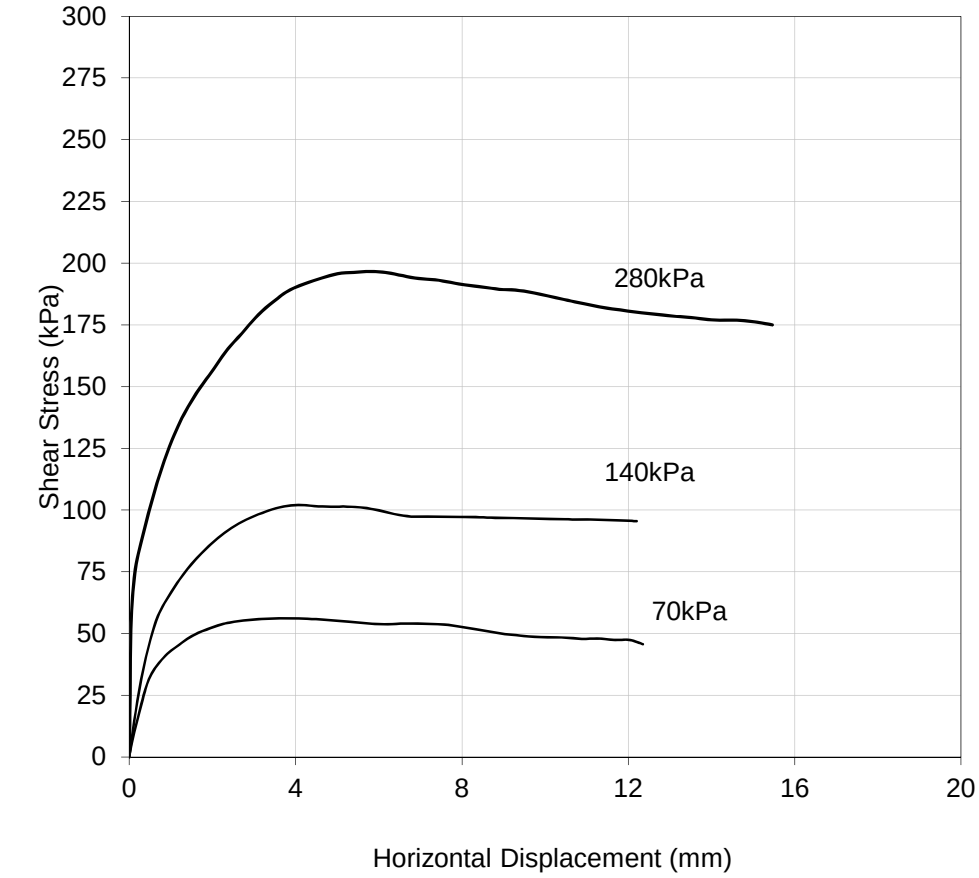


Figure 1 Failure Envelope



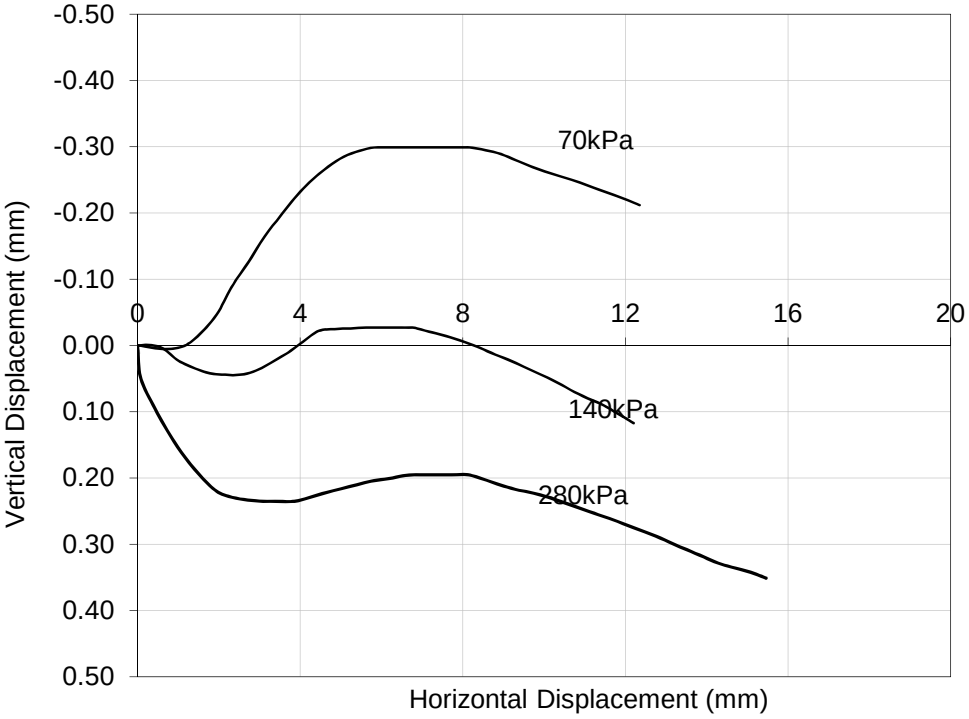


Figure 2 Stress-strain behaviour

Unconsolidated Undrained test (BS1377:1990 7/8)				
Location&Ref	1906-18			
Borehole/sample no.	BH-03			
Depth	17.2m(2)			
Soil type	Grey clayey silt			
Sampling	Compaction			
Stage No.		1	2	3
Diameter	mm	105		
Height	mm	200		
Initial moisture content	%	11.0		
Initial bulk density	kg/m3	2228		
Dry density	kg/m3	2007		
Cell pressure	kPa	100		
Rate of strain	%/min	1.00		
CONDITIONS AT FAILURE				
Mem. and side drains corrections	kPa	3		
Maximum deviator stress	kPa	436		
c_u			216 kPa	
Mode of failure			Bulging	
Checked and approved by V Sivakumar				

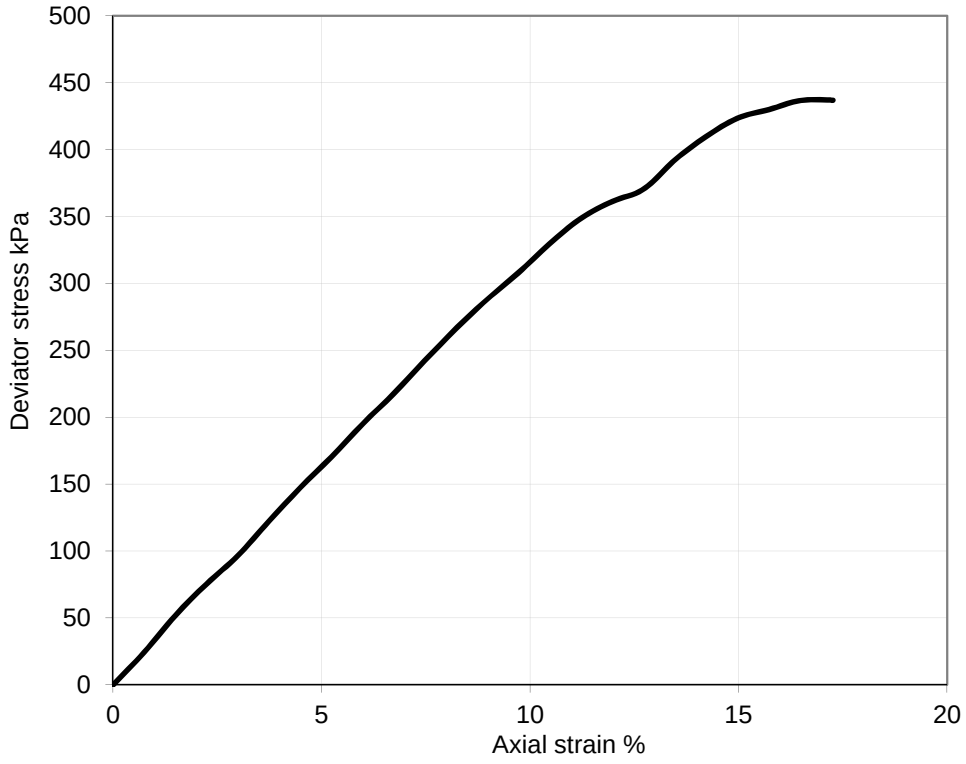


Figure 1 Deviator stress vs axial strain

Unconsolidated Undrained test (BS1377:1990 7/8)				
Location&Ref	1906-18			
Borehole/sample no.	BH-03			
Depth	17.2m			
Soil type	Grey clayey silt			
Sampling	Compaction			
Stage No.		1	2	3
Diameter	mm	105		
Height	mm	200		
Initial moisture content	%	11.5		
Initial bulk density	kg/m3	2264		
Dry density	kg/m3	2029		
Cell pressure	kPa	100		
Rate of strain	%/min	1.00		
CONDITIONS AT FAILURE				
Mem. and side drains corrections	kPa	3		
Maximum deviator stress	kPa	305		
c_u			151 kPa	
Mode of failure			Bulging	
Checked and approved by V Sivakumar				

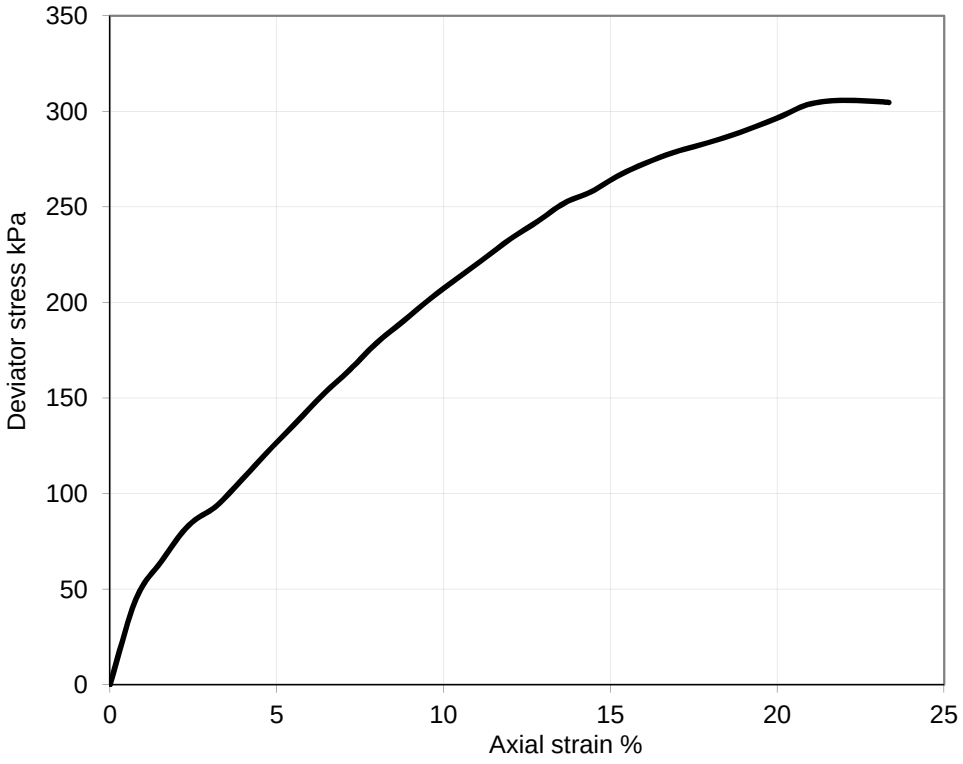


Figure 1 Deviator stress vs axial strain

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					Loading 90/173/360 kPa	
Ref:	St OlaPier		Size mm	100	Initial wet mass g	842
BH	BH-03		Thickness mm	36.75	Bulk Density mg/m3	2291
Depth m	18.0m					
Our Ref	20			σ'_v kPa		
Soil type	Silty sandy GRAVEL					
Rate of shearing mm/min			0.5	90		
>10 mm removed				173		
				360		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
90		90	93
173		173	175
360		360	306

Peak angle of internal friction
Cohesion kPa
Ultimate angle of internal friction **41**

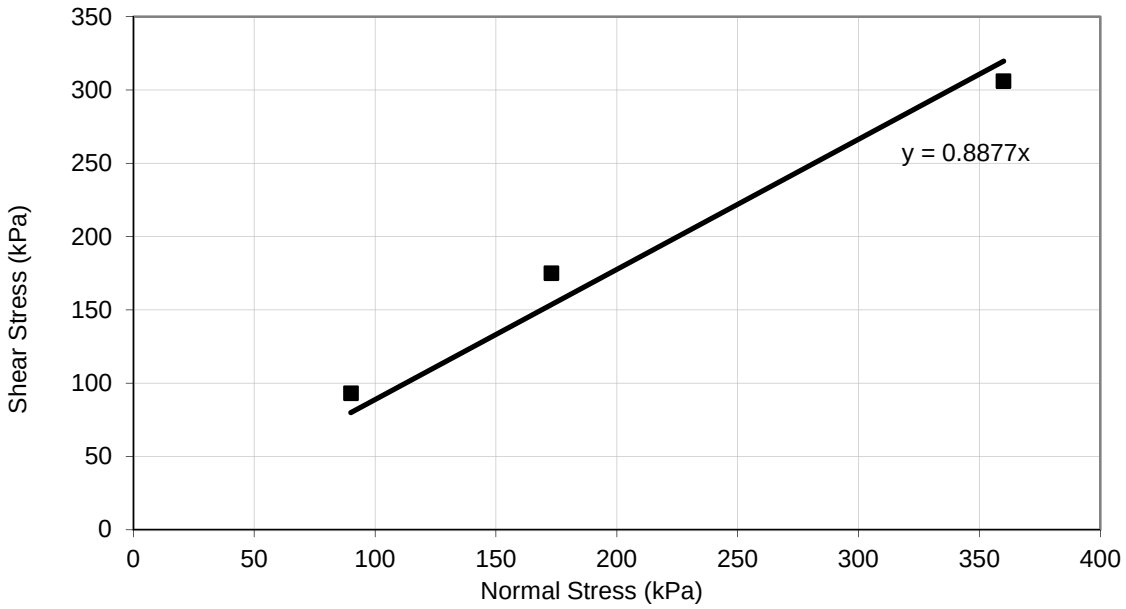
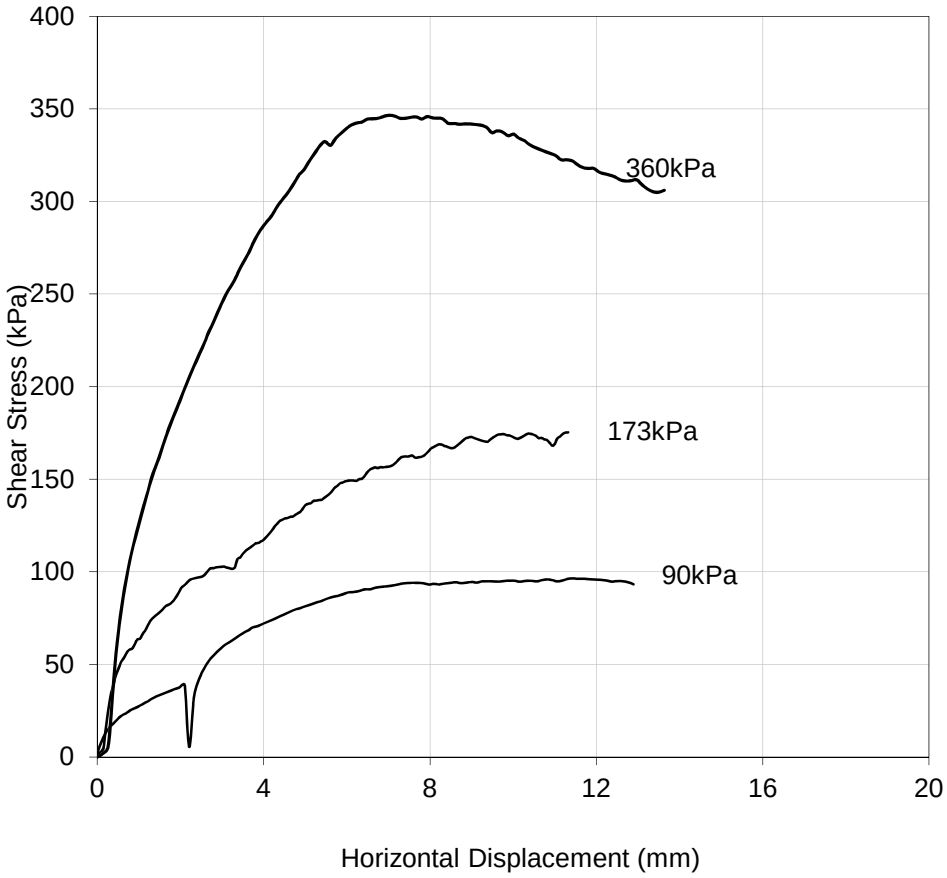


Figure 1 Failure Envelope



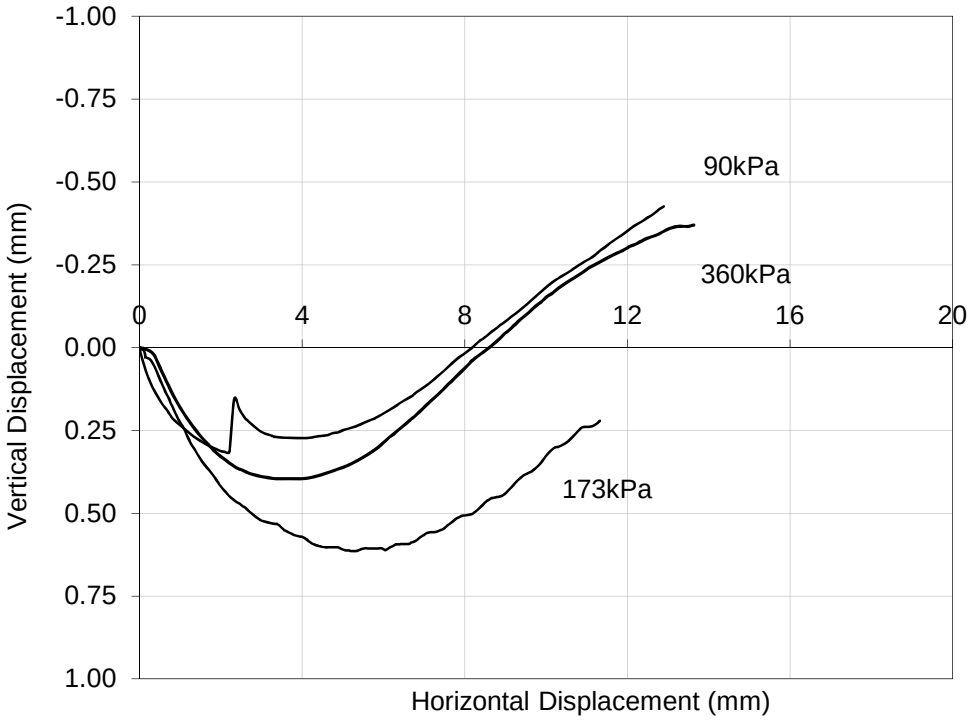


Figure 2 Stress-strain behaviour

Unconsolidated Undrained test (BS1377:1990 7/8)				
Location&Ref	1906-18			
Borehole/sample no.	BH-03			
Depth	2.7m			
Soil type	Grey gravelly sandy silt			
Sampling	Compaction			
Stage No.		1	2	3
Diameter	mm	105		
Height	mm	200		
Initial moisture content	%	9.5		
Initial bulk density	kg/m3	2318		
Dry density	kg/m3	2117		
Cell pressure	kPa	100		
Rate of strain	%/min	1.00		
CONDITIONS AT FAILURE				
Mem. and side drains corrections	kPa	3		
Maximum deviator stress	kPa	334		
c_u			165 kPa	
Mode of failure			Bulging	
Checked and approved by V Sivakumar				

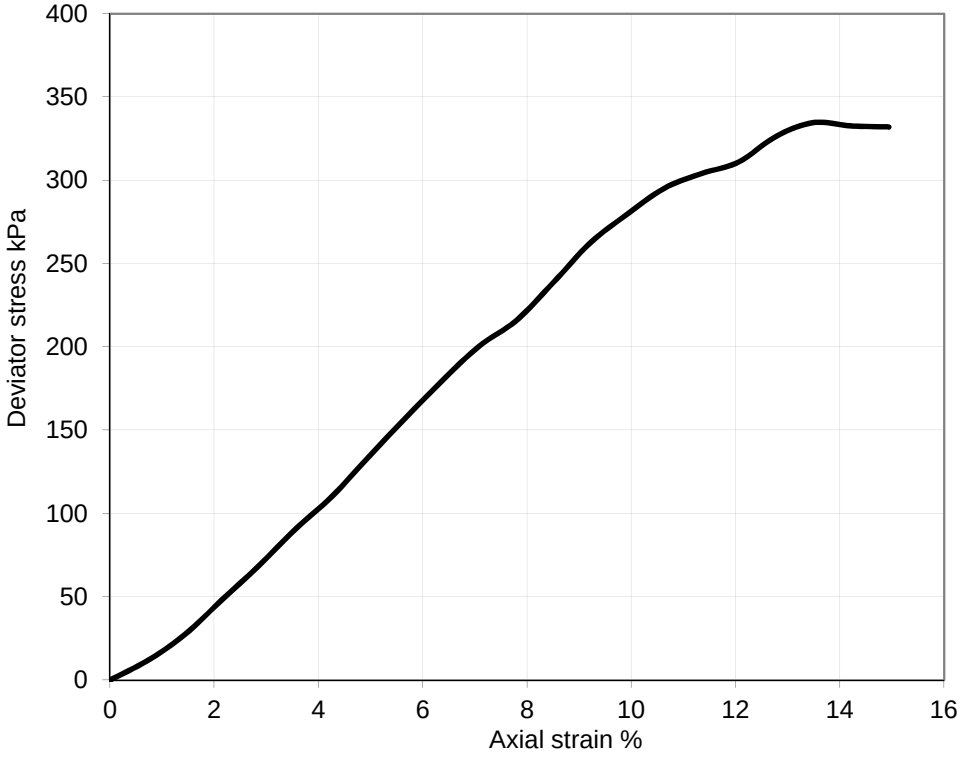


Figure 1 Deviator stress vs axial strain

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Ref:	St OlaPier	Size mm	100	Initial wet mass g	595
BH	BH-03	Thickness mm	33.25	Bulk Density mg/m3	1789
Depth m	8.5m				
Our Ref	7		σ'_v kPa		
Soil type	Gravel				
Rate of shearing mm/min		0.5	40		
>10 mm removed			80		
			160		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
40	55	40	40
80	97	80	81
160	179	160	161

Peak angle of internal friction **48**
Cohesion kPa
Ultimate angle of internal friction **45**

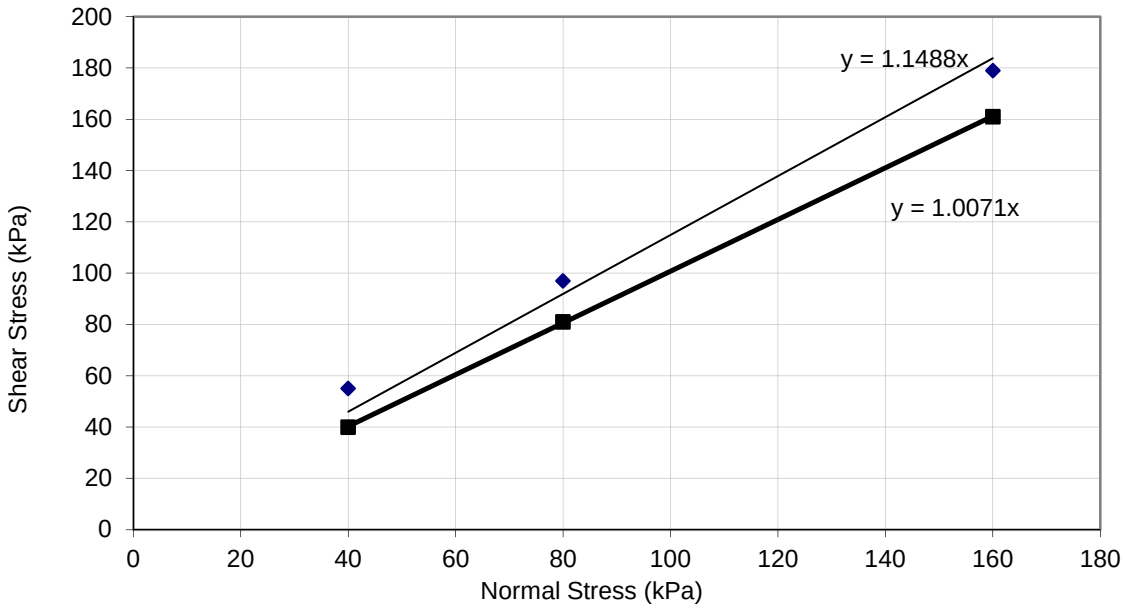
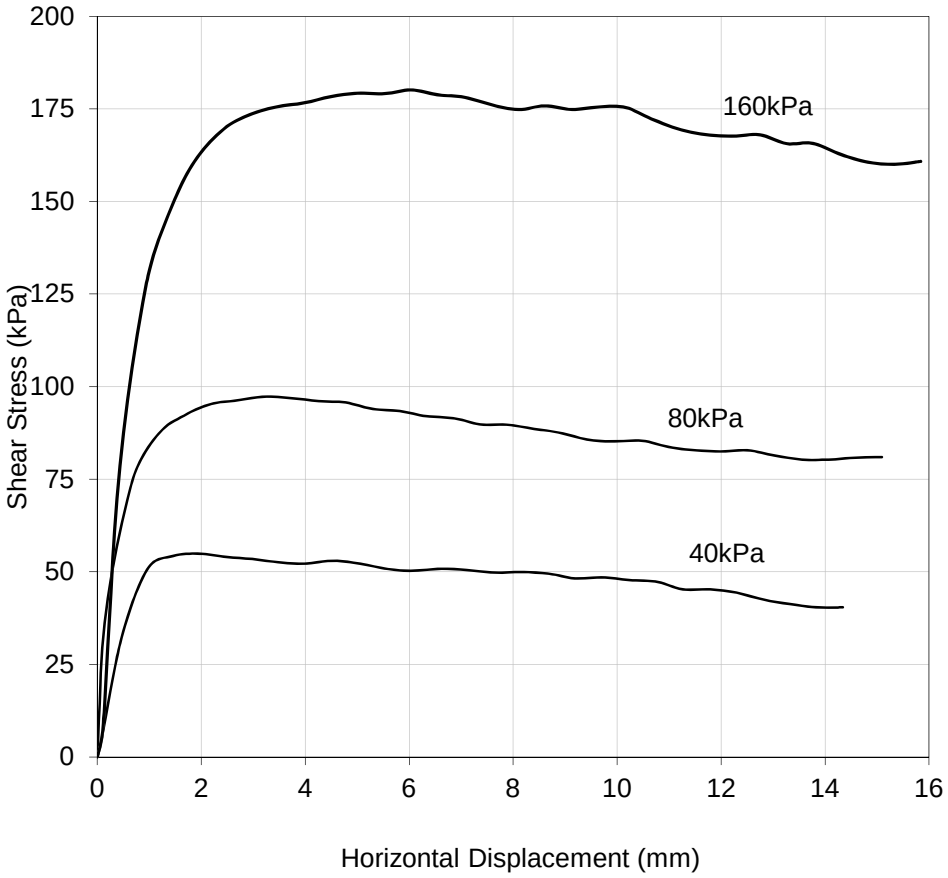


Figure 1 Failure Envelope



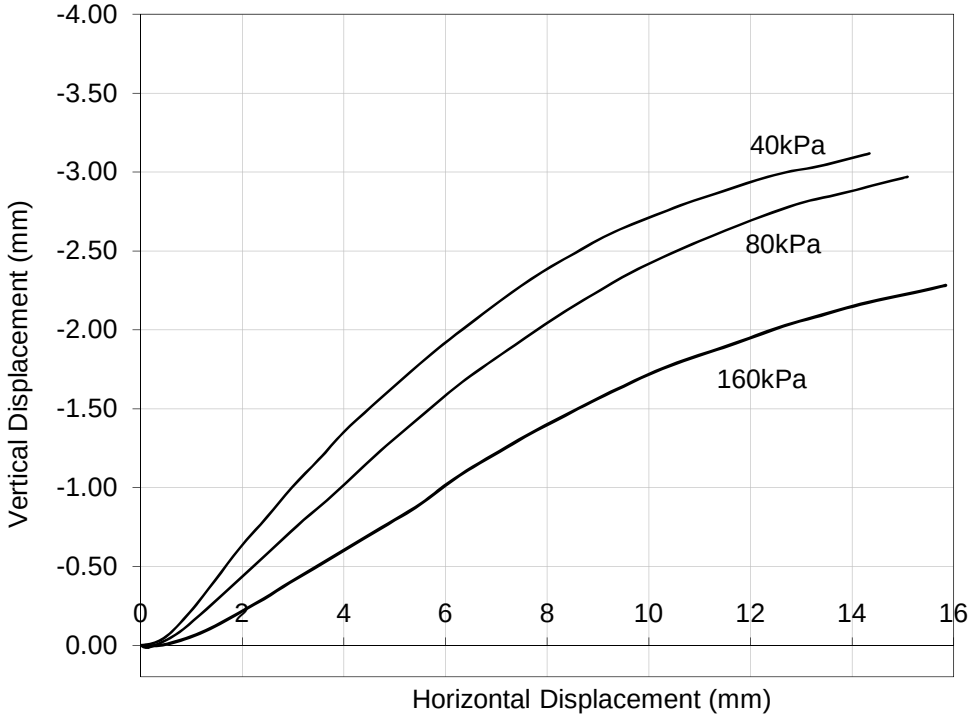


Figure 2 Stress-strain behaviour

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					Loading 50,80,160 kPa	
Ref:	St OlaPier		Size mm	100	Initial wet mass g	625
BH	BH-04		Thickness mm	34.25	Bulk Density mg/m3	1824
Depth m	10.0m					
Our Ref	32			σ'_v kPa		
Soil type	Gravel					
Rate of shearing mm/min			0.5	50		
>10 mm removed				80		
				160		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
50	63	50	53
80	103	80	73
160	180	160	155

Peak angle of internal friction **48**
Cohesion kPa
Ultimate angle of internal friction **43**

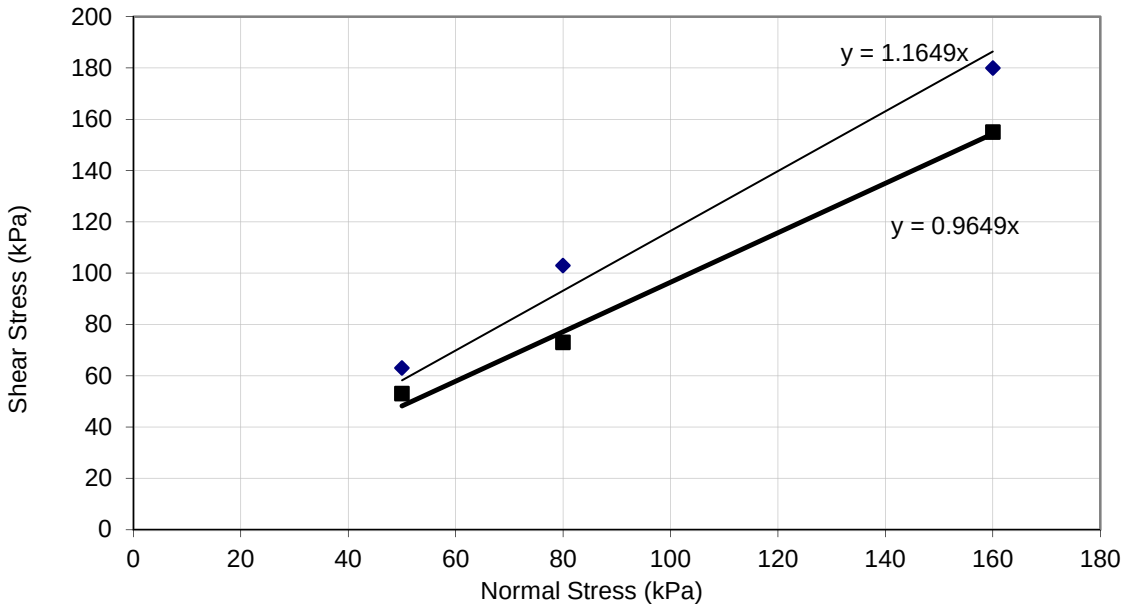
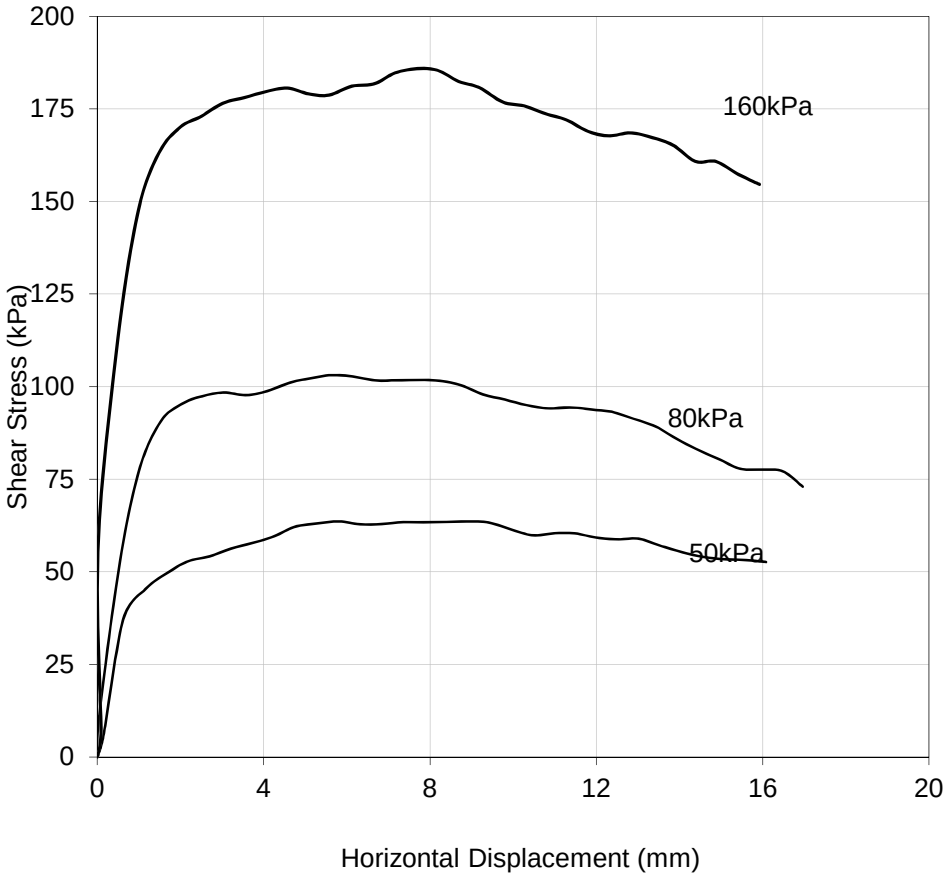


Figure 1 Failure Envelope



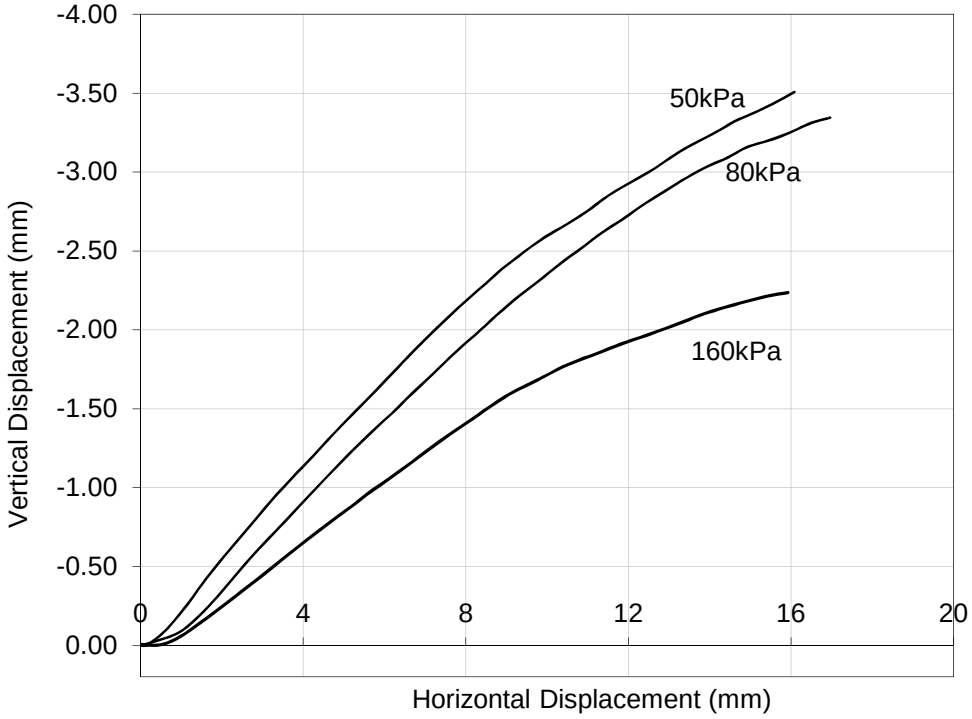


Figure 2 Stress-strain behaviour

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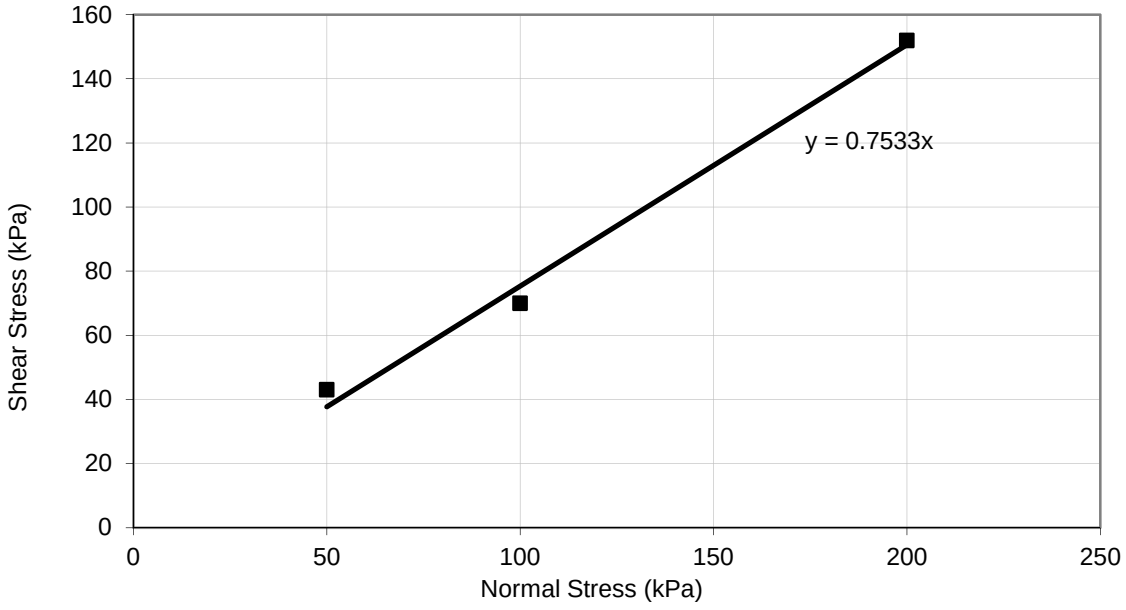
						Loading 50/100/200 kPa	
Ref:	St OlaPier		Size mm		100	Initial wet mass g	653
BH	BH-04		Thickness mm		33.25	Bulk Density mg/m3	1963
Depth m	13.0m						
Our Ref	29			σ'_v kPa			
Soil type	SAND						
Rate of shearing mm/min			0.5	50			
>10 mm removed				100			
				200			

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
50		50	43
100		100	70
200		200	152

Peak angle of internal friction
Cohesion kPa
Ultimate angle of internal friction **36**



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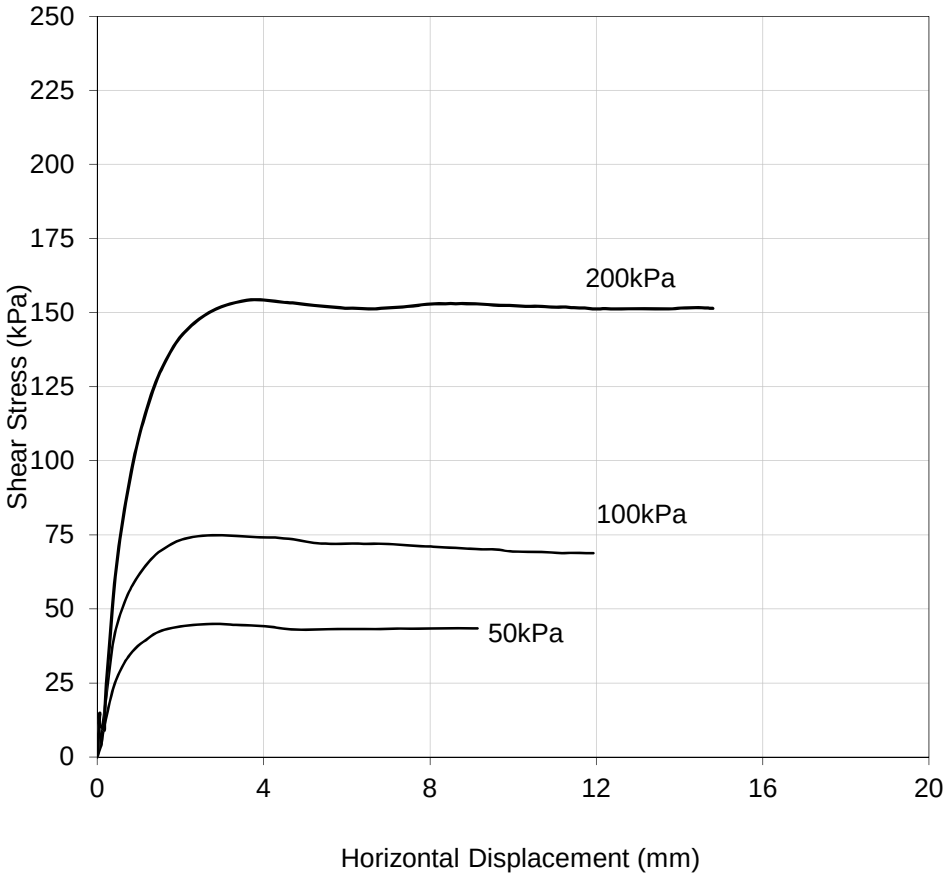

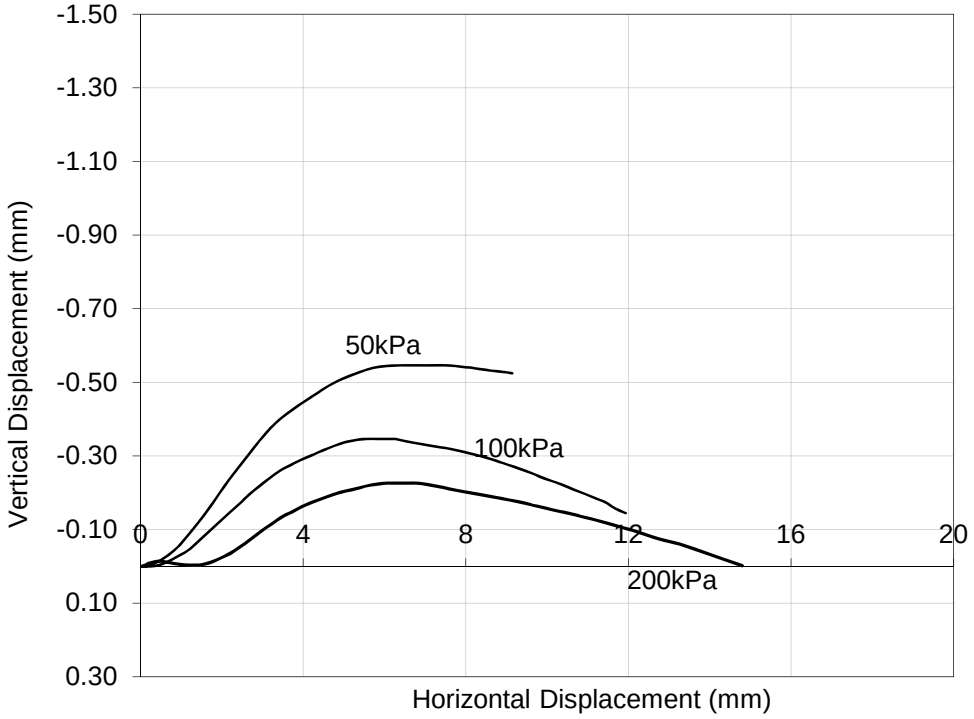

Figure 2 Stress-strain behaviour

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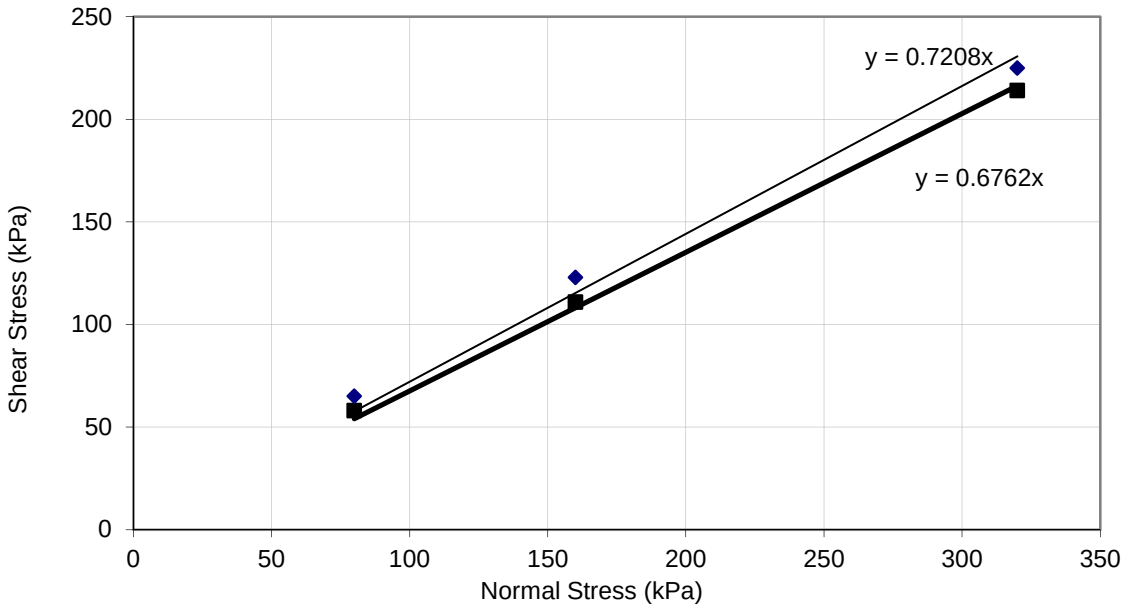
					Loading 80/160/320 kPa	
Ref:	St OlaPier		Size mm	100	Initial wet mass g	678
BH	BH-04		Thickness mm	33.25	Bulk Density mg/m3	2038
Depth m	16.0m					
Our Ref	6			σ'_v kPa		
Soil type	SAND					
Rate of shearing mm/min			0.5	80		
>10 mm removed				160		
				320		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
80	65	80	58
160	123	160	111
320	225	320	214

Peak angle of internal friction	**35**
Cohesion kPa	
Ultimate angle of internal friction	**34**



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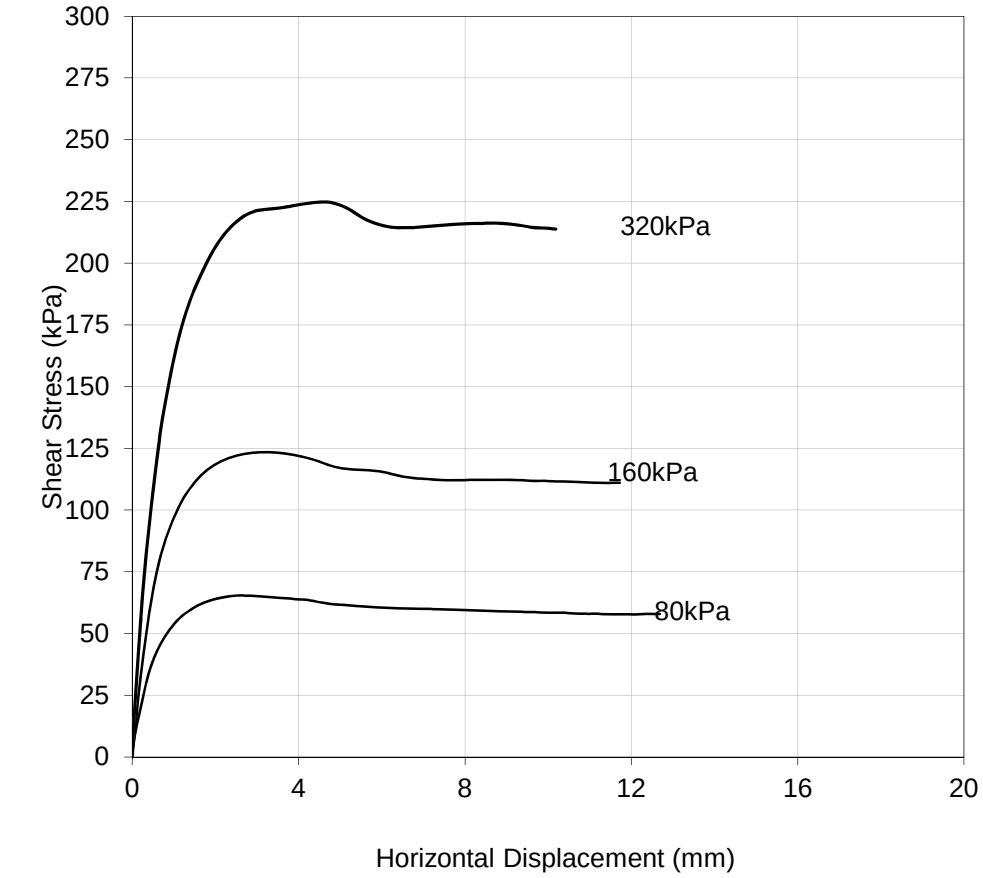

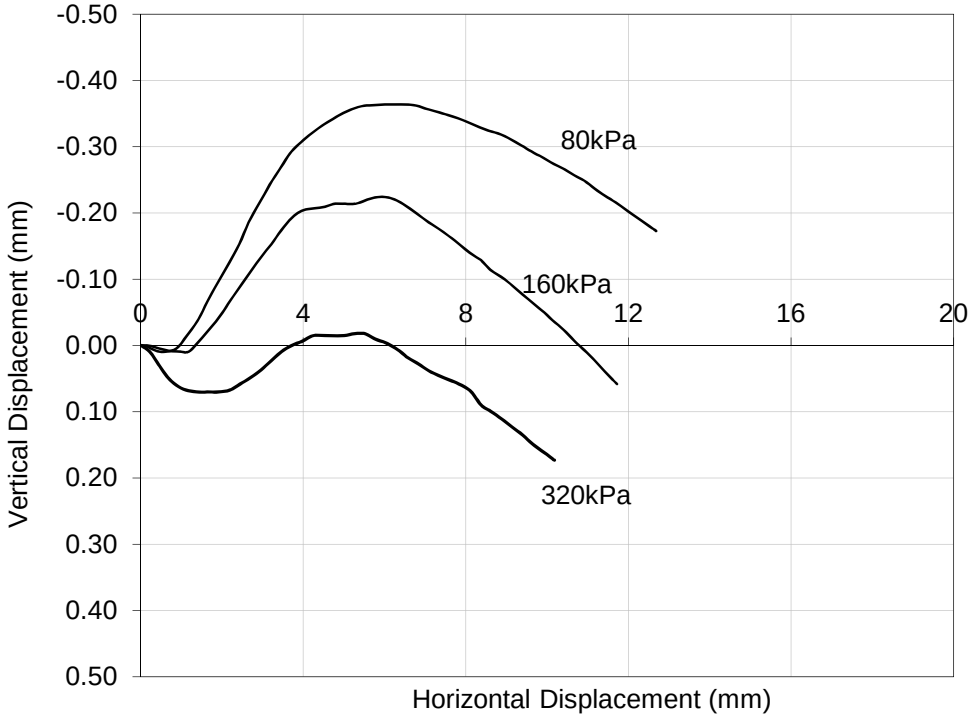

Figure 2 Stress-strain behaviour

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						Loading 100 kPa	
Ref:	St OlaPier		Size mm	100		Initial wet mass g	706
BH	BH-04		Thickness mm	30.75		Bulk Density mg/m3	2296
Depth m	20.7-31.2m					Final wet mass g	693
Our Ref	40			σ'_v kPa		Dry mass g	613
Soil type	Gravelly clayey sandy SILT					Initial water content %	15.2
Rate of shearing mm/min				0.015	100	Final water content %	13.1
					100		
					300		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
100		100	73
100		100	73
300		300	225

ONLY TWO LOADINGS

Loading 300 kPa	
Initial wet mass g	717
Bulk Density mg/m3	755
Final wet mass g	704
Dry mass g	631
Initial water content %	13.6
Final water content %	11.6

Peak angle of internal friction
Cohesion kPa
Ultimate angle of internal friction **36**

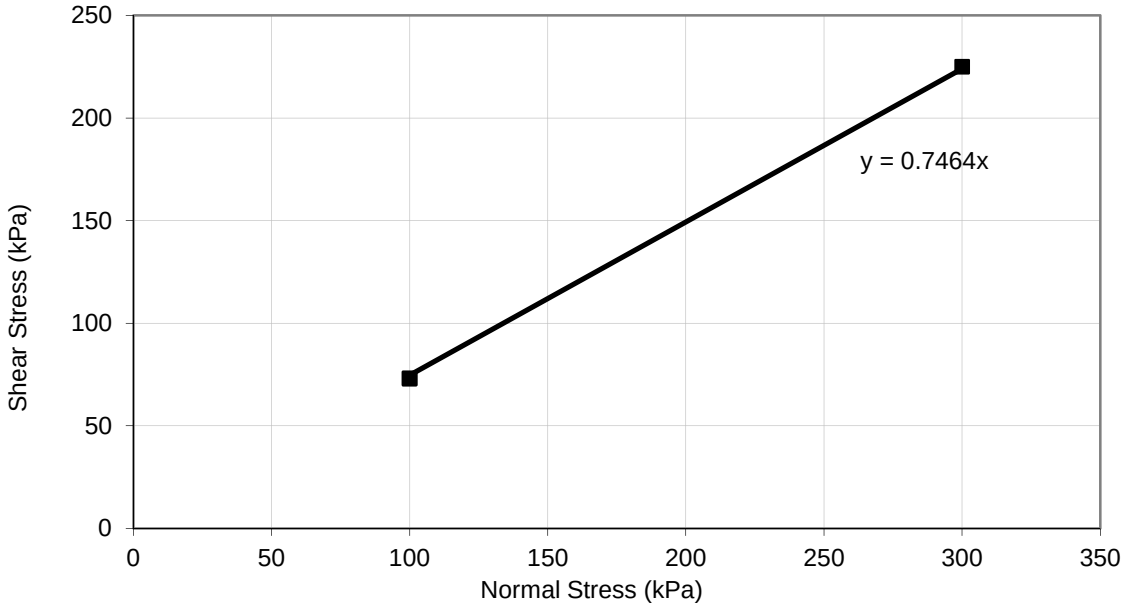

Figure 1 Failure Envelope

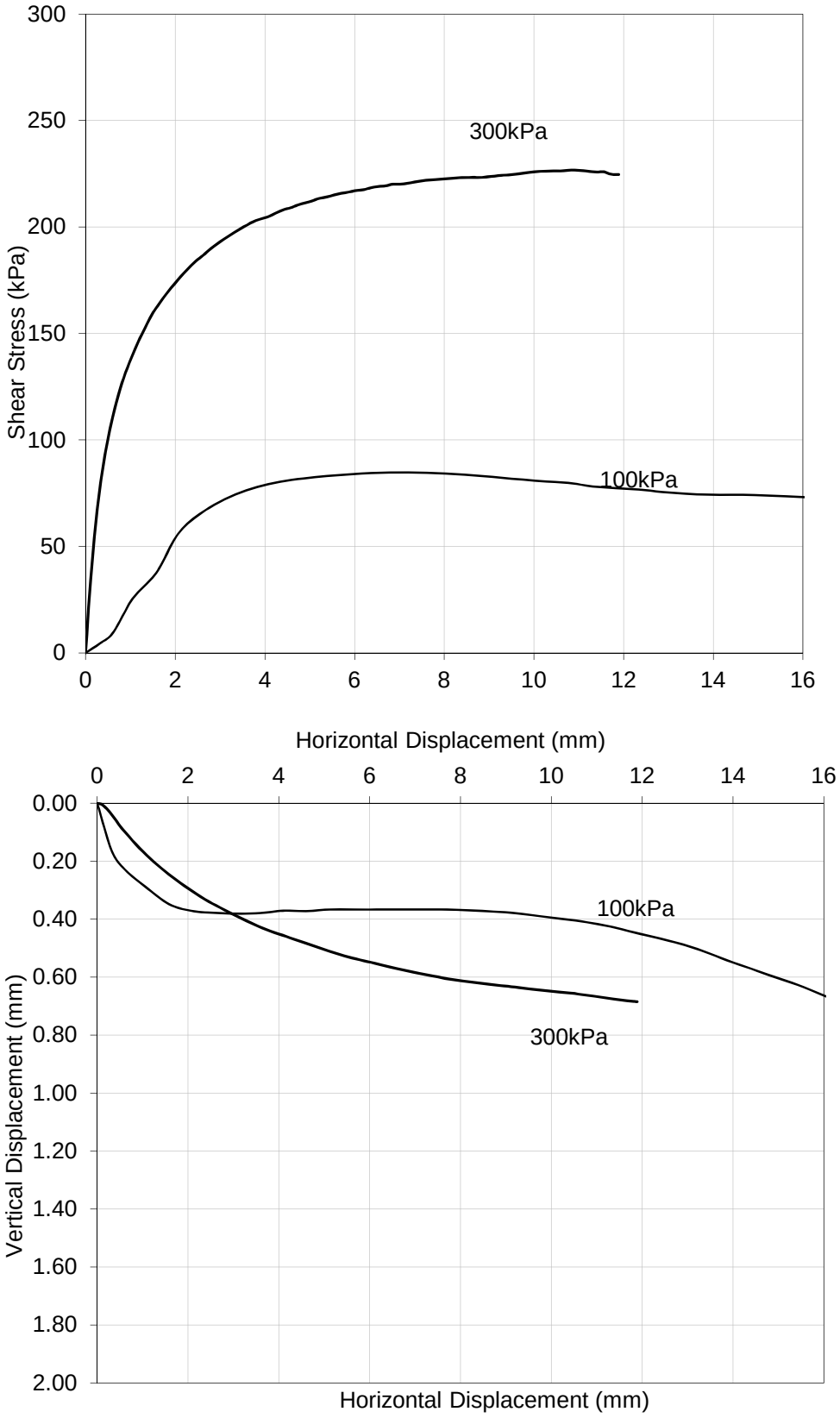

Figure 2 Stress-strain behaviour

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						Loading 100 kPa	
Ref:	St OlaPier		Size mm	100		Initial wet mass g	706
BH	BH-04		Thickness mm	30.75		Bulk Density mg/m3	2296
Depth m	20.7-31.2m					Final wet mass g	693
Our Ref	40			σ'_v kPa		Dry mass g	613
Soil type	Gravelly clayey sandy SILT					Initial water content %	15.2
Rate of shearing mm/min				0.015	100	Final water content %	13.1
					100		
					300		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
100		100	73
100		100	73
300		300	225

ONLY TWO LOADINGS

Loading 300 kPa	
Initial wet mass g	717
Bulk Density mg/m3	755
Final wet mass g	704
Dry mass g	631
Initial water content %	13.6
Final water content %	11.6

Peak angle of internal friction
Cohesion kPa
Ultimate angle of internal friction **36**

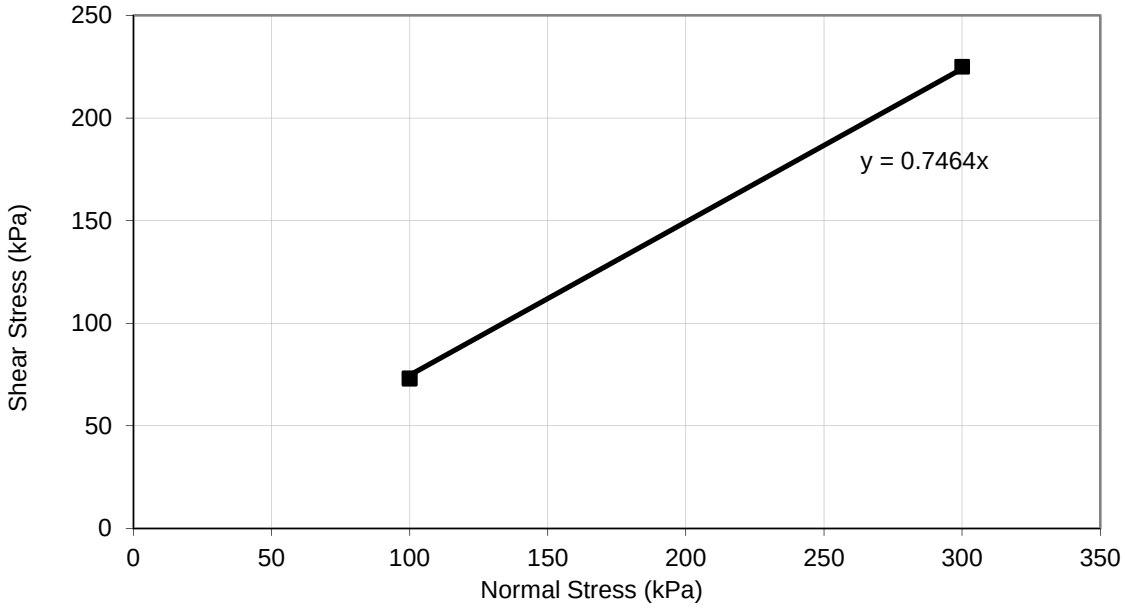

Figure 1 Failure Envelope

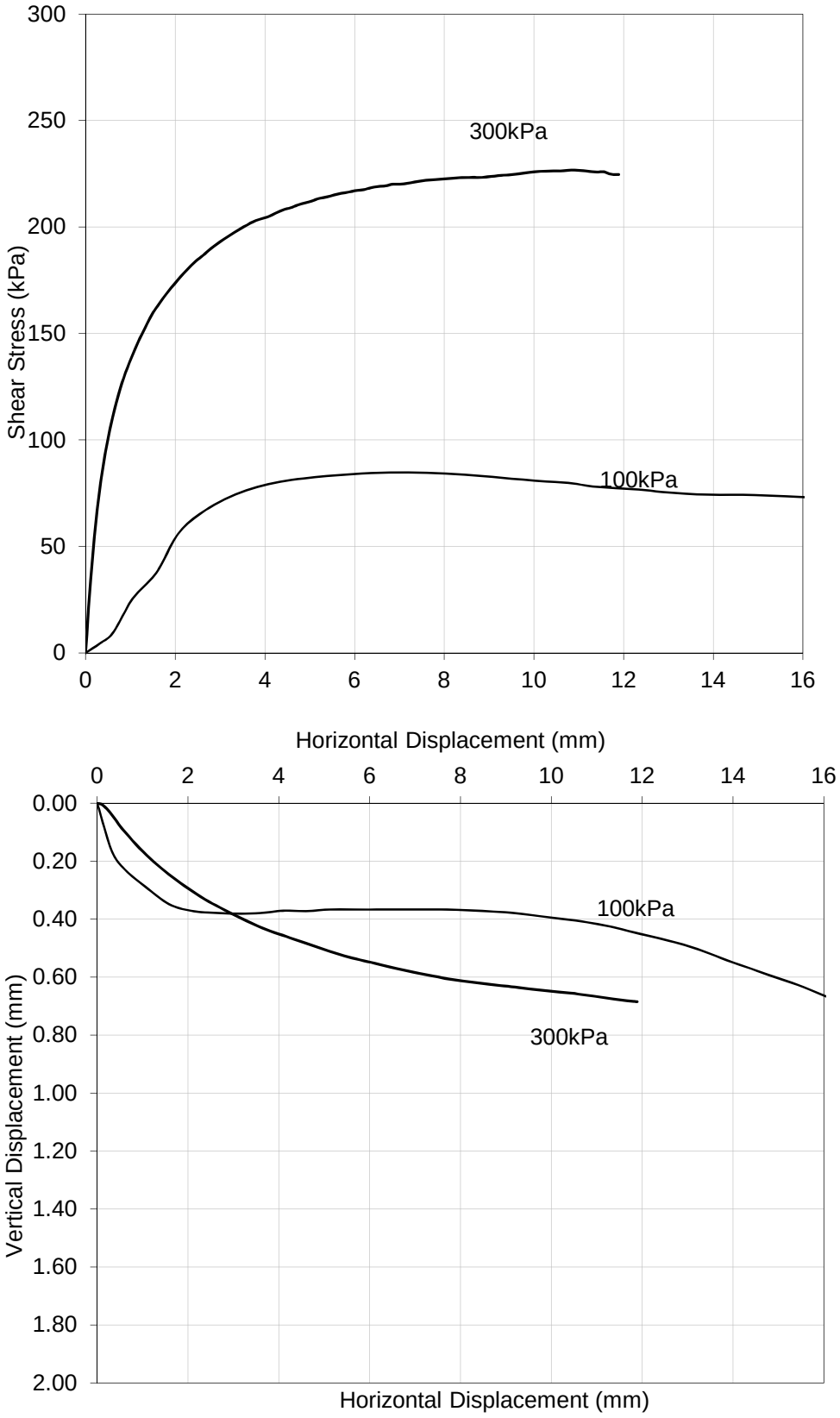

Figure 2 Stress-strain behaviour

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					Loading 40/80/160 kPa	
Ref:	St OlaPier		Size mm	100	Initial wet mass g	635
BH	BH-04		Thickness mm	35.25	Bulk Density mg/m3	1801
Depth m	8.5m					
Our Ref	31			σ'_v kPa		
Soil type	Sandy GRAVEL					
Rate of shearing mm/min			0.5	40		
>10 mm removed				80		
				160		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
40	52	40	41
80	92	80	82
160	175	160	152

Peak angle of internal friction **46**
Cohesion kPa
Ultimate angle of internal friction **43**

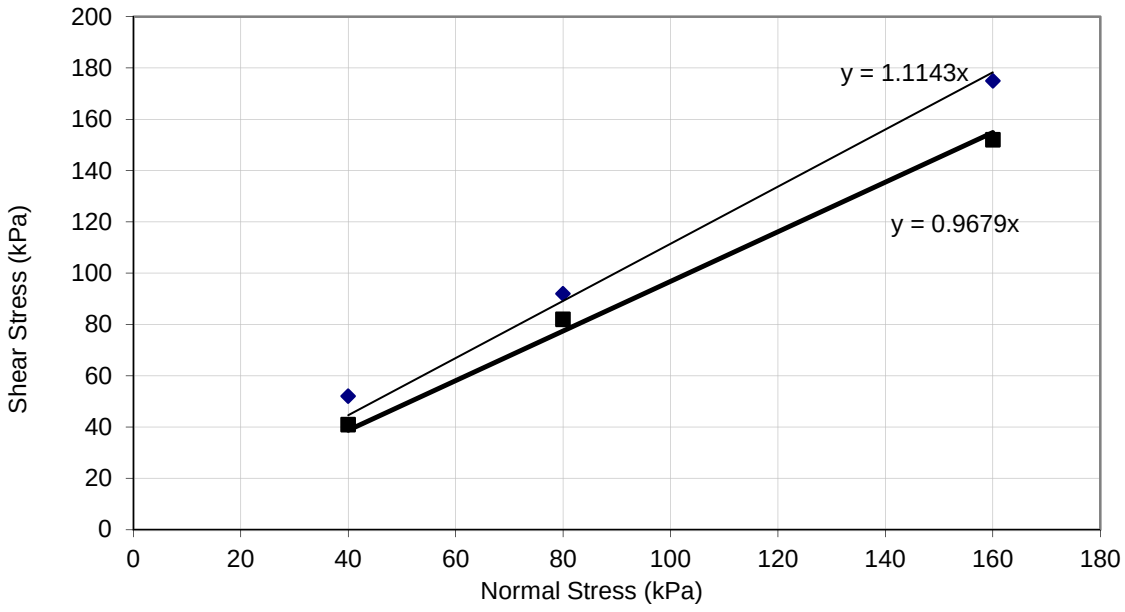
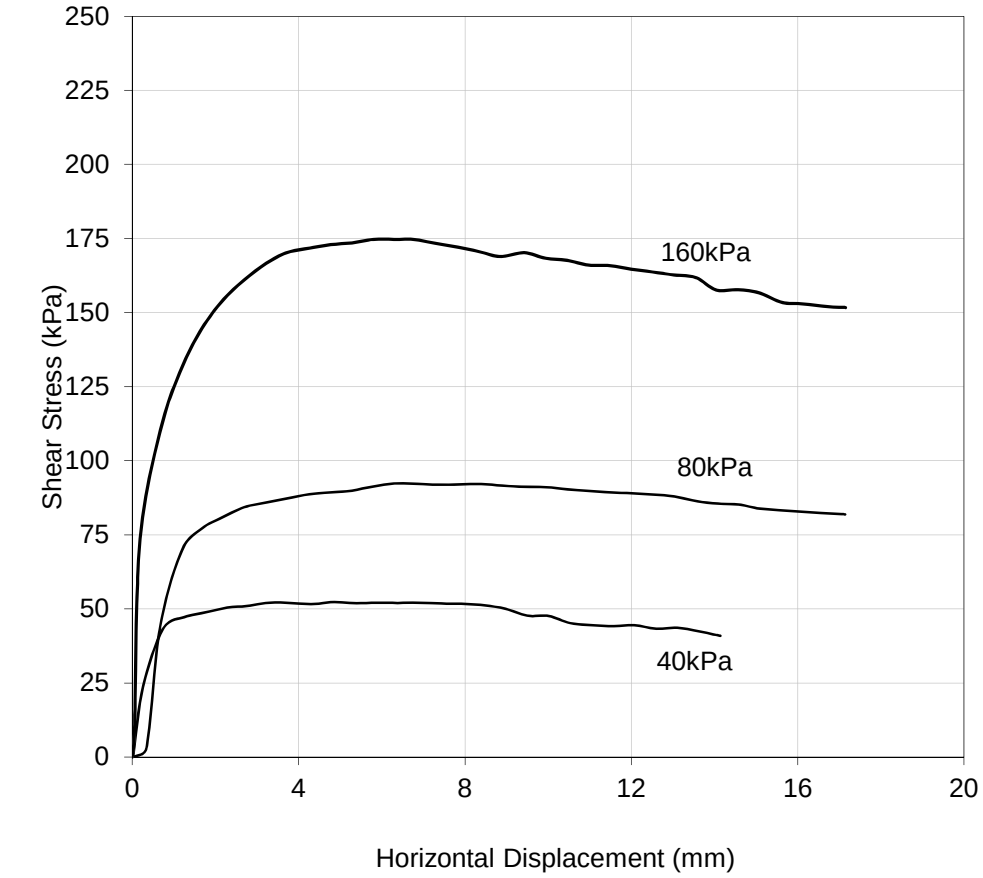


Figure 1 Failure Envelope



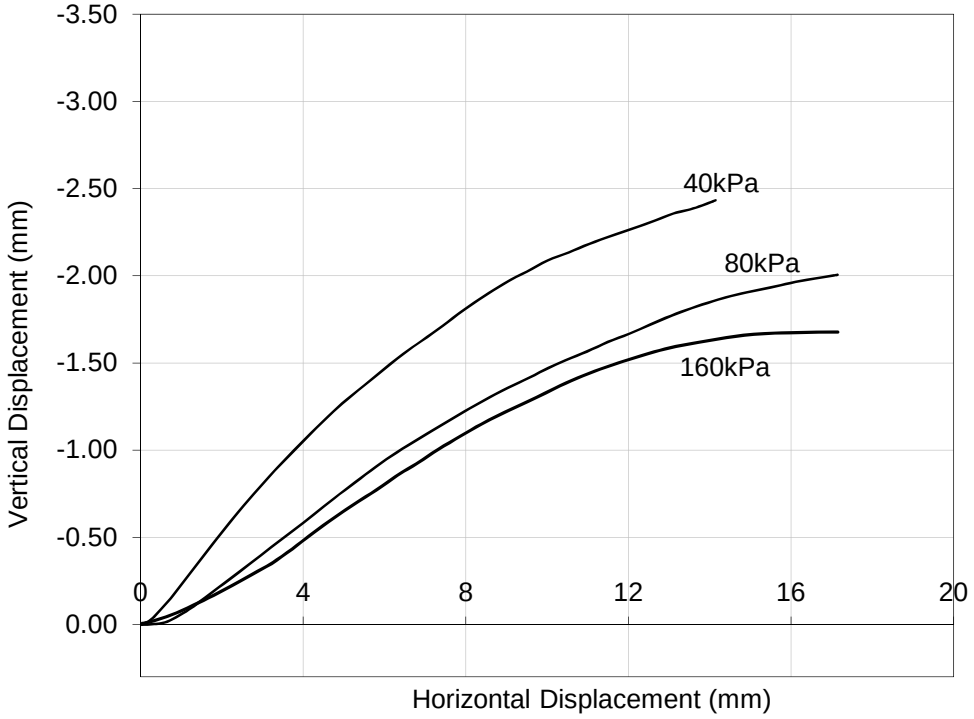


Figure 2 Stress-strain behaviour

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						Loading 50/100/200 kPa	
Ref:	St OlaPier		Size mm		100	Initial wet mass g	706
BH	BH-05		Thickness mm		35.75	Bulk Density mg/m3	1971
Depth m	11.0m						
Our Ref	24			σ'_v kPa			
Soil type	Gravelly SAND						
Rate of shearing mm/min			0.5		50		
>10 mm removed					100		
					200		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
50	50	50	37
100	100	100	74
200	169	200	148

Peak angle of internal friction **41**
Cohesion kPa
Ultimate angle of internal friction **36**

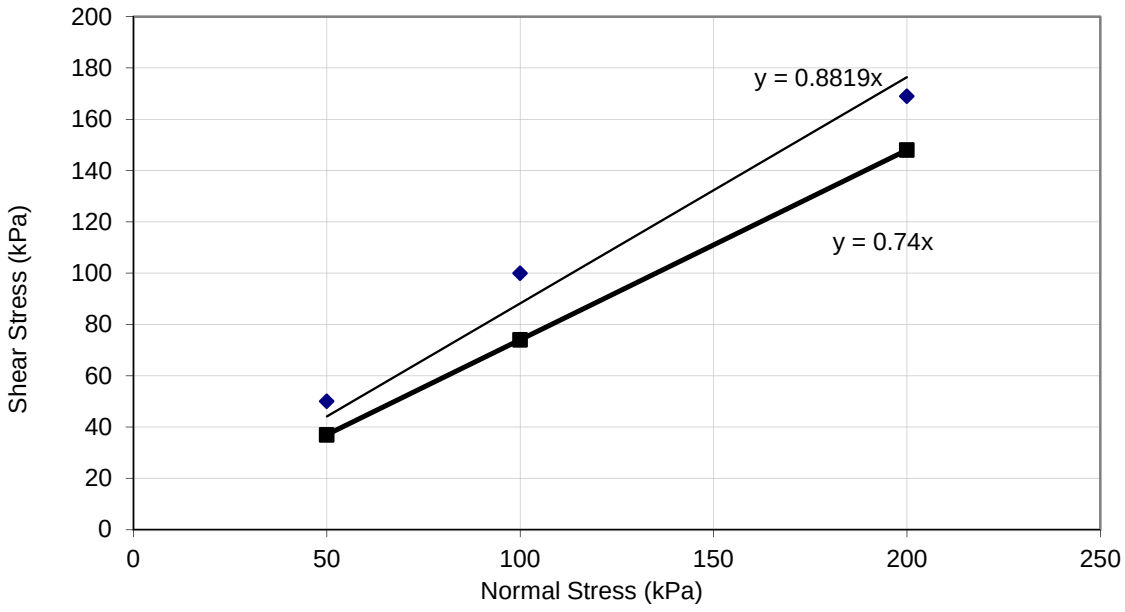
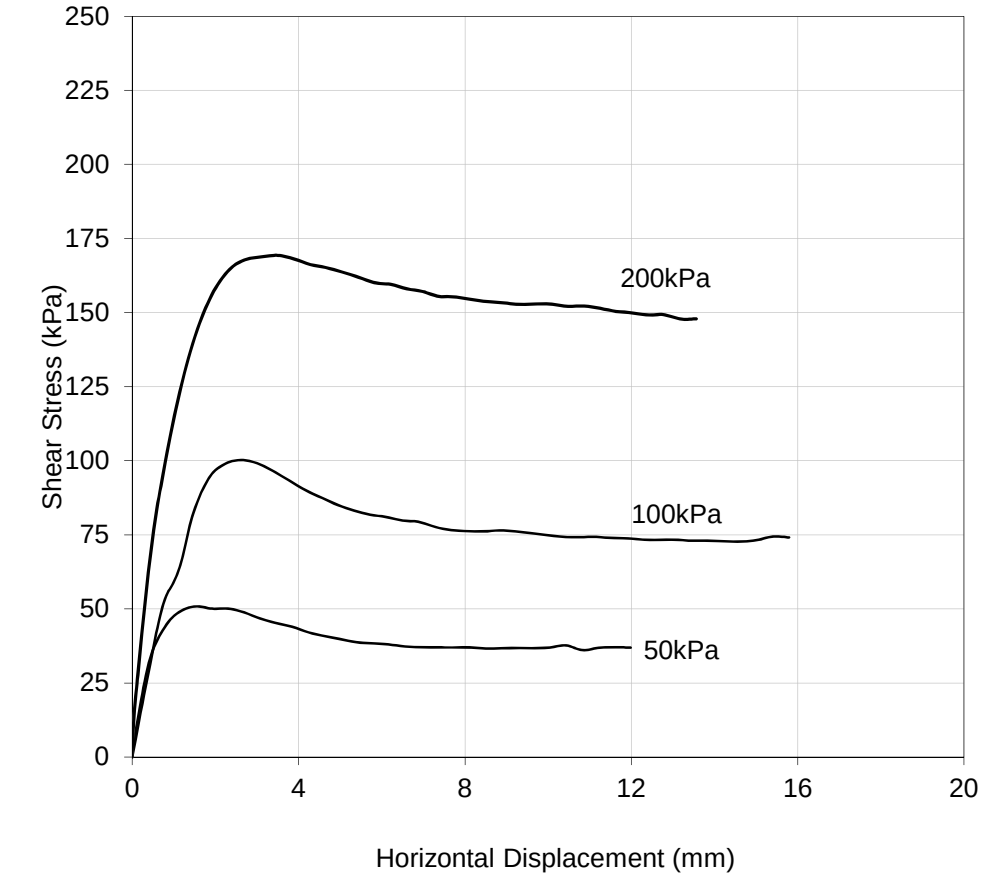


Figure 1 Failure Envelope



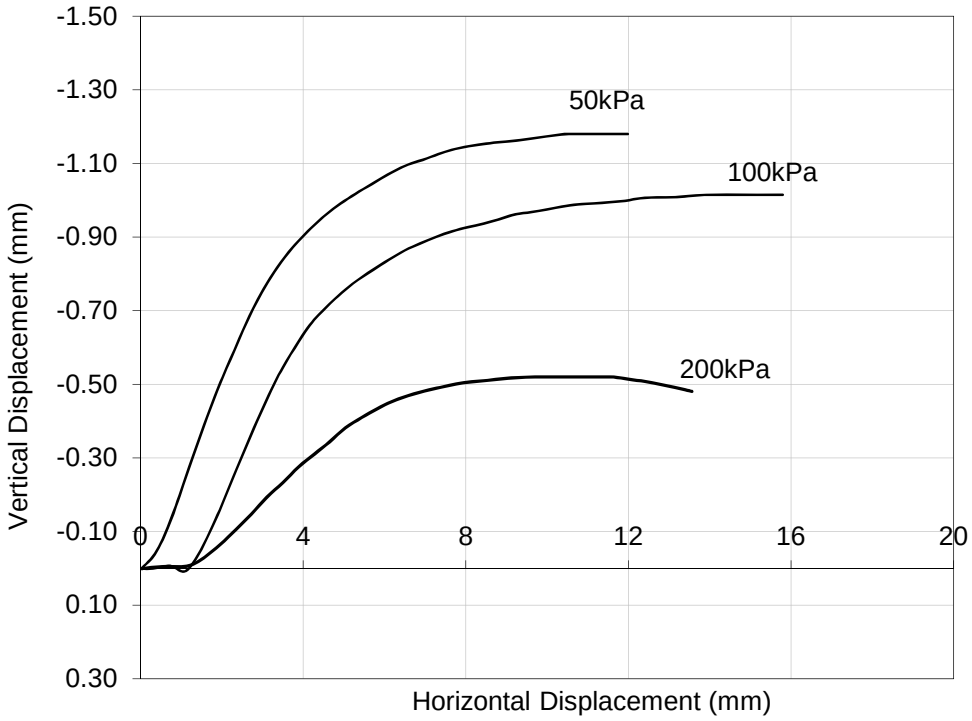


Figure 2 Stress-strain behaviour

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Ref:	St OlaPier		Size mm	100	
BH	BH05		Thickness mm	36.75	
Depth m	19.0m(C)				
Our Ref	3			σ'_v kPa	
Soil type	Clayey SILT				
Rate of shearing mm/min			0.015	90	
				180	
				360	

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
90		90	58
180		180	122
360		360	241

Peak angle of internal friction
Cohesion kPa
Ultimate angle of internal friction **34**

Loading 90 kPa	
Initial wet mass g	810
Bulk Density mg/m3	2204
Final wet mass g	765
Dry mass g	649
Initial water content %	24.8
Final water content %	17.9
Loading 180 kPa	
Initial wet mass g	795
Bulk Density mg/m3	2204
Final wet mass g	715
Dry mass g	626
Initial water content %	27.0
Final water content %	14.2
Loading 360 kPa	
Initial wet mass g	810
Bulk Density mg/m3	2204
Final wet mass g	755
Dry mass g	654
Initial water content %	23.9
Final water content %	15.4

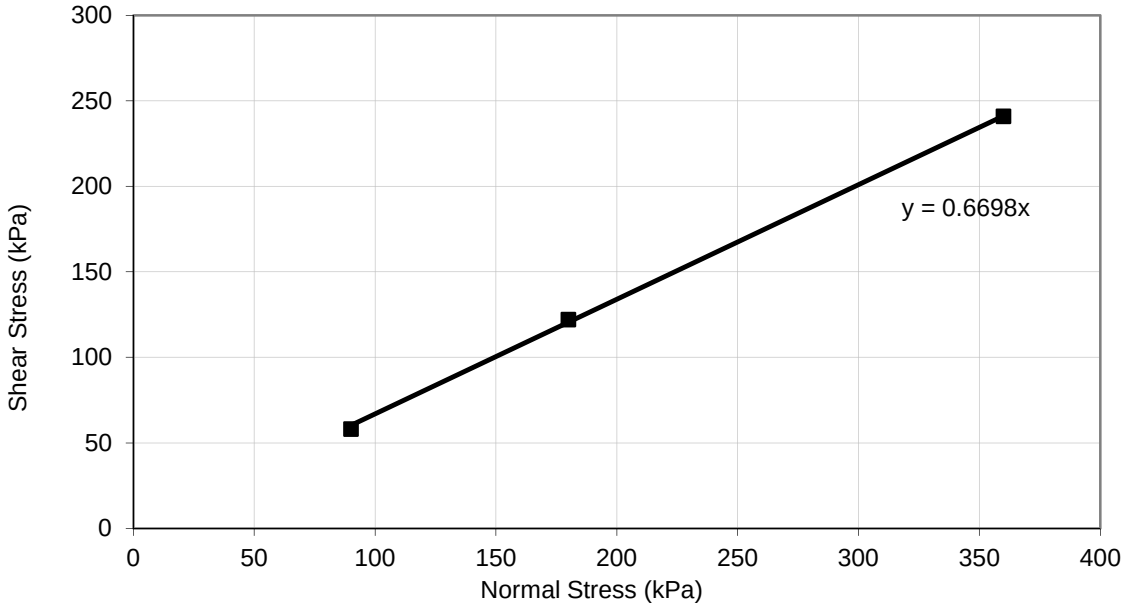

Figure 1 Failure Envelope

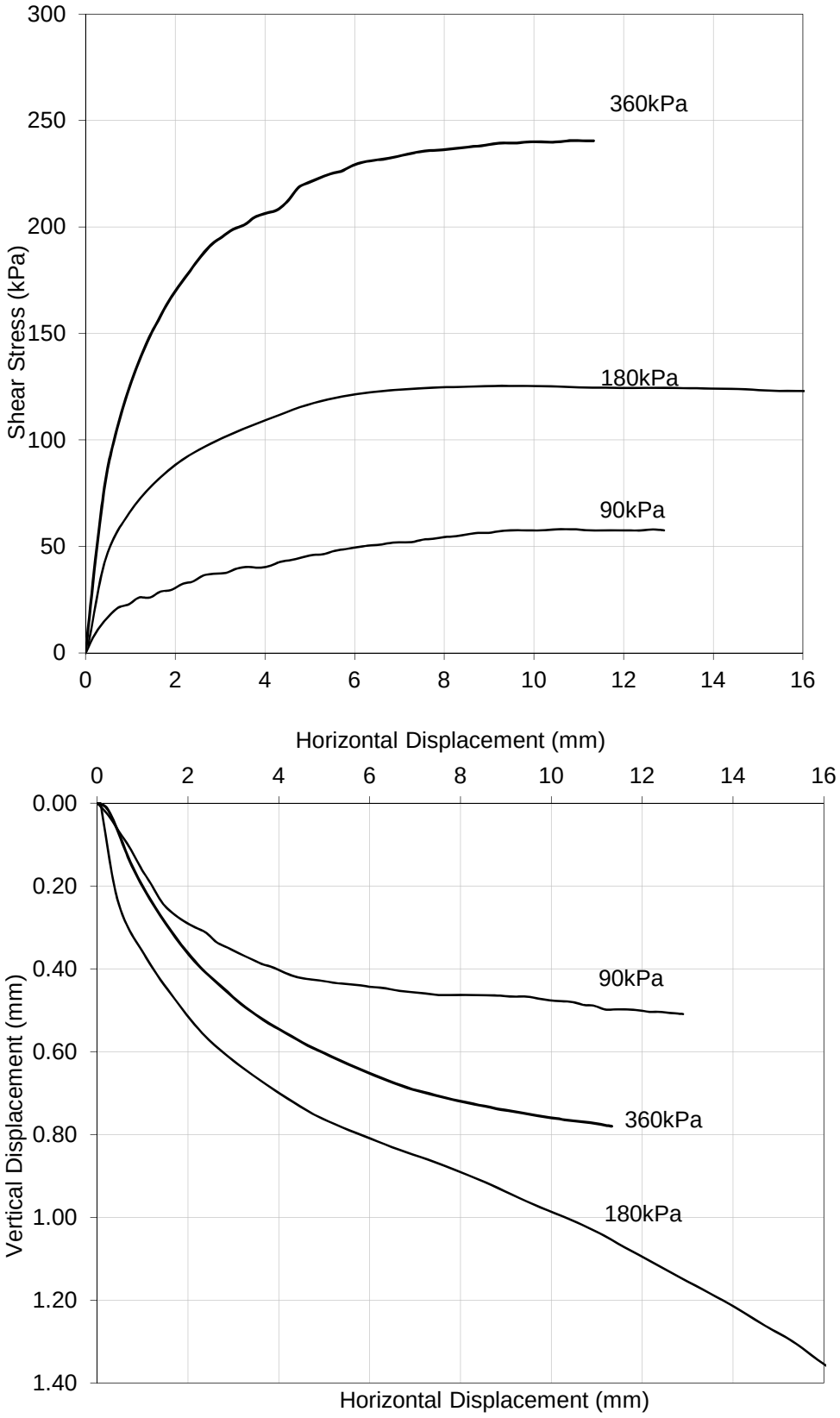

Figure 2 Stress-strain behaviour

Unconsolidated Undrained test (BS1377:1990 7/8)				
Location&Ref	1906-18			
Borehole/sample no.	BH-05			
Depth	19.0m(D)			
Soil type	Brown silty CLAY			
Sampling	Compaction			
Stage No.		1	2	3
Diameter	mm	105		
Height	mm	200		
Initial moisture content	%	24.4		
Initial bulk density	kg/m3	2086		
Dry density	kg/m3	1677		
Cell pressure	kPa	100		
Rate of strain	%/min	1.00		
CONDITIONS AT FAILURE				
Mem. and side drains corrections	kPa	3		
Maximum deviator stress	kPa	18		
c_u			7 kPa	
Mode of failure			Bulging	
Checked and approved by V Sivakumar				

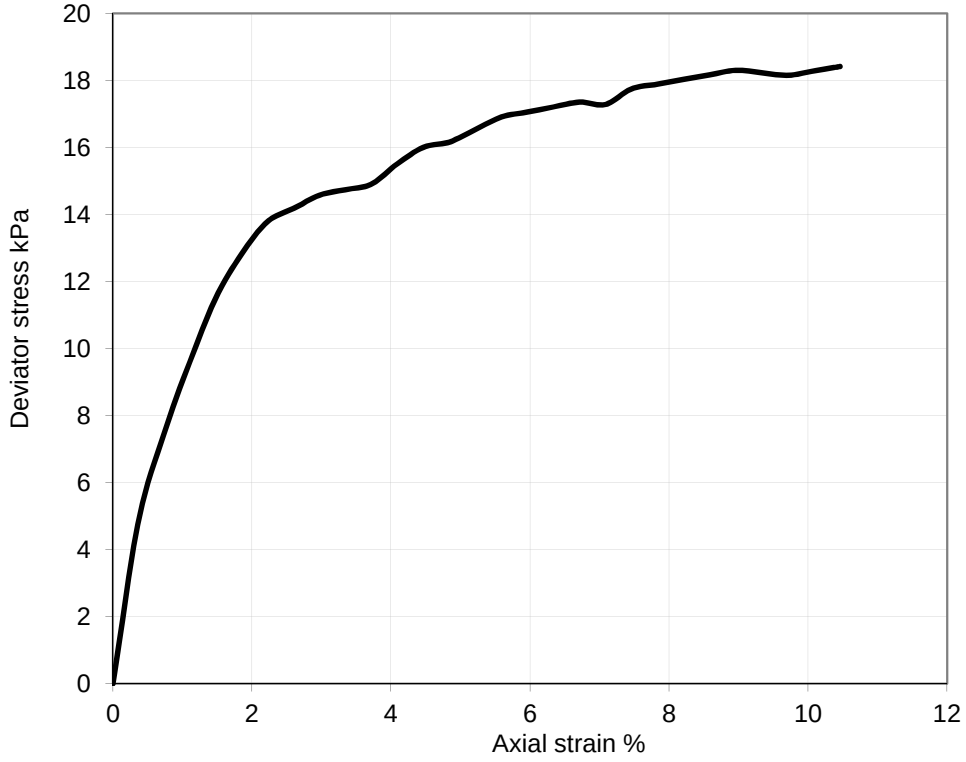

Figure 1 Deviator stress vs axial strain

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Ref:	St OlaPier		Size mm	100	
BH	BH05		Thickness mm	36.75	
Depth m	19.0m(A)				
Our Ref	26			σ'_v kPa	
Soil type	Clayey SILT				
Rate of shearing mm/min			0.015	90	
				90	
				360	

Loading 90 kPa	
Initial wet mass g	760
Bulk Density mg/m3	2068
Final wet mass g	714
Dry mass g	616
Initial water content %	23.4
Final water content %	15.9

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
90		90	64
90		90	64
360		360	222

ONLY TWO LOADINGS

Loading 360 kPa	
Initial wet mass g	772
Bulk Density mg/m3	755
Final wet mass g	723
Dry mass g	632
Initial water content %	22.2
Final water content %	14.4

Peak angle of internal friction
Cohesion kPa
Ultimate angle of internal friction **32**

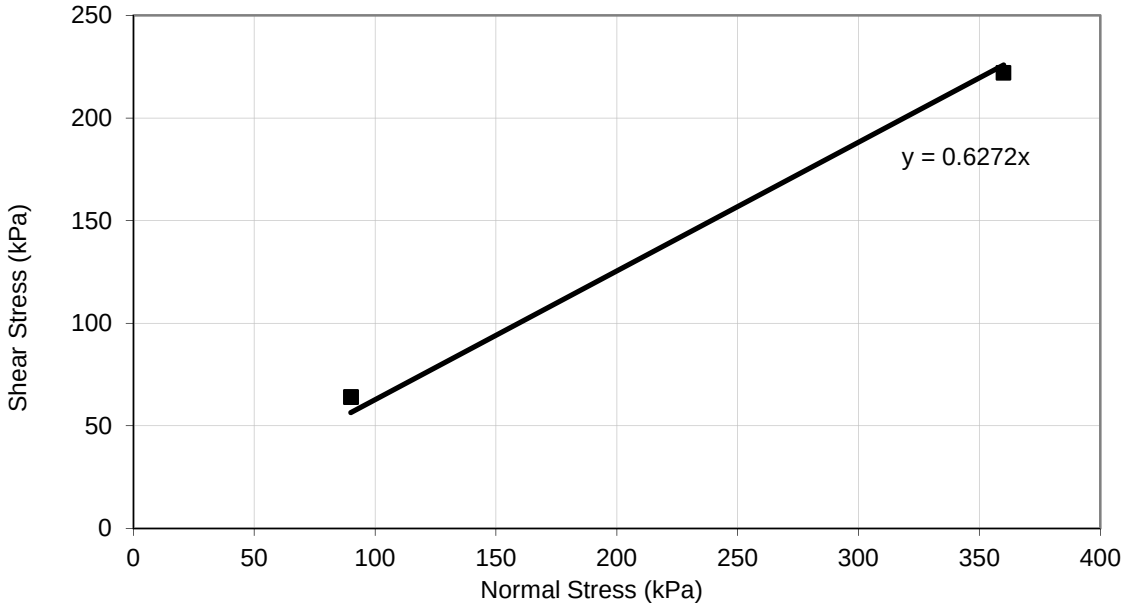

Figure 1 Failure Envelope

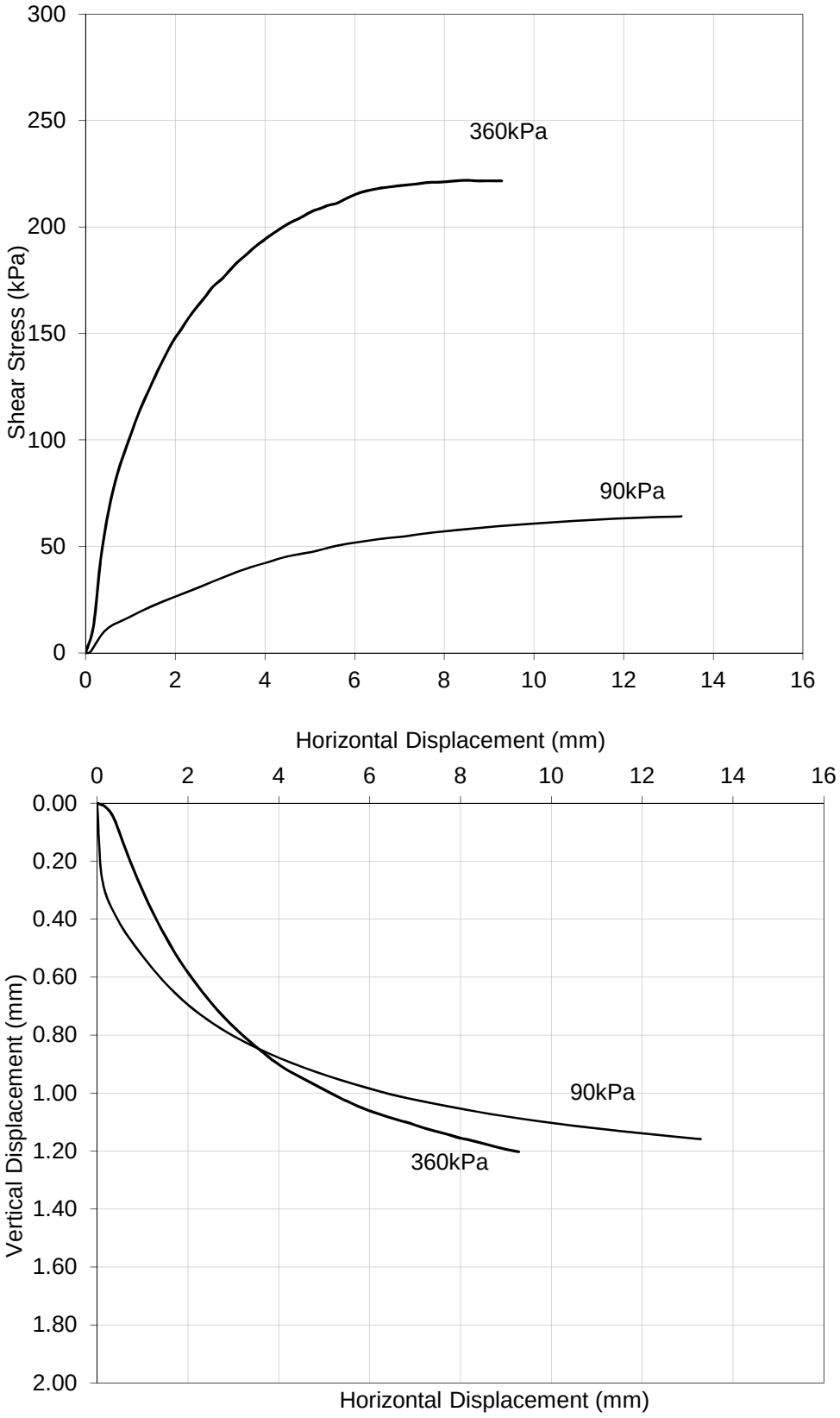

Figure 2 Stress-strain behaviour

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Ref:	St OlaPier		Size mm	100	
BH	BH05		Thickness mm	36.75	
Depth m	19.0m(B)				
Our Ref	25			σ'_v kPa	
Soil type	Clayey SILT				
Rate of shearing mm/min			0.015	90	
				180	
				360	

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
90		90	63
180		180	120
360		360	229

Peak angle of internal friction
Cohesion kPa
Ultimate angle of internal friction **33**

Loading 90 kPa	
Initial wet mass g	767
Bulk Density mg/m3	2087
Final wet mass g	720
Dry mass g	622
Initial water content %	23.3
Final water content %	15.8
Loading 180 kPa	
Initial wet mass g	724
Bulk Density mg/m3	2087
Final wet mass g	679
Dry mass g	589
Initial water content %	22.9
Final water content %	15.3
Loading 360 kPa	
Initial wet mass g	730
Bulk Density mg/m3	2087
Final wet mass g	672
Dry mass g	595
Initial water content %	22.7
Final water content %	12.9

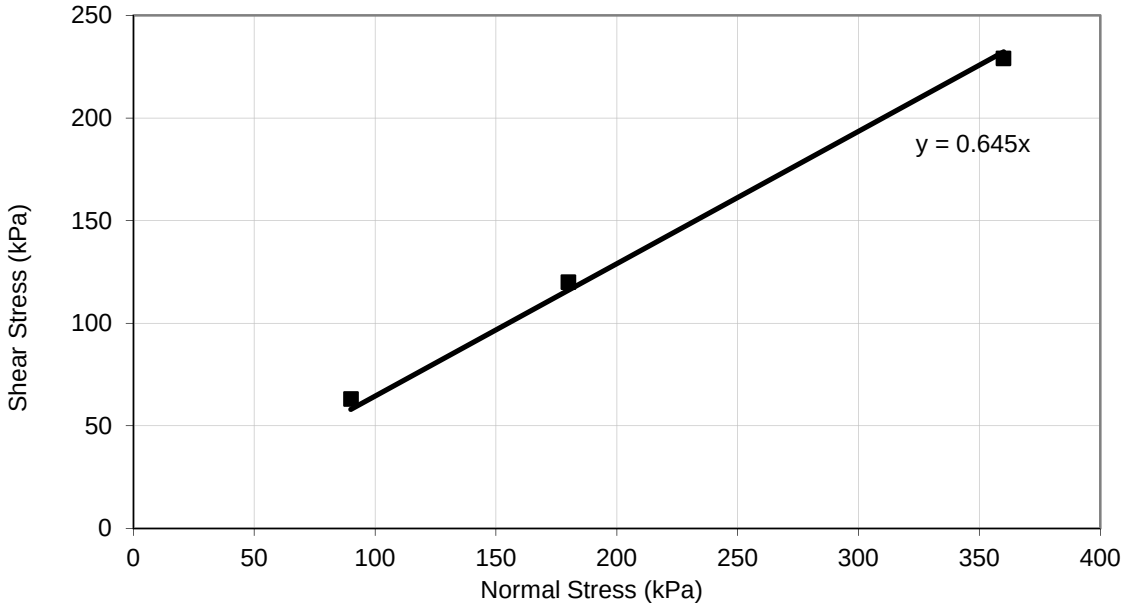

Figure 1 Failure Envelope

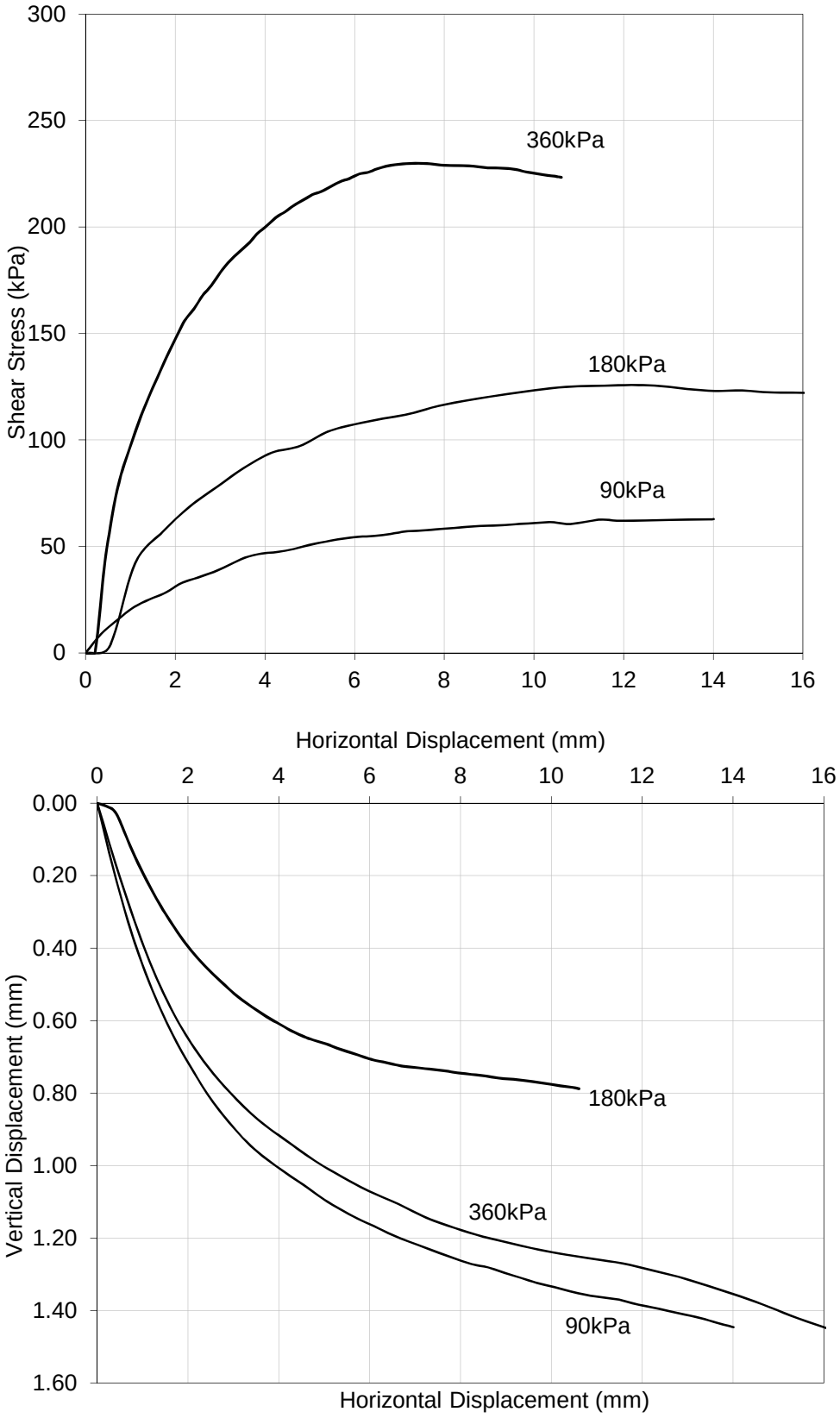

Figure 2 Stress-strain behaviour

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Ref:	St OlaPier		Size mm	100	
BH	BH05		Thickness mm	36.75	
Depth m	19.0m(D)				
Our Ref	9			σ'_v kPa	
Soil type	Clayey SILT				
Rate of shearing mm/min			0.015	90	
				180	
				360	

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
90		90	66
180		180	119
360		360	247

Peak angle of internal friction
Cohesion kPa
Ultimate angle of internal friction **34**

Loading 90 kPa	
Initial wet mass g	805
Bulk Density mg/m3	2190
Final wet mass g	758
Dry mass g	640
Initial water content %	25.8
Final water content %	18.4
Loading 180 kPa	
Initial wet mass g	756
Bulk Density mg/m3	2190
Final wet mass g	711
Dry mass g	621
Initial water content %	21.7
Final water content %	14.5
Loading 360 kPa	
Initial wet mass g	787
Bulk Density mg/m3	2190
Final wet mass g	735
Dry mass g	647
Initial water content %	21.6
Final water content %	13.6

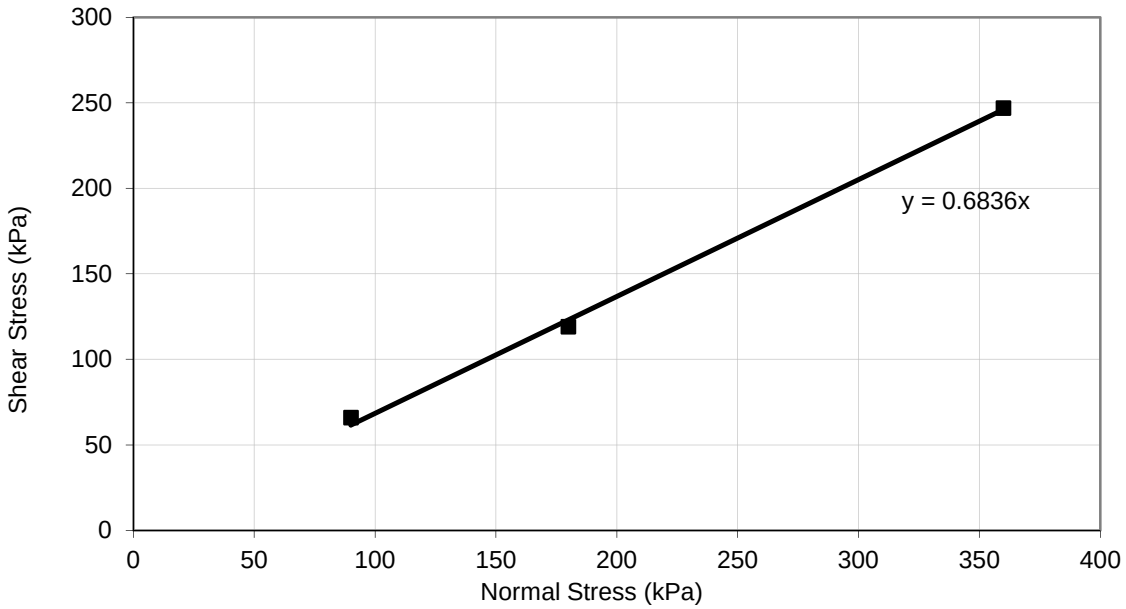

Figure 1 Failure Envelope

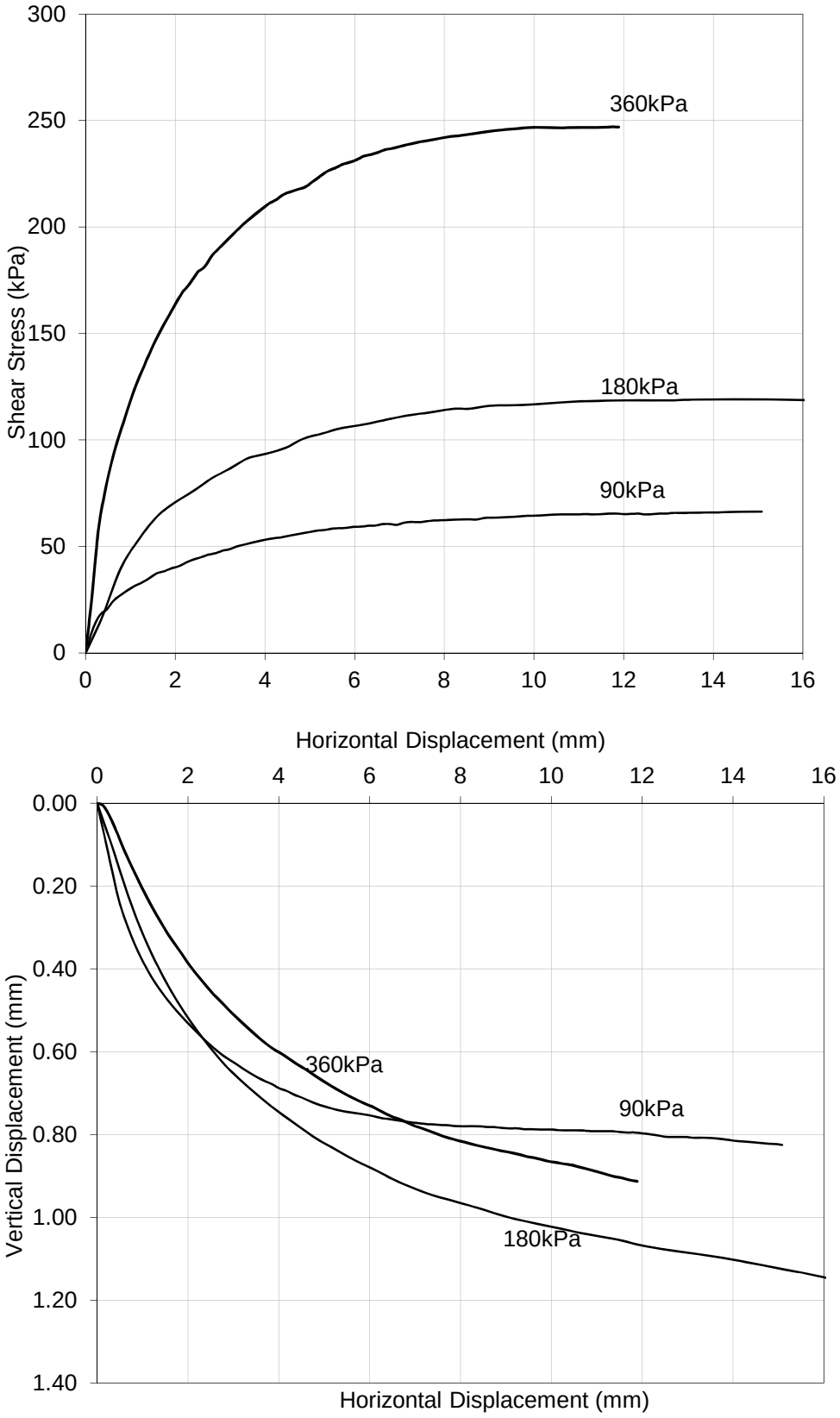

Figure 2 Stress-strain behaviour

Consolidated undrained multistage triaxial test with pore water pressure measurements				
Tested in accordance with BS:1377 Part 8				
Location	St Ola Pier			
Job Ref	1906-18			
Borehole No	BH-05			
Depth	19.0m			
Soil type	Dark brwon clayey SILT			
Sampling	U			
INITIAL CONDITIONS				
Stage No.		1	2	3
Diameter	mm	50	50	50
Height	mm	100	100	100
Initial Moisture content	%	15.1	20.6	20.3
Moisture content after saturation	%	14.8	17.9	17.7
Initial Bulk density	kg/m3	2298	2267	2236
Initial dry density	kg/m3	1997	1880	1859
Specific Gravity		2.70	2.70	2.70
SATURATION STAGE				
Initial cell pressure	kPa	50	50	50
Initial B value		<0.95	<0.95	<0.95
Back pressure applied	kPa	300	300	300
Period of saturation	Days	1	1	1
Final B value	kPa	1	1	1
CONSOLIDATION STAGE				
Cell pressure	kPa	379	466	603
Back pressure	kPa	305	301	300
Effective consolidation pressure	kPa	74	165	303
Drainage conditions	T/B			
Period of consolidation	h	30	48	28
Water content after consolidation%		13.5	13.6	13.7
Void ratio		0.365	0.366	0.370
COMPRESSION STAGE				
Total cell pressure	kPa	379	466	603
Rate of strain	%/h	0.34	0.36	0.34
Period of compression	h	28	30	24
CONDITIONS AT FAILURE/CRITICAL STATE				
Mem. and side drains corrections	kPa	6	6	6
Maximum deviator stress	kPa	110	149	269
Pore water pressure	kPa	348	411	504
Change in pore water pressure	kPa	43.0	110.0	203.0
Strain at failure	%	9.6	10.8	8.04
Minor principal total stress	kPa	379	466	603
Major principal total stress	kPa	489	615	872
Minor principal effective stress	kPa	31	55	99
Major principal effective stress	kPa	135	198	362
A_f		0.39	0.74	0.75
Critical ϕ' (degrees)			34	
Test carried out and checked by VS (QUB)				

Consolidated Undrained Triaxial Test With Pore Water Pressure Measurements
St Ola Pier , BH-05-19.0m(D)

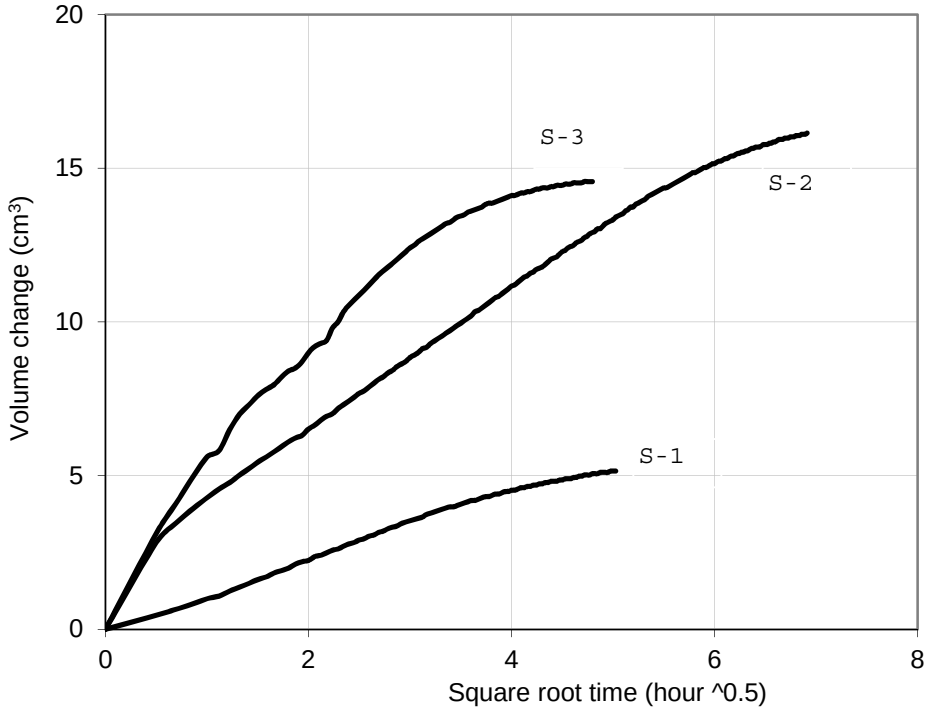

Figure 1 Consolidation: Volume change vs square root time

Consolidated Undrained Triaxial Test With Pore Water Pressure Measurements
St Ola Pier , BH-05-19.0m(D)

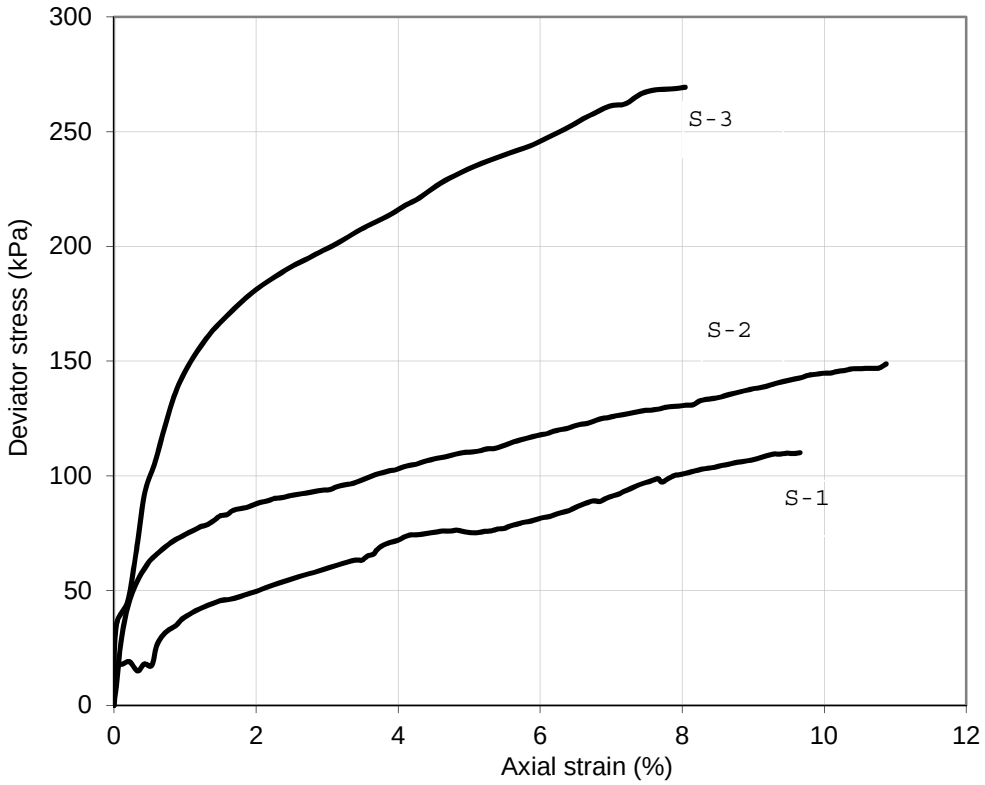

Figure 2 Deviator stress vs axial strain

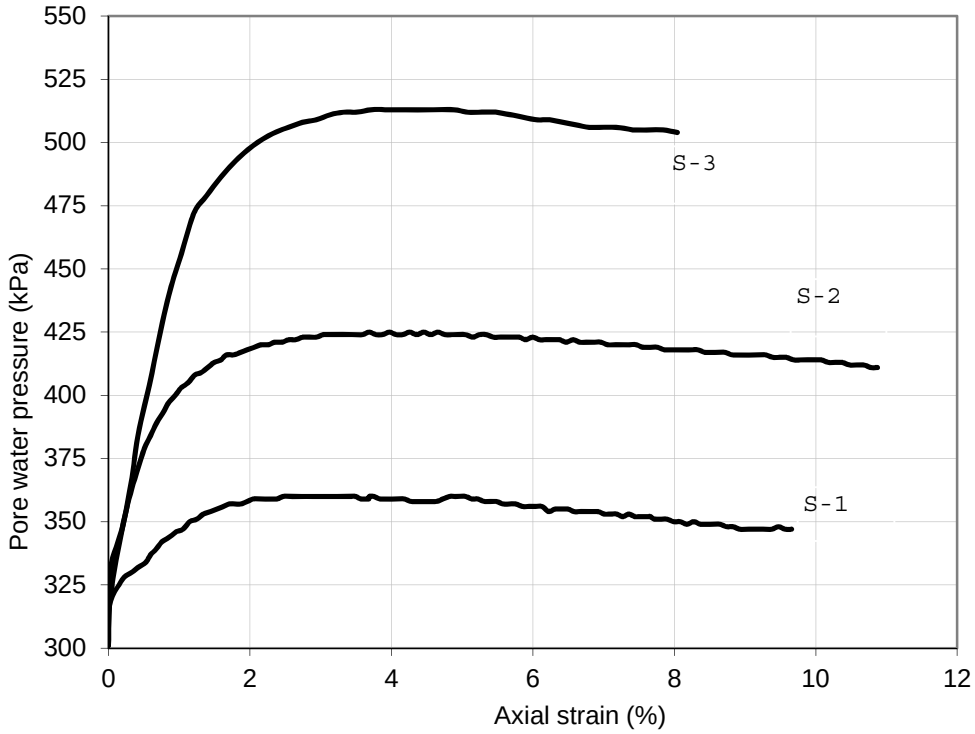

Figure 3 Pore water pressure vs axial strain

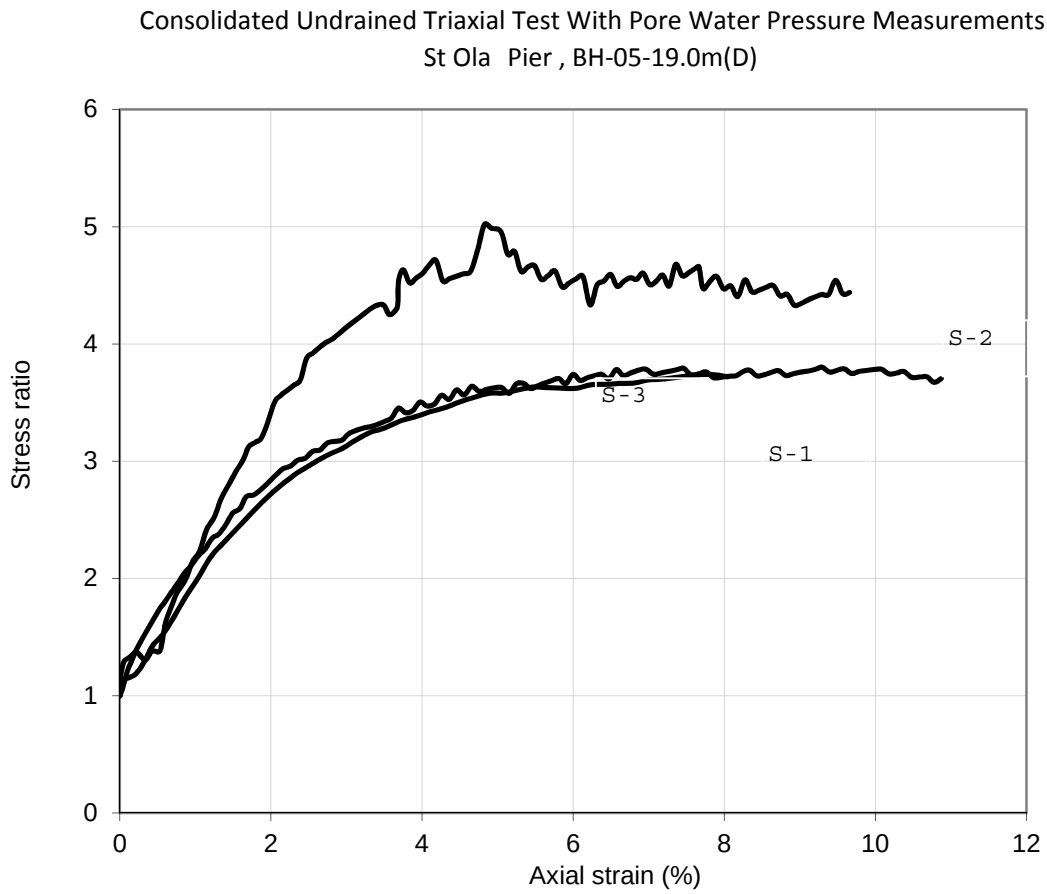

Figure 4 Stress ratio vs axial strain

Consolidated Undrained Triaxial Test With Pore Water Pressure Measurements
St Ola Pier , BH-05-19.0m(D)

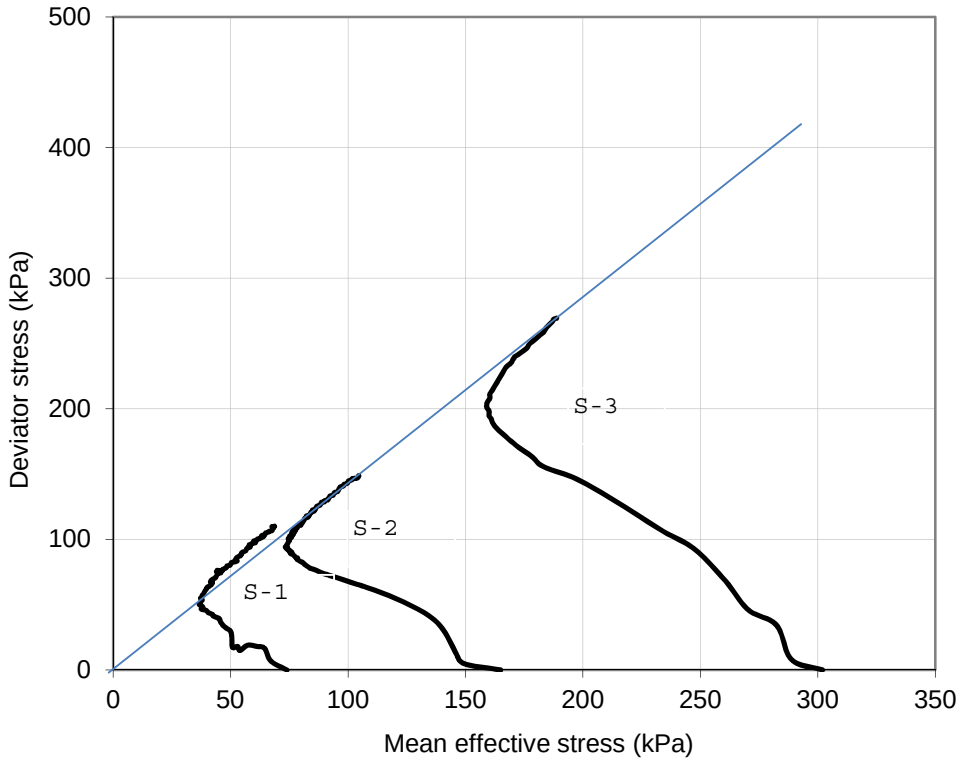

Figure 5 Deviator stress vs mean effective (stress paths)

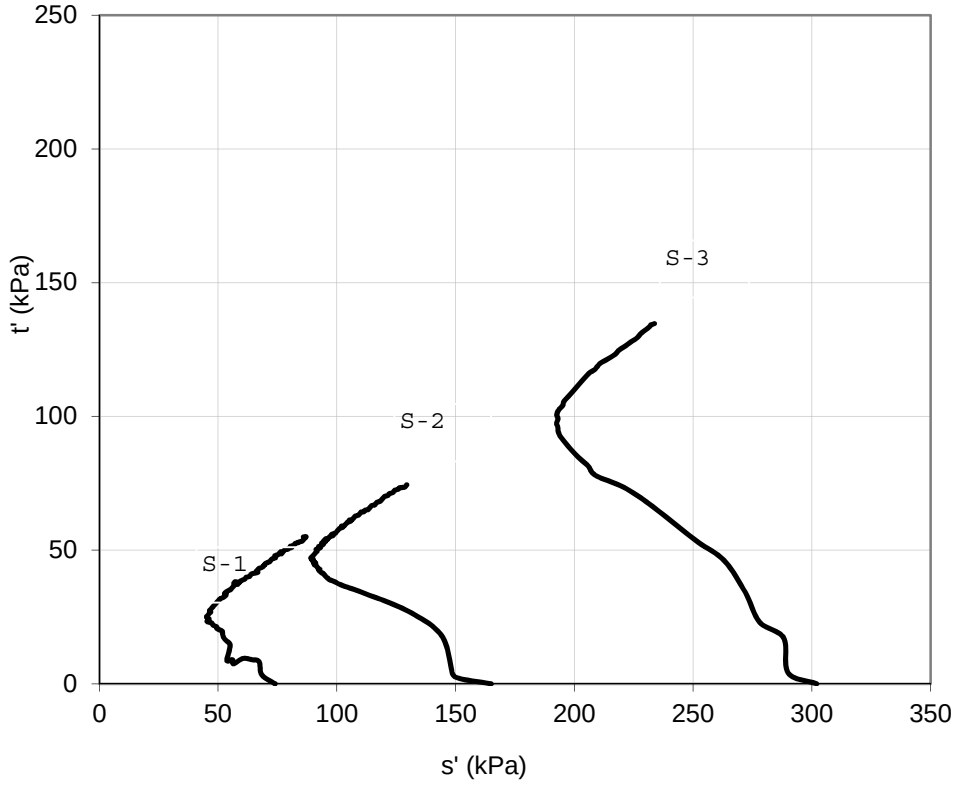

Figure 6 t' vs s' (stress paths)

Consolidated Undrained Triaxial Test With Pore Water Pressure Measurements
St Ol a Pier , BH-05-19.0m(D)

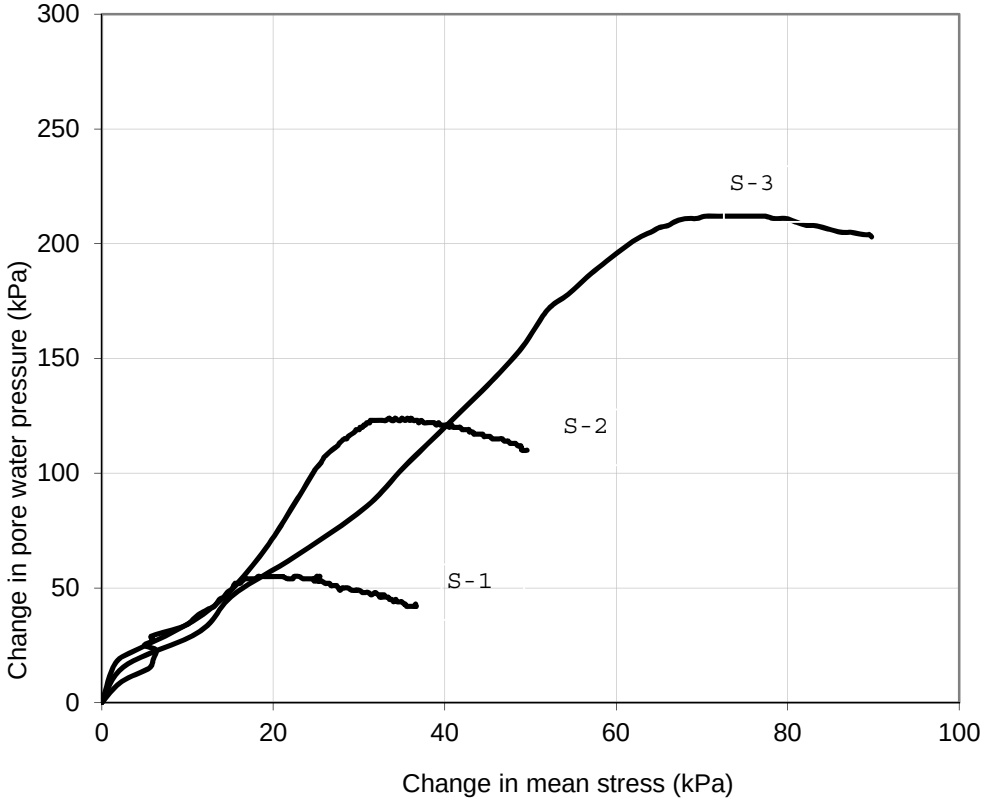

Figure 7 Change in pore water pressure vs change in mean stress

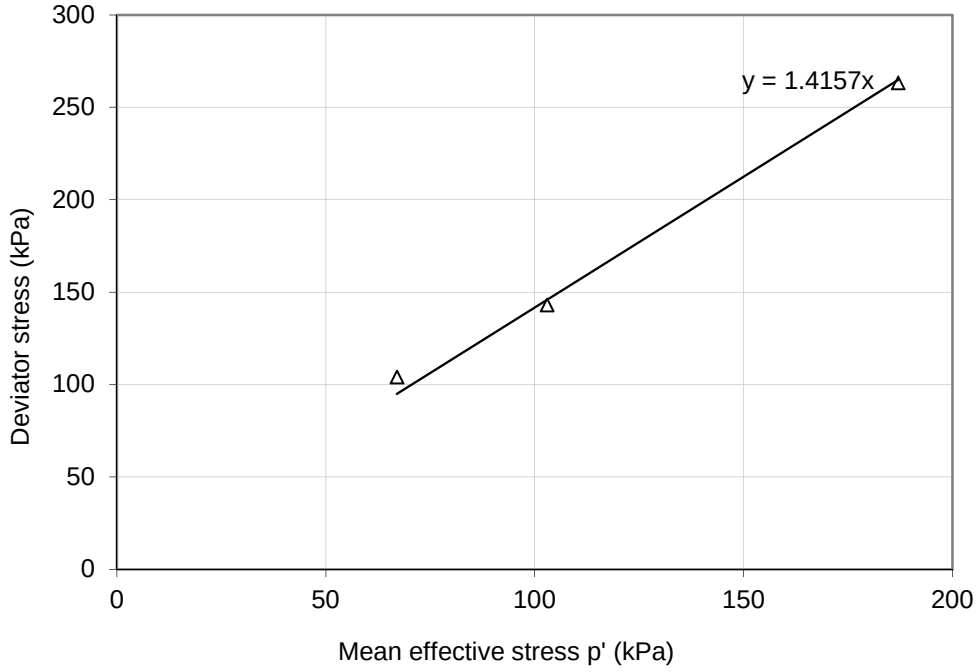

Figure 8 Deviator stress q vs mean effective stress at failure

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					Loading 43,80,160kPa	
Ref:	St OlaPier		Size mm	100	Initial wet mass g	673
BH	BH-o5		Thickness mm	35.75	Bulk Density mg/m3	1883
Depth m	2.5m					
Our Ref	33			σ'_v kPa		
Soil type	Gravelly SAND					
Rate of shearing mm/min			0.5	43		
>10 mm removed				80		
				160		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
43	42	43	34
80	76	80	62
160	133	160	117

Peak angle of internal friction	**40**
Cohesion kPa	
Ultimate angle of internal friction	**36**

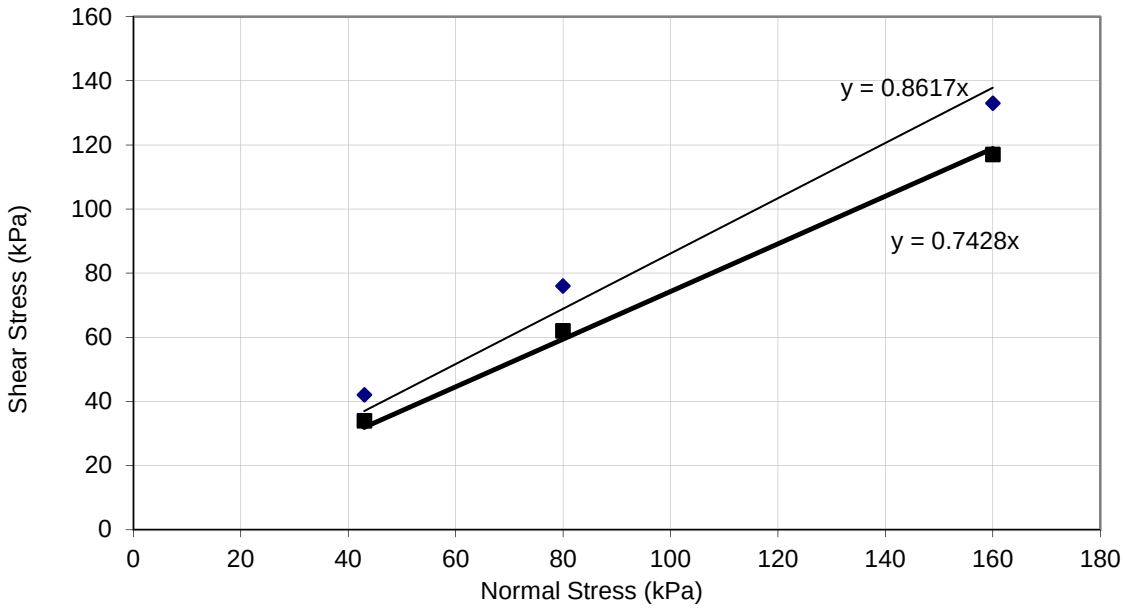
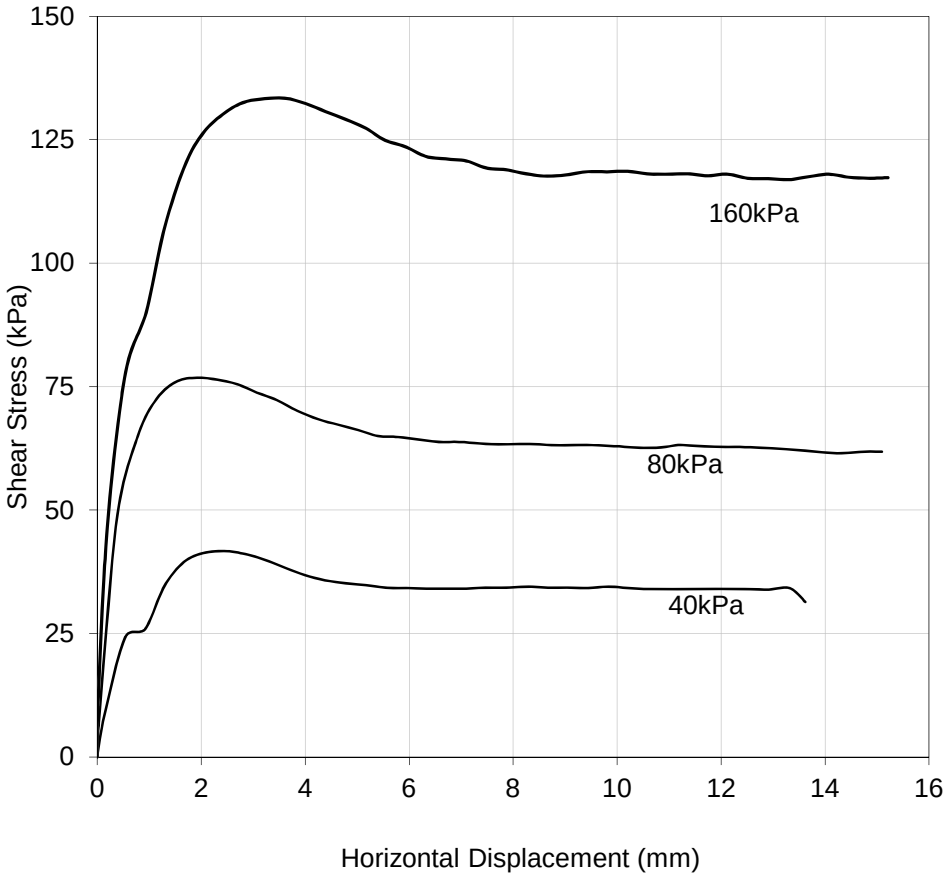


Figure 1 Failure Envelope



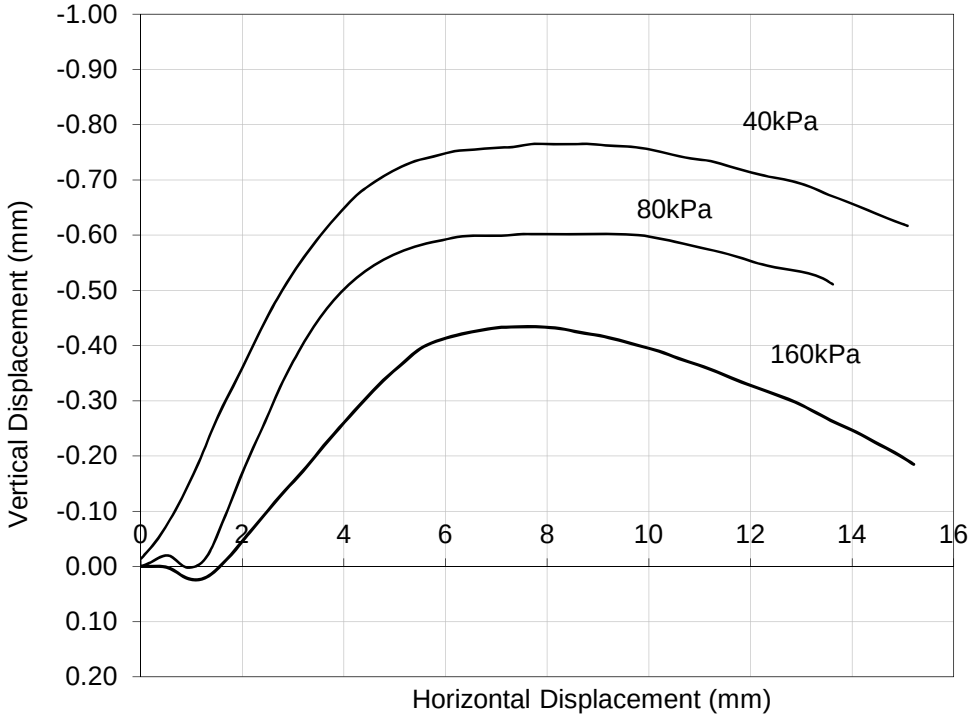


Figure 2 Stress-strain behaviour

Geotechnical Testing Laboratory
School of Natural and Built Enviroment
Queen's University Belfast
David Keir Building
Belfast BT9 5AG
Email: v.sivakumar@qub.ac.uk
Tel 07548802718

					Loading 40,80,160 kPa	
Ref:	St OlaPier		Size mm	100	Initial wet mass g	670
BH	BH-05		Thickness mm	36.25	Bulk Density mg/m3	1848
Depth m	4.7m					
Our Ref	22			σ'_v kPa		
Soil type	Gravelly SAND					
Rate of shearing mm/min			0.5	40		
>10 mm removed				80		
				160		

Peak		Ultimate	
σ'_n kPa	τ kPa	σ'_n kPa	τ kPa
40	38	40	31
80	72	80	60
160	136	160	115

Peak angle of internal friction **40**
Cohesion kPa
Ultimate angle of internal friction **35**

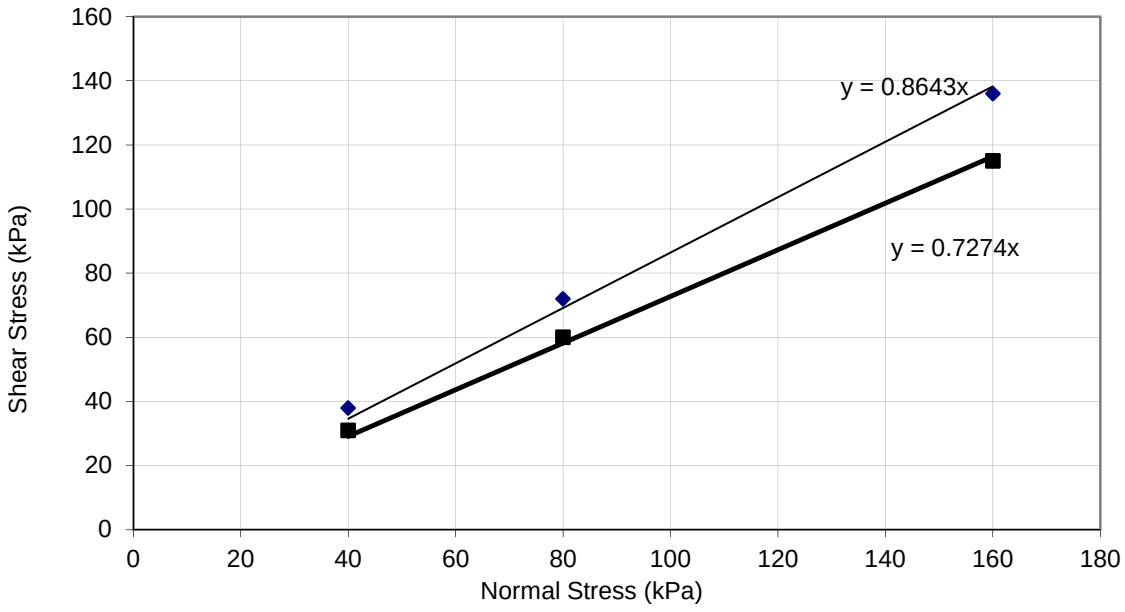
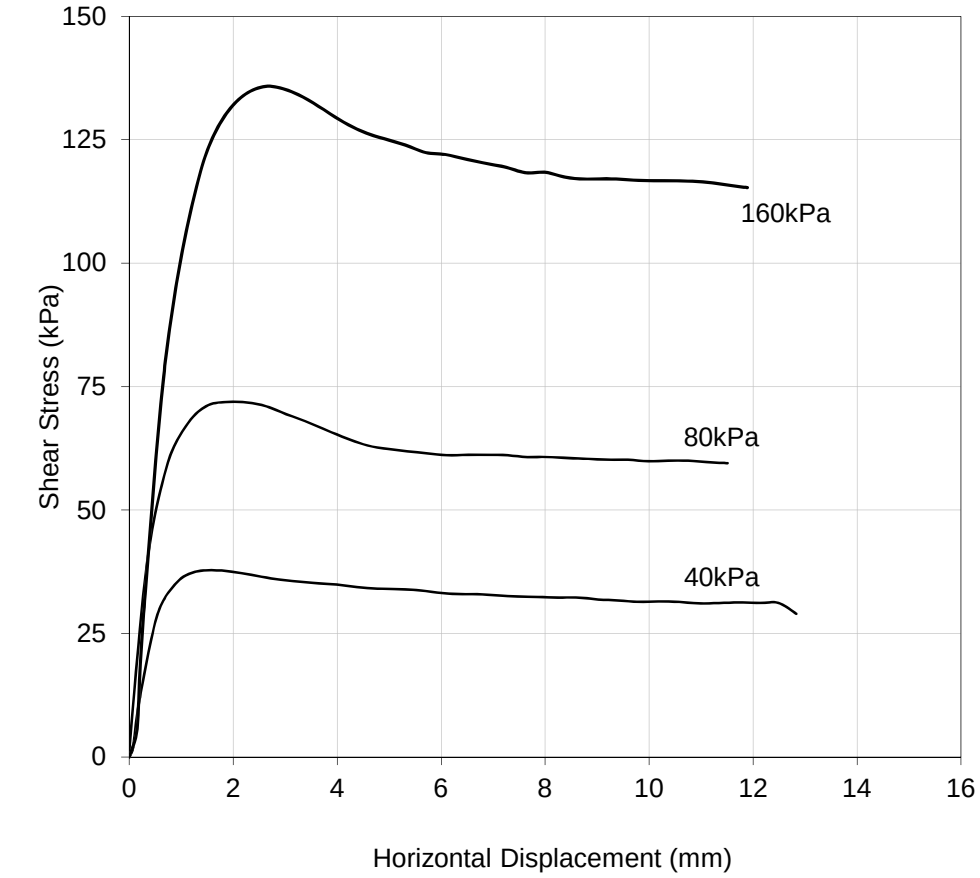


Figure 1 Failure Envelope



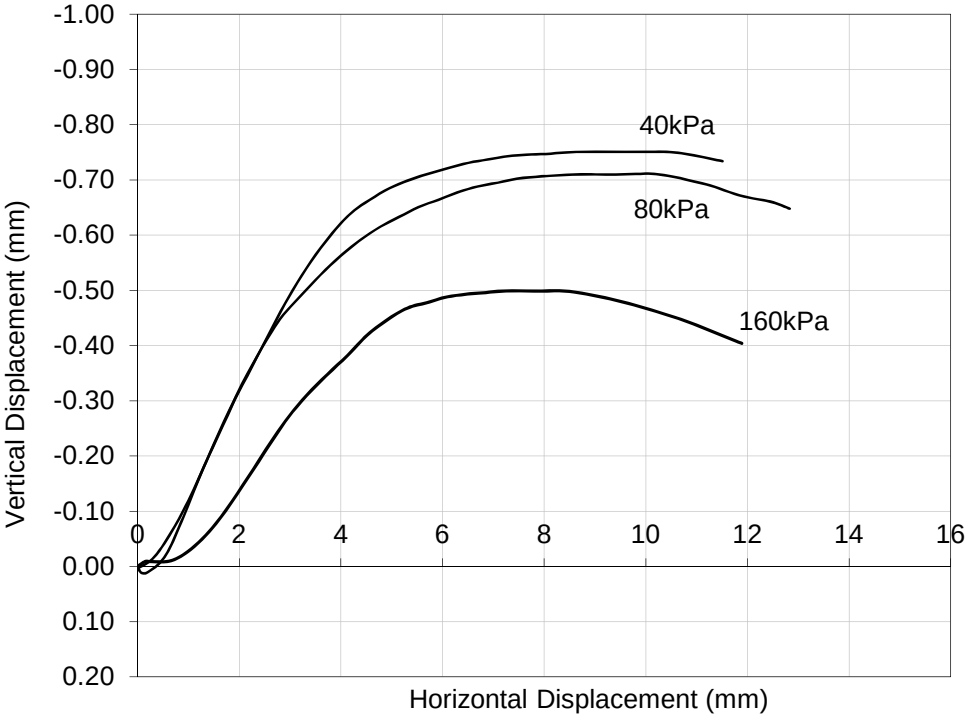


Figure 2 Stress-strain behaviour

Construction Testing Services Ltd
The Old Mill Business Park
Seven Mile Straight
Muckamore
Antrim BT4 1 4QE
Tel 028 9446 9191

COMPRESSIVE STRENGTH OF ROCK CORE SPECIMENS

Client: Whiteford Geoservices Ltd
Project: St Ola (1906-18)

UCS1826
03-Aug-18

Reports sent to:

Whiteford Geoservices Ltd
Straid House
2 Main Street
Straid
Co Antrim BT39 9NE

joy.mcneill@whitefordgeoservices.com

Lab Core ID	R2517	R2518	R2519	R2520		
Core Markings	BH01 23m	BH01 24m	BH01 24.8m	BH01 25m		
Date of coring	Unknown	Unknown	Unknown	Unknown		
Date received	23-Jul-18	23-Jul-18	23-Jul-18	23-Jul-18		
Diameter of core (Average mm)	72.6	72.7	72.7	72.8		
Length at test (mm)	121.0	198.9	191.5	184.3		
Length / Diameter Ratio	1.67	2.74	2.63	2.53		
Mass (g)	1260	2059	2003	1928		
Density (Mg/m^3)	2.52	2.49	2.52	2.51		
Date of test	03-Aug-18	03-Aug-18	03-Aug-18	03-Aug-18		
Fail Load (KN)	292.9	307.4	209.2	174.2		
Measured compressive strength (MPa)	**70.8**	**74.0**	**50.3**	**41.8**		
Failure Type	Multiple shear	Axial splitting	Axial splitting	Multiple shear		

Comments						

Cores tested in received moisture condition using our UKAS calibrated Class 1 Compression Testing Machine.

Signed: *I Nichol*
I Nichol BSc(Hons) MSc

Point Load Tests

Location: St Ola Pier

Job no: 1906-18

Sample no:	*Postion*	*Sample Depth (m)*	*Diameter (mm) "D"*	*Max Load (kN) "P"*	*Point Load Strength (Mpa) "I_s"*	*Size Correction Factor (F)*	*Corrected Point Load Strength (MPa) "$I_{s(50)}$"*
BH01	D	20.50	70	14.279	2.91	1.16	3.39
BH01	D	23.00	70	29.989	6.12	1.16	7.12
BH01	A	23.00	70	5.263	1.07	1.16	1.25
BH01	D	23.50	70	7.151	1.46	1.16	1.70
BH01	A	23.50	70	12.025	2.45	1.16	2.86
BH01	D	24.10	70	24.917	5.09	1.16	5.92
BH01	A	24.10	70	21.926	4.47	1.16	5.21
BH01	D	25.00	70	31.937	6.52	1.16	7.58
BH02	A	30.60	70	2.039	0.42	1.16	0.48
BH02	D	30.60	70	2.937	0.60	1.16	0.70
					Operator	**Checked**	**Approved**
					RL		

AS TM D5731-08

Certificate of Analysis

Certificate Number	18-15007
	05-Jul-18
Client	Whiteford Straid House 2 Main Street Straid Ballyclare BT39 9NE
Our Reference	18-15007
Client Reference	1906-18
Order No	(not supplied)
Contract Title	St Ola Pier Refurbishment
Description	3 Soil samples.
Date Received	20-Jun-18
Date Started	20-Jun-18
Date Completed	05-Jul-18
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

[Redacted]

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 18-15007
Client Ref 1906-18
Contract Title St Ola Pier Refurbishment

			Lab No	1355990	1355991	1355992
			Sample ID	BH5	BH3	BH4
			Depth	8.00	11.90	11.40
			Other ID			
			Sample Type	SOIL	SOIL	SOIL
			Sampling Date	11/06/18	11/06/18	05/06/18
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Metals						
Antimony	DETSC 2301*	1	mg/kg	< 1.0	< 1.0	< 1.0
Arsenic	DETSC 2301#	0.2	mg/kg	2.0	5.5	6.4
Barium	DETSC 2301#	1.5	mg/kg	21	150	200
Beryllium	DETSC 2301#	0.2	mg/kg	< 0.2	0.3	0.3
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	2.1	2.4	3.0
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Chromium III	DETSC 2301*	0.15	mg/kg	4.3	22	17
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	2.3	15	16
Lead	DETSC 2301#	0.3	mg/kg	2.5	10	9.6
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Molybdenum	DETSC 2301#	0.4	mg/kg	< 0.4	0.7	1.0
Nickel	DETSC 2301#	1	mg/kg	2.8	20	17
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg	5.9	32	26
Zinc	DETSC 2301#	1	mg/kg	15	45	35
Inorganics						
Cyanide, Free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Petroleum Hydrocarbons						
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3321	0.01	mg/kg	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 18-15007
Client Ref 1906-18
Contract Title St Ola Pier Refurbishment

			Lab No	1355990	1355991	1355992
			Sample ID	BH5	BH3	BH4
			Depth	8.00	11.90	11.40
			Other ID			
			Sample Type	SOIL	SOIL	SOIL
			Sampling Date	11/06/18	11/06/18	05/06/18
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
PAHs						
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.11
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.16
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.04
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.14
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.14
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.04
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	0.04
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	0.66
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3
Organotins						
Tributyl Tin	DETSC 3421*	1	mg/kg	< 1.0	< 1.0	< 1.0

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Client Ref 1906-18
Contract Title St Ola Pier Refurbishment

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			Other ID			
			Sample Type	SOIL	SOIL	SOIL
			Sampling Date	11/06/18	11/06/18	05/06/18
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
VOCs						
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01

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Summary of Chemical Analysis
Soil Samples

Our Ref 18-15007
Client Ref 1906-18
Contract Title St Ola Pier Refurbishment

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			Depth	8.00	11.90	11.40
			Other ID			
			Sample Type	SOIL	SOIL	SOIL
			Sampling Date	11/06/18	11/06/18	05/06/18
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Carbon Disulphide	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
SVOCs						
Phenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dibenzofuran	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Diethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Diphenylamine	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 18-15007
Client Ref 1906-18
Contract Title St Ola Pier Refurbishment

			Lab No	1355990	1355991	1355992
			Sample ID	BH5	BH3	BH4
			Depth	8.00	11.90	11.40
			Other ID			
			Sample Type	SOIL	SOIL	SOIL
			Sampling Date	11/06/18	11/06/18	05/06/18
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
4-Bromophenylphenylether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Hexachlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433	0.1	mg/kg	< 0.1	0.1	< 0.1
Di-n-octylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Azobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 18-15007
Client Ref 1906-18
Contract Title St Ola Pier Refurbishment

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1355990	BH5 8.00	SOIL	NAD	none	D Wilkinson
1355991	BH3 11.90	SOIL	NAD	none	D Wilkinson
1355992	BH4 11.40	SOIL	NAD	none	D Wilkinson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 18-15007
Client Ref 1906-18
Contract St Ola Pier Refurbishment

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1355990	BH5 8.00 SOIL	11/06/18	GJ 250ml, GJ 60ml	VOC (7 days)	
1355991	BH3 11.90 SOIL	11/06/18	GJ 250ml, GJ 60ml	VOC (7 days)	
1355992	BH4 11.40 SOIL	05/06/18	GJ 250ml x2, GJ 60ml	Aliphatics/Aromatics (14 days), BTEX (14 days), Naphthalene (14 days), PAH MS (14 days), SVOC (14 days), Tributyl Tin (14 days)	

Key: G-Glass J-Jar

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix 10.1 Fugro Lab Results

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CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 785487-2

Date of Report: 10-Jan-2019

Customer: Fugro GeoServices
Fugro House
Hithercroft Road
Wallingford
Oxfordshire
OX10 9RB

Customer Contact: Ms Karen Blackmore

Customer Job Reference: G180030U, CoC 23901
Customer Purchase Order: 74376KB-WAL
Customer Site Reference: St. Ola Pier, Scrabster
Date Job Received at Concept: 20-Nov-2018
Date Analysis Started: 28-Nov-2018
Date Analysis Completed: 10-Jan-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aleksandra Pacula
Senior Customer Service Advisor

[Redacted]

Issued by :
Aleksandra Pacula
Senior Customer Servic Advisor

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil
MCERTS Preparation

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Moisture @105C	T162	AR	0.1	%	**22**	**16**	**26**
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Asbestos ID	T27	A40			N.D.	N.D.	N.D.
Cyanide(Total)	T4	AR	1	mg/kg	<1	<1	<1
Sulphur (total)	T6	A40	0.01	%	**0.12**	**0.11**	**0.17**
(Acid Soluble) SO4	T192	A40	0.01	%	**0.09**	**0.09**	**0.12**
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	**0.19**	**0.15**	**0.30**
pH	T7	A40			**8.4**	**8.8**	**8.5**
Moisture @105C	T162	AR	0.1	%	**22**	**16**	**26**
Soil Organic Matter	T287	A40	0.1	%	**0.7**	**1.0**	**0.9**
Dibutyl tin	T72	AR	0.01	mg/kg	<0.01	<0.01	<0.01
Benzo(j)fluoranthrene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1
Tributyl tin	T72	AR	0.01	mg/kg	<0.01	<0.01	<0.01

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil
Heavy Metals(9)

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Arsenic	T6	M40	2	mg/kg	**6**	**7**	**5**
Boron (water-soluble)	T6	A40	1	mg/kg	<1	<1	**1**
Barium	T6	A40	1	mg/kg	**96**	**93**	**100**
Beryllium	T6	A40	2	mg/kg	<2	<2	<2
Cadmium	T6	M40	1	mg/kg	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**17**	**16**	**17**
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1
Copper	T6	M40	1	mg/kg	**8**	**8**	**7**
Iron	T6	A40	1	mg/kg	**10000**	**9200**	**9300**
Mercury	T6	M40	1	mg/kg	<1	<1	<1
Nickel	T6	M40	1	mg/kg	**13**	**13**	**13**
Lead	T6	M40	1	mg/kg	**8**	**7**	**7**
Selenium	T6	M40	3	mg/kg	<3	<3	<3
Vanadium	T6	M40	1	mg/kg	**21**	**20**	**20**
Zinc	T6	M40	1	mg/kg	**34**	**25**	**31**

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	**0.8**	<0.1	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	**0.7**	<0.1	<0.1
Pyrene	T207	M105	0.1	mg/kg	**0.5**	<0.1	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Chrysene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
PAH(total)	T207	M105	0.1	mg/kg	**2.4**	<0.1	<0.1

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil
Phenols (Speciated)

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Resorcinol	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05
Catechol	T17	AR	0.05	mg/kg	(NR)	(NR)	(NR)
Phenol	T17	AR	0.1	mg/kg	<0.1	<0.1	<0.1
Cresols	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05
Xylenols	T17	AR	0.05	mg/kg	<0.06	<0.06	<0.06
Naphthols	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05
Trimethyl phenol	T17	AR	0.05	mg/kg	<0.05	<0.05	<0.05
Total Phenols	T17	AR	0.1	mg/kg	(NR)	(NR)	(NR)

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil
TPH UKCWG

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Benzene	T209	M105	10	µg/kg	<100(13,110)	<10(13)	<20(110,13)
Toluene	T209	M105	10	µg/kg	<100(110)	<10	<20(110)
EthylBenzene	T209	M105	10	µg/kg	<20(110)	<10	<20(110)
M/P Xylene	T209	M105	10	µg/kg	<20(110)	<10	<20(110)
O Xylene	T209	M105	10	µg/kg	<20(110)	<10	<20(110)
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<20(110)	<10	<20(110)
TPH (C5-C6 aliphatic)	T209	M105	100	µg/kg	<200(110)	<100	<200(110)
TPH (C6-C8 aliphatic)	T209	M105	100	µg/kg	<200(110)	<100	<200(110)
TPH (C8-C10 aliphatic)	T209	M105	100	µg/kg	<200(110)	<100	<200(110)
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	**1(13)**	<1(13)	<1(13)
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	**2(13)**	**1(13)**	<1(13)
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	**3(13)**	**1(13)**	**1(13)**
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	**8(13)**	<2(13)	**3(13)**
TPH (Aliphatic) total	T85	M105		mg/kg	**11(13)**	**2.0(13)**	**4.0(13)**
TPH (C6-C7 aromatic)	T209	M105	100	µg/kg	<200(110)	<100	<200(110)
TPH (C7-C8 aromatic)	T209	M105	100	µg/kg	<200(110)	<100	<200(110)
TPH (C8-C10 aromatic)	T209	M105	100	µg/kg	<200(110)	<100	<200(110)
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	<2(13)	<2(13)	<2(13)
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	<1(13)	<1(13)	<1(13)
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	<1(13)	<1(13)	<1(13)
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	**8(13)**	**3(13)**	<1(13)
TPH (Aromatic) total	T85	M105		mg/kg	**8.0(13)**	**3.0(13)**	N.D.(13)
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	**19.0(13)**	**5.00(13)**	**4.00(13)**

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil

Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
PCB BZ#77	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#81	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#105	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#114	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#118	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#123	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#126	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#156	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#157	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#167	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#169	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05
PCB BZ#189	T1	AR	0.05	µg/kg	<0.05	<0.05	<0.05

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Phenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Bis (2-chloroethyl) ether	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2-Chlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
1,2-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Bis (2-chloroisopropyl) ether	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2-methyl phenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
3/4-Methylphenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Hexachloroethane	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Nitrobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Isophorone	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2-Nitrophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2,4-Dimethylphenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Bis (2-chloroethoxy) methane	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2,4-Dichlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
1,2,4-Trichlorobenzene	T207	M105	0.1	mg/kg	<0.1[131]	<0.1[131]	<0.1[131]
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
4-Chloroaniline	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Hexachlorobutadiene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2-Methylnaphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	T207	M105	0.1	mg/kg	<0.3[131,162]	<0.3[131,162]	<0.3[131,162]
2,4,6-Trichlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2-Chloronaphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2-Nitroaniline	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Dimethyl phthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2,6-Dinitrotoluene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
3-Nitroaniline	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Dibenzofuran	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
2,4-Dinitrotoluene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Diethyl phthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
4-Chlorophenyl phenylether	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
4-Nitroaniline	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Azobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
4-Bromophenyl phenylether	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Hexachlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Pentachlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	**0.8**	<0.1	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Carbazole	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Di-n-butylphthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	**0.7**	<0.1	<0.1
Pyrene	T207	M105	0.1	mg/kg	**0.5**	<0.1	<0.1
Butyl benzylphthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Chrysene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1
Bis (2-ethylhexyl)phthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Di-n-octylphthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

				Concept Reference	**785487 001**	**785487 007**	**785487 009**
				Customer Sample Reference	**BH03**	**BH05**	**BH11**
				Hole ID	**BH03**	**BH05**	**BH11**
				Bottom Depth	**0.50**	**4.00**	**2.50**
				Top Depth	**0.00**	**3.50**	**1.50**
				Depth	**0.00**	**3.50**	**1.50**
				Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**13**	**5**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	**0.3**	<0.1	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Soil Analysed as Soil

Volatile Organic Compounds (USEPA 624) (MCERTS)

Concept Reference	**785487 001**	**785487 007**	**785487 009**
Customer Sample Reference	**BH03**	**BH05**	**BH11**
Hole ID	**BH03**	**BH05**	**BH11**
Bottom Depth	**0.50**	**4.00**	**2.50**
Top Depth	**0.00**	**3.50**	**1.50**
Depth	**0.00**	**3.50**	**1.50**
Date Sampled	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**13**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units			
Dichlorodifluoromethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Chloromethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Vinyl chloride	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Bromomethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Chloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Trichlorofluoromethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1-Dichloroethylene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Dichloromethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1-Dichloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
2,2-Dichloropropane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Chloroform	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Bromochloromethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1,1-Trichloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1-Dichloropropene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Carbon tetrachloride	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,2-Dichloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Benzene	T209	M105	10	µg/kg	<100[13,110]	<10[13]	<20[110,13]
1,2-Dichloropropane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Trichloroethene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Bromodichloromethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Dibromomethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Toluene	T209	M105	10	µg/kg	<100[110]	<10	<20[110]
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1,2-Trichloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,3-Dichloropropane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Tetrachloroethene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Chlorodibromomethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,2-dibromoethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Chlorobenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
EthylBenzene	T209	M105	10	µg/kg	<20[110]	<10	<20[110]
M/P Xylene	T209	M105	10	µg/kg	<20[110]	<10	<20[110]
O Xylene	T209	M105	10	µg/kg	<20[110]	<10	<20[110]
Styrene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Bromoform	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Isopropyl benzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,2,3-Trichloropropane	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
n-Propylbenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
Bromobenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
T-Butylbenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
S-Butylbenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
p-Isopropyltoluene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
2-Chlorotoluene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
4-Chlorotoluene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,3-Dichlorobenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,4-Dichlorobenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]
1,2-Dichlorobenzene	T209	M105	50	µg/kg	<100[110]	<50	<100[110]

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

Concept Reference				**785487 002**	**785487 003**	**785487 004**	**785487 006**	**785487 008**
Customer Sample Reference				**BH03**	**BH03**	**BH03**	**BH05**	**BH11**
Hole ID				**BH03**	**BH03**	**BH03**	**BH05**	**BH11**
Bottom Depth				**1.00**	**2.00**	**3.00**	**3.00**	**1.00**
Top Depth				**0.50**	**1.50**	**2.50**	**2.50**	**0.00**
Depth				**0.50**	**1.50**	**2.50**	**2.50**	**0.00**
Date Sampled				**09-NOV-2018**	**09-NOV-2018**	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
AGS Type				**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference				**4**	**7**	**11**	**9**	**1**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
As (Total)	T301	AR	1.0	mg/kg	**6.3**	**5.5**	**6.9**	**6.4**	**3.7**
Cd (Total)	T301	AR	0.05	mg/kg	**0.05**	<0.05	<0.05	<0.05	<0.05
Cr (Total)	T301	AR	0.2	mg/kg	**29**	**25**	**29**	**23**	**21**
Cu (Total)	T301	AR	0.1	mg/kg	**5.8**	**4.2**	**4.7**	**3.9**	**3.3**
Mercury	T355	AR	0.01	mg/kg	**0.03**(13)	**0.02**(13)	**0.01**(13)	<0.01(13)	<0.01(13)
Pb (Total)	T301	AR	0.2	mg/kg	**13**	**12**	**13**	**13**	**12**
Ni (Total)	T301	AR	0.2	mg/kg	**14**	**12**	**14**	**12**	**9.0**
Zinc	T740	AR	1	mg/kg	**60**	**27**	**41**	**31**	**22**
Tributyl tin	T16	AR	10	µg/kg	<10	<10	<10	<10	<10
Dibutyl tin	T16	AR	10	µg/kg	<10	<10	<10	<10	<10
Total Organic Carbon	T21	AR	0.1	%	**0.2**	**0.1**	**0.1**	**0.2**	**0.2**
Dry solids @40C	T277	AR	0.1	%	**78**	**81**	**74**	**75**	**72**
Dry solids @105C	T162	AR	0.1	%	**79**	**81**	**74**	**74**	**74**
GRO (C5-C10)	T54	AR	10	µg/kg	<10	<10	<10	<10	<20(110)
TPH (C10-C12)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
TPH (C12-C16)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
TPH (C16-C21)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0	<1.0	**>1.0**
TPH (C21-C35)	T250	AR	0.1	mg/kg	**>1.0**	<1.0	<1.0	**>1.0**	**>1.0**
TPH (C40-C44)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
PCB (Total Tri-Hepta)	T1	AR	1.4	µg/kg	<1.4	<1.4	<1.4	<1.4	<1.4

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

Concept Reference	**785487 010**	**785487 011**	**785487 012**
Customer Sample Reference	**BH11**	**BH03 (marine sediment)**	**BH11 (marine sediment)**
Hole ID	**BH11**	**BH03**	**BH11**
Bottom Depth	**3.50**	**0.50**	**2.50**
Top Depth	**2.50**	**0.00**	**1.50**
Depth	**2.50**	**0.00**	**1.50**
Date Sampled	**10-NOV-2018**	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**8**	**1**	**5**

Determinand	Method	Test Sample	LOD	Units			
As (Total)	T301	AR	1.0	mg/kg	**5.1**	**7.4**	**5.8**
Cd (Total)	T301	AR	0.05	mg/kg	**0.05**	<0.05	<0.05
Cr (Total)	T301	AR	0.2	mg/kg	**24**	**30**	**29**
Cu (Total)	T301	AR	0.1	mg/kg	**4.8**	**6.6**	**4.9**
Mercury	T355	AR	0.01	mg/kg	<0.01(13)	<0.01(13)	<0.01(13)
Pb (Total)	T301	AR	0.2	mg/kg	**12**	**14**	**15**
Ni (Total)	T301	AR	0.2	mg/kg	**11**	**14**	**14**
Zinc	T740	AR	1	mg/kg	**36**	**35**	**34**
Tributyl tin	T16	AR	10	µg/kg	<10	<10	<10
Dibutyl tin	T16	AR	10	µg/kg	<10	<10	<10
Total Organic Carbon	T21	AR	0.1	%	<0.1	**0.2**	**0.2**
Dry solids @40C	T277	AR	0.1	%	**74**	**74**	**75**
Dry solids @105C	T162	AR	0.1	%	**77**	**73**	**74**
GRO (C5-C10)	T54	AR	10	µg/kg	<10	<10	<10
TPH (C10-C12)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0
TPH (C12-C16)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0
TPH (C16-C21)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0
TPH (C21-C35)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0
TPH (C40-C44)	T250	AR	0.1	mg/kg	<1.0	<1.0	<1.0
PCB (Total Tri-Hepta)	T1	AR	1.4	µg/kg	<1.4	<1.4	<1.4

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**785487 002**	**785487 003**	**785487 004**	**785487 006**	**785487 008**
				Customer Sample Reference	**BH03**	**BH03**	**BH03**	**BH05**	**BH11**
				Hole ID	**BH03**	**BH03**	**BH03**	**BH05**	**BH11**
				Bottom Depth	**1.00**	**2.00**	**3.00**	**3.00**	**1.00**
				Top Depth	**0.50**	**1.50**	**2.50**	**2.50**	**0.00**
				Depth	**0.50**	**1.50**	**2.50**	**2.50**	**0.00**
				Date Sampled	**09-NOV-2018**	**09-NOV-2018**	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**4**	**7**	**11**	**9**	**1**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Naphthalene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Acenaphthylene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Acenaphthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Fluorene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Phenanthrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(a)Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Chrysene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(a)Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Indeno(123-cd)Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(ghi)Perylene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(b)fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(k)fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
Dibenzo(ah)Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0
PAH(total)	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0	<2.0	<2.0

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**785487 010**	**785487 011**	**785487 012**
				Customer Sample Reference	**BH11**	**BH03 (marine sediment)**	**BH11 (marine sediment)**
				Hole ID	**BH11**	**BH03**	**BH11**
				Bottom Depth	**3.50**	**0.50**	**2.50**
				Top Depth	**2.50**	**0.00**	**1.50**
				Depth	**2.50**	**0.00**	**1.50**
				Date Sampled	**10-NOV-2018**	**09-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**8**	**1**	**5**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Naphthalene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Acenaphthylene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Acenaphthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Fluorene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Phenanthrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(a)Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Chrysene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(a)Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Indeno(123-cd)Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(ghi)Perylene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(b)fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(k)fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Dibenzo(ah)Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
PAH(total)	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**785487 002**	**785487 003**	**785487 004**	**785487 006**	**785487 008**
				Customer Sample Reference	**BH03**	**BH03**	**BH03**	**BH05**	**BH11**
				Hole ID	**BH03**	**BH03**	**BH03**	**BH05**	**BH11**
				Bottom Depth	**1.00**	**2.00**	**3.00**	**3.00**	**1.00**
				Top Depth	**0.50**	**1.50**	**2.50**	**2.50**	**0.00**
				Depth	**0.50**	**1.50**	**2.50**	**2.50**	**0.00**
				Date Sampled	**09-NOV-2018**	**09-NOV-2018**	**09-NOV-2018**	**11-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**4**	**7**	**11**	**9**	**1**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
PCB BZ#28	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PCB BZ#52	T1	AR	0.10	µg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
PCB BZ#101	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PCB BZ#118	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PCB BZ#153	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PCB BZ#138	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PCB BZ#180	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
PCB EC7 (Sum)	T85	AR	0.7	µg/kg	<0.7	<0.7	<0.7	<0.7	<0.7

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**785487 010**	**785487 011**	**785487 012**
				Customer Sample Reference	**BH11**	**BH03 (marine sediment)**	**BH11 (marine sediment)**
				Hole ID	**BH11**	**BH03**	**BH11**
				Bottom Depth	**3.50**	**0.50**	**2.50**
				Top Depth	**2.50**	**0.00**	**1.50**
				Depth	**2.50**	**0.00**	**1.50**
				Date Sampled	**10-NOV-2018**	**09-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**8**	**1**	**5**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
PCB BZ#28	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#52	T1	AR	0.10	µg/kg	<0.10	<0.10	<0.10
PCB BZ#101	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#118	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#153	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#138	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#180	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB EC7 (Sum)	T85	AR	0.7	µg/kg	<0.7	<0.7	<0.7

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Special Waste Leachate Suite - Clause 15.7

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
pH	T7	10:1			**7.85**	**7.82**
Sulphate	T686	10:1	0.5	mg/l	**79**	**120**
Chloride	T686	10:1	1	mg/l	**690**	**950**
Ammonia expressed as N	T686	10:1	0.05	mg/l	**0.25**	<0.05
Nitrate	T686	10:1	0.5	mg/l	<0.5	<0.5
Nitrite	T686	10:1	0.1	mg/l	<0.1	<0.1
orthophosphate	T686	10:1	0.5	mg/l	<0.5	<0.5
Cyanide(Total)	T4	10:1	0.05	mg/l	<0.05	<0.05
Benzo(j)fluoranthrene	T149	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
Dibutyl tin	T72	10:1	0.01	µg/l	<0.01	<0.01
Tributyl tin	T72	10:1	0.01	µg/l	<0.01	<0.01

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Metals ICP MS

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
As (Dissolved)	T281	10:1	0.2	µg/l	**2.4**	**1.7**
Cd (Dissolved)	T281	10:1	0.02	µg/l	<0.02	<0.02
Cr (Dissolved)	T281	10:1	1	µg/l	**1**	**2**
Cu (Dissolved)	T281	10:1	0.5	µg/l	<0.5	<0.5
Ni (Dissolved)	T281	10:1	1	µg/l	**1**	**1**
Pb (Dissolved)	T281	10:1	0.3	µg/l	<0.3	<0.3
Zn (Dissolved)	T281	10:1	2	µg/l	<2	<2
Hg (Dissolved)	T281	10:1	0.05	µg/l	<0.05	<0.05
V (Dissolved)	T281	10:1	2	µg/l	<2	**3**
Se (Dissolved)	T281	10:1	0.5	µg/l	<0.5	<0.5
Mn (Dissolved)	T281	10:1	1	µg/l	<1	**2**
Ba (Dissolved)	T281	10:1	1	µg/l	**36**	**38**
Be (Dissolved)	T281	10:1	0.05	µg/l	<0.05	<0.05

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Metals ICP OES

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Calcium	T6	10:1	0.1	mg/l	**33**	**35**
Sodium	T6	10:1	0.1	mg/l	**420**	**490**
Magnesium	T6	10:1	0.1	mg/l	**42**	**53**
Potassium	T6	10:1	0.1	mg/l	**19**	**23**
Aluminium	T6	10:1	0.02	mg/l	**0.05**	**0.07**
Chromium VI	T686	10:1	0.003	mg/l	<0.003	<0.003
Boron	T6	10:1	0.01	mg/l	**0.37**	**0.36**
Iron	T6	10:1	0.01	mg/l	<0.01	**0.05**

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
PAH US EPA 16 (B and K split)

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Naphthalene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Acenaphthylene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Acenaphthene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Fluorene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Phenanthrene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Anthracene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Fluoranthene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Pyrene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Benzo(a)Anthracene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Chrysene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Benzo(b)fluoranthene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Benzo(k)fluoranthene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Benzo(a)Pyrene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Indeno(123-cd)Pyrene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Dibenzo(ah)Anthracene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
Benzo(ghi)Perylene	T149	10:1	0.01	µg/l	<0.01(13)	<0.01(13)
PAH(total)	T149	10:1	0.01	µg/l	<0.01	<0.01

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Phenols (Speciated)

				Concept Reference	**785487 001**	**785487 009**
				Customer Sample Reference	**BH03**	**BH11**
				Hole ID	**BH03**	**BH11**
				Bottom Depth	**0.50**	**2.50**
				Top Depth	**0.00**	**1.50**
				Depth	**0.00**	**1.50**
				Date Sampled	**09-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**
				AGS Sample Reference	**1**	**5**
				Matrix Class	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Catechol	T17	10:1	0.005	mg/l	<0.005	<0.005
Cresols	T17	10:1	0.005	mg/l	<0.005	<0.005
Naphthols	T17	10:1	0.01	mg/l	<0.01	<0.01
Phenol	T17	10:1	0.005	mg/l	<0.005(13)	<0.005(13)
Resorcinol	T17	10:1	0.005	mg/l	<0.005	<0.005
Total Phenols	T17	10:1	0.01	mg/l	<0.01	<0.01
Trimethyl phenols	T17	10:1	0.01	mg/l	<0.01	<0.01
Xylenols	T17	10:1	0.01	mg/l	<0.01	<0.01

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Poly-Chlorinated Biphenyls (WHO 12)

				Concept Reference	**785487 001**	**785487 009**
				Customer Sample Reference	**BH03**	**BH11**
				Hole ID	**BH03**	**BH11**
				Bottom Depth	**0.50**	**2.50**
				Top Depth	**0.00**	**1.50**
				Depth	**0.00**	**1.50**
				Date Sampled	**09-NOV-2018**	**10-NOV-2018**
				AGS Type	**ES**	**ES**
				AGS Sample Reference	**1**	**5**
				Matrix Class	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
PCB BZ#81	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#77	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#105	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#114	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#118	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#123	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#126	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#156	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#157	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#167	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#169	T16	10:1	0.005	µg/l	<0.005	<0.005
PCB BZ#189	T16	10:1	0.005	µg/l	<0.005	<0.005

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
TPH (CWG)

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
TPH (C5-C6 aliphatic)	T215	10:1	10	µg/l	<10	<10
TPH (C6-C8 aliphatic)	T215	10:1	10	µg/l	<10	<10
TPH (C8-C10 aliphatic)	T215	10:1	10	µg/l	<10	<10
TPH (C10-C12 aliphatic)	T910	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH (C12-C16 aliphatic)	T910	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH (C16-C21 aliphatic)	T910	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH (C21-C35 aliphatic)	T910	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH (Aliphatic) total	T85	10:1		mg/l	N.D.(13)	N.D.(13)
TPH (C6-C7 aromatic)	T215	10:1	10	µg/l	<10	<10
TPH (C7-C8 aromatic)	T215	10:1	10	µg/l	<10	<10
TPH (C8-C10 aromatic)	T215	10:1	10	µg/l	<10	<10
TPH (C10-C12 aromatic)	T910	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH (C12-C16 aromatic)	T910	10:1	0.01	mg/l	**0.02(13)**	<0.01(13)
TPH (C16-C21 aromatic)	T910	10:1	0.01	mg/l	**0.02(13)**	<0.01(13)
TPH (C21-C35 aromatic)	T910	10:1	0.01	mg/l	<0.01(13)	<0.01(13)
TPH (Aromatic) total	T85	10:1		mg/l	**0.04(13)**	N.D.(13)
TPH (Aliphatic+Aromatic) (sum)	T85	10:1		mg/l	**0.04(13)**	N.D.(13)

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
SVOC (USEPA 625) (B and K split)

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Phenol	T71	10:1	1	µg/l	<10(26)	<10(26)
Bis (2-chloroethyl) ether	T71	10:1	1	µg/l	<10(26)	<10(26)
2-Chlorophenol	T71	10:1	1	µg/l	<10(26)	<10(26)
1,3-Dichlorobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
1,4-Dichlorobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
1,2-Dichlorobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
Bis (2-chloroisopropyl) ether	T71	10:1	1	µg/l	<10(26)	<10(26)
2-methyl phenol	T71	10:1	1	µg/l	<10(26)	<10(26)
3/4-Methylphenol	T71	10:1	1	µg/l	<10(26)	<10(26)
Hexachloroethane	T71	10:1	1	µg/l	<10(26)	<10(26)
Nitrobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
Isophorone	T71	10:1	1	µg/l	<10(26)	<10(26)
2-Nitrophenol	T71	10:1	1	µg/l	<10(26)	<10(26)
2,4-Dimethylphenol	T71	10:1	1	µg/l	<10(26)	<10(26)
Bis (2-chloroethoxy) methane	T71	10:1	1	µg/l	<10(26)	<10(26)
2,4-Dichlorophenol	T71	10:1	1	µg/l	<10(26)	<10(26)
1,2,4-Trichlorobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
Naphthalene	T71	10:1	1	µg/l	<10(26)	<10(26)
4-Chloroaniline	T71	10:1	1	µg/l	<10(26)	<10(26)
Hexachlorobutadiene	T71	10:1	1	µg/l	<10(26)	<10(26)
4-Chloro-3-methylphenol	T71	10:1	1	µg/l	<10(26)	<10(26)
2-Methylnaphthalene	T71	10:1	1	µg/l	<10(26)	<10(26)
Hexachlorocyclopentadiene	T71	10:1	1	µg/l	<10(26)	<10(26)
2,4,6-Trichlorophenol	T71	10:1	1	µg/l	<10(26)	<10(26)
2,4,5-Trichlorophenol	T71	10:1	1	µg/l	<10(26)	<10(26)
2-Chloronaphthalene	T71	10:1	1	µg/l	<10(26)	<10(26)
2-Nitroaniline	T71	10:1	1	µg/l	<10(26)	<10(26)
Dimethyl phthalate	T71	10:1	1	µg/l	<10(26)	<10(26)
2,6-Dinitrotoluene	T71	10:1	1	µg/l	<10(26)	<10(26)
Acenaphthylene	T71	10:1	1	µg/l	<10(26)	<10(26)
Acenaphthene	T71	10:1	1	µg/l	<10(26)	<10(26)
3-Nitroaniline	T71	10:1	1	µg/l	<10(26)	<10(26)
Dibenzofuran	T71	10:1	1	µg/l	<10(26)	<10(26)
2,4-Dinitrotoluene	T71	10:1	1	µg/l	<10(26)	<10(26)
Diethyl phthalate	T71	10:1	1	µg/l	<10(26)	<10(26)
Fluorene	T71	10:1	1	µg/l	<10(26)	<10(26)
4-Chlorophenyl phenylether	T71	10:1	1	µg/l	<10(26)	<10(26)
4-Nitroaniline	T71	10:1	1	µg/l	<10(131,26)	<10(131,26)
Azobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
4-Bromophenyl phenylether	T71	10:1	1	µg/l	<10(26)	<10(26)
Hexachlorobenzene	T71	10:1	1	µg/l	<10(26)	<10(26)
Pentachlorophenol	T71	10:1	1	µg/l	<2(413,100)	<2(413,100)
Phenanthrene	T71	10:1	1	µg/l	<10(26)	<10(26)
Anthracene	T71	10:1	1	µg/l	<10(26)	<10(26)
Carbazole	T71	10:1	1	µg/l	<10(26)	<10(26)
Di-n-butylphthalate	T71	10:1	1	µg/l	<10(26)	<10(26)
Fluoranthene	T71	10:1	1	µg/l	<10(26)	<10(26)
Pyrene	T71	10:1	1	µg/l	<10(26)	<10(26)
Butyl benzylphthalate	T71	10:1	1	µg/l	<10(26)	<10(26)
Benzo(a)Anthracene	T71	10:1	1	µg/l	<10(26)	<10(26)
Chrysene	T71	10:1	1	µg/l	<10(26)	<10(26)
Bis (2-ethylhexyl)phthalate	T71	10:1	1	µg/l	<10(26)	<10(26)
Di-n-octylphthalate	T71	10:1	1	µg/l	<10(26)	<10(26)

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
SVOC (USEPA 625) (B and K split)

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Benzo(a)Pyrene	T71	10:1	1	µg/l	<10[26]	<10[26]
Indeno(123-cd)Pyrene	T71	10:1	1	µg/l	<10[26]	<10[26]
Dibenzo(ah)Anthracene	T71	10:1	1	µg/l	<10[26]	<10[26]
Benzo(ghi)Perylene	T71	10:1	1	µg/l	<10[26]	<10[26]
Benzo(b)fluoranthene	T71	10:1	1	µg/l	<10[26]	<10[26]
Benzo(k)fluoranthene	T71	10:1	1	µg/l	<10[26]	<10[26]

Concept Reference: 785487
Project Site: St. Ola Pier, Scrabster
Customer Reference: G180030U, CoC 23901

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Volatile Organic Compounds (USEPA 624)

Concept Reference	**785487 001**	**785487 009**
Customer Sample Reference	**BH03**	**BH11**
Hole ID	**BH03**	**BH11**
Bottom Depth	**0.50**	**2.50**
Top Depth	**0.00**	**1.50**
Depth	**0.00**	**1.50**
Date Sampled	**09-NOV-2018**	**10-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**5**
Matrix Class	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Dichlorodifluoromethane	T54	10:1	1	µg/l	<1	<1
Chloromethane	T54	10:1	1	µg/l	<1	<1
Vinyl chloride	T54	10:1	1	µg/l	<1	<1
Bromomethane	T54	10:1	1	µg/l	<1	<1
Chloroethane	T54	10:1	1	µg/l	<1	<1
Trichlorofluoromethane	T54	10:1	1	µg/l	<1	<1
1,1-Dichloroethylene	T54	10:1	1	µg/l	<1	<1
Dichloromethane	T54	10:1	50	µg/l	<50	<50
Trans-1,2-Dichloroethene	T54	10:1	1	µg/l	<1	<1
1,1-Dichloroethane	T54	10:1	1	µg/l	<1	<1
Cis-1,2-Dichloroethylene	T54	10:1	1	µg/l	<1	<1
2,2-Dichloropropane	T54	10:1	1	µg/l	<1	<1
Chloroform	T54	10:1	1	µg/l	<1	<1
Bromochloromethane	T54	10:1	1	µg/l	<1	<1
1,1,1-Trichloroethane	T54	10:1	1	µg/l	<1	<1
1,1-Dichloropropene	T54	10:1	1	µg/l	<1	<1
Carbon tetrachloride	T54	10:1	1	µg/l	<1	<1
1,2-Dichloroethane	T54	10:1	1	µg/l	<1	<1
Benzene	T54	10:1	1	µg/l	<1(13)	<1(13)
1,2-Dichloropropane	T54	10:1	1	µg/l	<1	<1
1,1,2-Trichloroethylene	T54	10:1	1	µg/l	<1	<1
Bromodichloromethane	T54	10:1	1	µg/l	<1	<1
Dibromomethane	T54	10:1	1	µg/l	<1	<1
Cis-1,3-Dichloropropene	T54	10:1	1	µg/l	<1	<1
Toluene	T54	10:1	1	µg/l	<1	<1
Trans-1,3-Dichloropropene	T54	10:1	1	µg/l	<1	<1
1,1,2-Trichloroethane	T54	10:1	1	µg/l	<1	<1
1,3-Dichloropropane	T54	10:1	1	µg/l	<1	<1
Tetrachloroethene	T54	10:1	1	µg/l	<1	<1
Chlorodibromomethane	T54	10:1	1	µg/l	<1	<1
1,2-dibromoethane	T54	10:1	1	µg/l	<1	<1
Chlorobenzene	T54	10:1	1	µg/l	<1	<1
1,1,1,2-Tetrachloroethane	T54	10:1	1	µg/l	<1	<1
EthylBenzene	T54	10:1	1	µg/l	<1	<1
M/P Xylene	T54	10:1	1	µg/l	<1	<1
O Xylene	T54	10:1	1	µg/l	<1	<1
Styrene	T54	10:1	1	µg/l	<1	<1
Bromoform	T54	10:1	1	µg/l	<1	<1
Isopropyl benzene	T54	10:1	1	µg/l	<1	<1
1,1,2,2-Tetrachloroethane	T54	10:1	1	µg/l	<1	<1
1,2,3-Trichloropropane	T54	10:1	1	µg/l	<1	<1
n-Propylbenzene	T54	10:1	1	µg/l	<1	<1
Bromobenzene	T54	10:1	1	µg/l	<1	<1
1,3,5-Trimethylbenzene	T54	10:1	1	µg/l	<1	<1
T-Butylbenzene	T54	10:1	1	µg/l	<1	<1
1,2,4-Trimethylbenzene	T54	10:1	1	µg/l	<1	<1
S-Butylbenzene	T54	10:1	1	µg/l	<1	<1
p-Isopropyltoluene	T54	10:1	1	µg/l	<1	<1
2-Chlorotoluene	T54	10:1	1	µg/l	<1	<1
4-Chlorotoluene	T54	10:1	1	µg/l	<1	<1
1,3-Dichlorobenzene	T54	10:1	1	µg/l	<1	<1
1,4-Dichlorobenzene	T54	10:1	1	µg/l	<1	<1
1,2-Dichlorobenzene	T54	10:1	1	µg/l	<1	<1

Index to symbols used in 785487-2

Value	Description
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
AR	As Received
A40	Assisted dried < 40C
10:1	Leachate to BS EN 12457-2 (10:1)
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
N.D.	Not Detected
100	LOD determined by sample aliquot used for analysis
13	Results have been blank corrected.
162	LOD determined by matrix spike recovery
26	LOD raised because the analysis was performed by an alternative technique
110	LOD raised due to low internal standard recovery.
131	Result is outside of the scope of accreditation due to a QC Failure
413	The associated QC has failed performance criteria for this compound and the result is indicative only. Result is non accredited.
NR	No Result
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Soil samples have been analysed exceeding recommended holding times for pH, PAH, BTEX, TPH, VOC, SVOC and PCB. It is possible therefore that the results provided may be compromised.
SVOC (leachate) was transferred to Concept East Kilbride.
Phenols Speciated (leachate) testing was subcontractedc to Exova Jones.
Asbestos testing was subcontracted to REC Asbestos.
Please Note: The recoveries in several samples are low, however the S/N is >20:1, therefore the data is considered valid.

Method Index

Value	Description
T2	Grav
T21	OX/IR
T27	PLM
T7	Probe
T209	GC/MS (Head Space)(MCERTS)
T740	ICP/MS (HF)
T250	GC/FID (LD)
T207	GC/MS (MCERTS)
T686	Discrete Analyser
T355	CVAFS
T1	GC/MS (HR)
T54	GC/MS (Headspace)
T72	GC/MS (Deriv.)
T85	Calc
T277	Grav (1 Dec) (40 C)
T301	ICP/MS (Total)
T149	GC/MS (SIR)
T281	ICP/MS (Filtered)
T287	Calc TOC/0.58
T4	Colorimetry
T6	ICP/OES
T71	GC/MS (1l ext.)
T215	GC/MS (Headspace)(LV)
T909	GCxGC
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T16	GC/MS
T17	HPLC
T162	Grav (1 Dec) (105 C)
T192	HCl Extraction/ICP/OES (TRL 447 T2)
T910	GCxGC (LV)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Retained on 10mm sieve	T2	M40	0.1	%	N	001,007,009
As (Total)	T301	AR	1.0	mg/kg	N	002-004,006,008,010-012
Cd (Total)	T301	AR	0.05	mg/kg	N	002-004,006,008,010-012
Cr (Total)	T301	AR	0.2	mg/kg	N	002-004,006,008,010-012
Cu (Total)	T301	AR	0.1	mg/kg	N	002-004,006,008,010-012
Mercury	T355	AR	0.01	mg/kg	N	002-004,006,008,010-012
Pb (Total)	T301	AR	0.2	mg/kg	N	002-004,006,008,010-012
Ni (Total)	T301	AR	0.2	mg/kg	N	002-004,006,008,010-012
Zinc	T740	AR	1	mg/kg	N	002-004,006,008,010-012
Tributyl tin	T16	AR	10	µg/kg	N	002-004,006,008,010-012
Dibutyl tin	T16	AR	10	µg/kg	N	002-004,006,008,010-012
Total Organic Carbon	T21	AR	0.1	%	N	002-004,006,008,010-012
Dry solids @40C	T277	AR	0.1	%	N	002-004,006,008,010-012
Dry solids @105C	T162	AR	0.1	%	N	002-004,006,008,010-012
GRO (C5-C10)	T54	AR	10	µg/kg	N	002-004,006,008,010-012
TPH (C10-C12)	T250	AR	0.1	mg/kg	N	002-004,006,008,010-012
TPH (C12-C16)	T250	AR	0.1	mg/kg	N	002-004,006,008,010-012
TPH (C16-C21)	T250	AR	0.1	mg/kg	N	002-004,006,008,010-012
TPH (C21-C35)	T250	AR	0.1	mg/kg	N	002-004,006,008,010-012
TPH (C40-C44)	T250	AR	0.1	mg/kg	N	002-004,006,008,010-012
PCB (Total Tri-Hepta)	T1	AR	1.4	µg/kg	U	002-004,006,008,010-012
Naphthalene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Acenaphthylene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Acenaphthene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Fluorene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Phenanthrene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Anthracene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Fluoranthene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Pyrene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Benzo(a)Anthracene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Chrysene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Benzo(a)Pyrene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Indeno(123-cd)Pyrene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Benzo(ghi)Perylene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Benzo(b)fluoranthene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Benzo(k)fluoranthene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
Dibenzo(ah)Anthracene	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
PAH(total)	T1	AR	2.0	µg/kg	N	002-004,006,008,010-012
PCB BZ#28	T1	AR	0.1	µg/kg	U	002-004,006,008,010-012
PCB BZ#52	T1	AR	0.10	µg/kg	U	002-004,006,008,010-012
PCB BZ#101	T1	AR	0.1	µg/kg	U	002-004,006,008,010-012
PCB BZ#118	T1	AR	0.1	µg/kg	U	002-004,006,008,010-012
PCB BZ#153	T1	AR	0.1	µg/kg	U	002-004,006,008,010-012
PCB BZ#138	T1	AR	0.1	µg/kg	U	002-004,006,008,010-012
PCB BZ#180	T1	AR	0.1	µg/kg	U	002-004,006,008,010-012
PCB EC7 (Sum)	T85	AR	0.7	µg/kg	N	002-004,006,008,010-012
Asbestos ID	T27	A40			SU	001,007,009
Cyanide(Total)	T4	AR	1	mg/kg	M	001,007,009
Sulphur (total)	T6	A40	0.01	%	M	001,007,009
(Acid Soluble) SO4	T192	A40	0.01	%	M	001,007,009
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	M	001,007,009
pH	T7	A40			M	001,007,009
Moisture @105C	T162	AR	0.1	%	N	001,007,009
Soil Organic Matter	T287	A40	0.1	%	N	001,007,009
Benzo(j)fluoranthrene	T16	AR	0.1	mg/kg	N	001,007,009
Dibutyl tin	T72	AR	0.01	mg/kg	N	001,007,009
Tributyl tin	T72	AR	0.01	mg/kg	N	001,007,009
Resorcinol	T17	AR	0.05	mg/kg	SM	001,007,009
Catechol	T17	AR	0.05	mg/kg	SN	001,007,009
Phenol	T17	AR	0.1	mg/kg	SM	001,007,009
Cresols	T17	AR	0.05	mg/kg	SM	001,007,009
Xylenols	T17	AR	0.05	mg/kg	SM	001,007,009
Naphthols	T17	AR	0.05	mg/kg	SN	001,007,009
Trimethyl phenol	T17	AR	0.05	mg/kg	SM	001,007,009
Total Phenols	T17	AR	0.1	mg/kg	SN	001,007,009
Arsenic	T6	M40	2	mg/kg	M	001,007,009
Boron (water-soluble)	T6	A40	1	mg/kg	N	001,007,009
Barium	T6	A40	1	mg/kg	U	001,007,009
Beryllium	T6	A40	2	mg/kg	U	001,007,009
Cadmium	T6	M40	1	mg/kg	M	001,007,009

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Chromium	T6	M40	1	mg/kg	M	001,007,009
Chromium VI	T6	A40	1	mg/kg	N	001,007,009
Copper	T6	M40	1	mg/kg	M	001,007,009
Iron	T6	A40	1	mg/kg	U	001,007,009
Mercury	T6	M40	1	mg/kg	M	001,007,009
Nickel	T6	M40	1	mg/kg	M	001,007,009
Lead	T6	M40	1	mg/kg	M	001,007,009
Selenium	T6	M40	3	mg/kg	M	001,007,009
Vanadium	T6	M40	1	mg/kg	M	001,007,009
Zinc	T6	M40	1	mg/kg	M	001,007,009
Naphthalene	T207	M105	0.1	mg/kg	M	001,007,009
Fluorene	T207	M105	0.1	mg/kg	M	001,007,009
Phenanthrene	T207	M105	0.1	mg/kg	M	001,007,009
Fluoranthene	T207	M105	0.1	mg/kg	M	001,007,009
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001,007,009
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001,007,009
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001,007,009
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001,007,009
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001,007,009
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001,007,009
PAH(total)	T207	M105	0.1	mg/kg	U	001,007,009
PCB BZ#77	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#81	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#105	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#114	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#118	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#123	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#126	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#156	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#157	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#167	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#169	T1	AR	0.05	µg/kg	U	001,007,009
PCB BZ#189	T1	AR	0.05	µg/kg	U	001,007,009
Phenol	T207	M105	0.1	mg/kg	M	001,007,009
Bis (2-chloroethyl) ether	T207	M105	0.1	mg/kg	M	001,007,009
2-Chlorophenol	T207	M105	0.1	mg/kg	M	001,007,009
1,3-Dichlorobenzene	T207	M105	0.1	mg/kg	M	001,007,009
1,4-Dichlorobenzene	T207	M105	0.1	mg/kg	M	001,007,009
1,2-Dichlorobenzene	T207	M105	0.1	mg/kg	M	001,007,009
Bis (2-chloroisopropyl) ether	T207	M105	0.1	mg/kg	M	001,007,009
2-methyl phenol	T207	M105	0.1	mg/kg	M	001,007,009
3/4-Methylphenol	T207	M105	0.1	mg/kg	M	001,007,009
Hexachloroethane	T207	M105	0.1	mg/kg	U	001,007,009
Nitrobenzene	T207	M105	0.1	mg/kg	M	001,007,009
Isophorone	T207	M105	0.1	mg/kg	U	001,007,009
2-Nitrophenol	T207	M105	0.1	mg/kg	U	001,007,009
2,4-Dimethylphenol	T207	M105	0.1	mg/kg	U	001,007,009
Bis (2-chloroethoxy) methane	T207	M105	0.1	mg/kg	M	001,007,009
2,4-Dichlorophenol	T207	M105	0.1	mg/kg	U	001,007,009
1,2,4-Trichlorobenzene	T207	M105	0.1	mg/kg	M	001,007,009
4-Chloroaniline	T207	M105	0.1	mg/kg	U	001,007,009
Hexachlorobutadiene	T207	M105	0.1	mg/kg	M	001,007,009
4-Chloro-3-methylphenol	T207	M105	0.1	mg/kg	M	001,007,009
2-Methylnaphthalene	T207	M105	0.1	mg/kg	M	001,007,009
Hexachlorocyclopentadiene	T207	M105	0.1	mg/kg	U	001,007,009
2,4,6-Trichlorophenol	T207	M105	0.1	mg/kg	U	001,007,009
2,4,5-Trichlorophenol	T207	M105	0.1	mg/kg	U	001,007,009
2-Chloronaphthalene	T207	M105	0.1	mg/kg	M	001,007,009
2-Nitroaniline	T207	M105	0.1	mg/kg	M	001,007,009
Dimethyl phthalate	T207	M105	0.1	mg/kg	U	001,007,009
2,6-Dinitrotoluene	T207	M105	0.1	mg/kg	U	001,007,009
Acenaphthylene	T207	M105	0.1	mg/kg	U	001,007,009
Acenaphthene	T207	M105	0.1	mg/kg	M	001,007,009
3-Nitroaniline	T207	M105	0.1	mg/kg	U	001,007,009
Dibenzofuran	T207	M105	0.1	mg/kg	M	001,007,009
2,4-Dinitrotoluene	T207	M105	0.1	mg/kg	M	001,007,009
Diethyl phthalate	T207	M105	0.1	mg/kg	U	001,007,009
4-Chlorophenyl phenylether	T207	M105	0.1	mg/kg	M	001,007,009
4-Nitroaniline	T207	M105	0.1	mg/kg	U	001,007,009
Azobenzene	T207	M105	0.1	mg/kg	M	001,007,009

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
4-Bromophenyl phenylether	T207	M105	0.1	mg/kg	M	001,007,009
Hexachlorobenzene	T207	M105	0.1	mg/kg	M	001,007,009
Pentachlorophenol	T207	M105	0.1	mg/kg	U	001,007,009
Anthracene	T207	M105	0.1	mg/kg	U	001,007,009
Carbazole	T207	M105	0.1	mg/kg	U	001,007,009
Di-n-butylphthalate	T207	M105	0.1	mg/kg	M	001,007,009
Pyrene	T207	M105	0.1	mg/kg	M	001,007,009
Butyl benzylphthalate	T207	M105	0.1	mg/kg	U	001,007,009
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001,007,009
Chrysene	T207	M105	0.1	mg/kg	M	001,007,009
Bis (2-ethylhexyl)phthalate	T207	M105	0.1	mg/kg	M	001,007,009
Di-n-octylphthalate	T207	M105	0.1	mg/kg	M	001,007,009
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	M	001,007,009
Dichlorodifluoromethane	T209	M105	50	µg/kg	M	001,007,009
Chloromethane	T209	M105	50	µg/kg	U	001,007,009
Vinyl chloride	T209	M105	50	µg/kg	M	001,007,009
Bromomethane	T209	M105	50	µg/kg	U	001,007,009
Chloroethane	T209	M105	50	µg/kg	M	001,007,009
Trichlorofluoromethane	T209	M105	50	µg/kg	M	001,007,009
1,1-Dichloroethylene	T209	M105	50	µg/kg	M	001,007,009
Dichloromethane	T209	M105	50	µg/kg	U	001,007,009
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	M	001,007,009
1,1-Dichloroethane	T209	M105	50	µg/kg	M	001,007,009
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	M	001,007,009
2,2-Dichloropropane	T209	M105	50	µg/kg	U	001,007,009
Chloroform	T209	M105	50	µg/kg	M	001,007,009
Bromochloromethane	T209	M105	50	µg/kg	M	001,007,009
1,1,1-Trichloroethane	T209	M105	50	µg/kg	M	001,007,009
1,1-Dichloropropene	T209	M105	50	µg/kg	M	001,007,009
Carbon tetrachloride	T209	M105	50	µg/kg	M	001,007,009
1,2-Dichloroethane	T209	M105	50	µg/kg	M	001,007,009
1,2-Dichloropropane	T209	M105	50	µg/kg	M	001,007,009
Trichloroethene	T209	M105	50	µg/kg	M	001,007,009
Bromodichloromethane	T209	M105	50	µg/kg	M	001,007,009
Dibromomethane	T209	M105	50	µg/kg	M	001,007,009
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	M	001,007,009
Toluene	T209	M105	10	µg/kg	M	001,007,009
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	M	001,007,009
1,1,2-Trichloroethane	T209	M105	50	µg/kg	M	001,007,009
1,3-Dichloropropane	T209	M105	50	µg/kg	M	001,007,009
Tetrachloroethene	T209	M105	50	µg/kg	M	001,007,009
Chlorodibromomethane	T209	M105	50	µg/kg	M	001,007,009
1,2-dibromoethane	T209	M105	50	µg/kg	M	001,007,009
Chlorobenzene	T209	M105	50	µg/kg	M	001,007,009
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	M	001,007,009
O Xylene	T209	M105	10	µg/kg	M	001,007,009
Styrene	T209	M105	50	µg/kg	U	001,007,009
Bromoform	T209	M105	50	µg/kg	M	001,007,009
Isopropyl benzene	T209	M105	50	µg/kg	M	001,007,009
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	U	001,007,009
1,2,3-Trichloropropane	T209	M105	50	µg/kg	U	001,007,009
n-Propylbenzene	T209	M105	50	µg/kg	M	001,007,009
Bromobenzene	T209	M105	50	µg/kg	M	001,007,009
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	M	001,007,009
T-Butylbenzene	T209	M105	50	µg/kg	M	001,007,009
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	M	001,007,009
S-Butylbenzene	T209	M105	50	µg/kg	M	001,007,009
p-Isopropyltoluene	T209	M105	50	µg/kg	M	001,007,009
2-Chlorotoluene	T209	M105	50	µg/kg	U	001,007,009
4-Chlorotoluene	T209	M105	50	µg/kg	U	001,007,009
1,3-Dichlorobenzene	T209	M105	50	µg/kg	M	001,007,009
1,4-Dichlorobenzene	T209	M105	50	µg/kg	M	001,007,009
1,2-Dichlorobenzene	T209	M105	50	µg/kg	M	001,007,009
Benzene	T209	M105	10	µg/kg	M	001,007,009
EthylBenzene	T209	M105	10	µg/kg	M	001,007,009
M/P Xylene	T209	M105	10	µg/kg	M	001,007,009
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	001,007,009
TPH (C5-C6 aliphatic)	T209	M105	100	µg/kg	N	001,007,009
TPH (C6-C8 aliphatic)	T209	M105	100	µg/kg	N	001,007,009
TPH (C8-C10 aliphatic)	T209	M105	100	µg/kg	N	001,007,009

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	M	001,007,009
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	M	001,007,009
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	M	001,007,009
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	M	001,007,009
TPH (Aliphatic) total	T85	M105		mg/kg	N	001,007,009
TPH (C6-C7 aromatic)	T209	M105	100	µg/kg	N	001,007,009
TPH (C7-C8 aromatic)	T209	M105	100	µg/kg	N	001,007,009
TPH (C8-C10 aromatic)	T209	M105	100	µg/kg	N	001,007,009
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	M	001,007,009
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	M	001,007,009
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	M	001,007,009
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	M	001,007,009
TPH (Aromatic) total	T85	M105		mg/kg	N	001,007,009
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N	001,007,009
pH	T7	10:1			U	001,009
Sulphate	T686	10:1	0.5	mg/l	U	001,009
Chloride	T686	10:1	1	mg/l	U	001,009
Ammonia expressed as N	T686	10:1	0.05	mg/l	U	001,009
Nitrate	T686	10:1	0.5	mg/l	U	001,009
Nitrite	T686	10:1	0.1	mg/l	U	001,009
orthophosphate	T686	10:1	0.5	mg/l	N	001,009
Cyanide(Total)	T4	10:1	0.05	mg/l	U	001,009
Benzo(j)fluoranthrene	T149	10:1	0.01	mg/l	N	001,009
Dibutyl tin	T72	10:1	0.01	µg/l	N	001,009
Tributyl tin	T72	10:1	0.01	µg/l	N	001,009
PCB BZ#81	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#77	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#105	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#114	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#118	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#123	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#126	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#156	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#157	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#167	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#169	T16	10:1	0.005	µg/l	U	001,009
PCB BZ#189	T16	10:1	0.005	µg/l	U	001,009
Catechol	T17	10:1	0.005	mg/l	N	001,009
Cresols	T17	10:1	0.005	mg/l	N	001,009
Naphthols	T17	10:1	0.01	mg/l	N	001,009
Phenol	T17	10:1	0.005	mg/l	N	001,009
Resorcinol	T17	10:1	0.005	mg/l	N	001,009
Total Phenols	T17	10:1	0.01	mg/l	N	001,009
Trimethyl phenols	T17	10:1	0.01	mg/l	N	001,009
Xylenols	T17	10:1	0.01	mg/l	N	001,009
Calcium	T6	10:1	0.1	mg/l	N	001,009
Sodium	T6	10:1	0.1	mg/l	N	001,009
Magnesium	T6	10:1	0.1	mg/l	N	001,009
Potassium	T6	10:1	0.1	mg/l	N	001,009
Aluminium	T6	10:1	0.02	mg/l	U	001,009
Chromium VI	T686	10:1	0.003	mg/l	U	001,009
Boron	T6	10:1	0.01	mg/l	N	001,009
Iron	T6	10:1	0.01	mg/l	U	001,009
As (Dissolved)	T281	10:1	0.2	µg/l	U	001,009
Cd (Dissolved)	T281	10:1	0.02	µg/l	U	001,009
Cr (Dissolved)	T281	10:1	1	µg/l	U	001,009
Cu (Dissolved)	T281	10:1	0.5	µg/l	U	001,009
Ni (Dissolved)	T281	10:1	1	µg/l	U	001,009
Pb (Dissolved)	T281	10:1	0.3	µg/l	U	001,009
Zn (Dissolved)	T281	10:1	2	µg/l	U	001,009
Hg (Dissolved)	T281	10:1	0.05	µg/l	U	001,009
V (Dissolved)	T281	10:1	2	µg/l	U	001,009
Se (Dissolved)	T281	10:1	0.5	µg/l	U	001,009
Mn (Dissolved)	T281	10:1	1	µg/l	U	001,009
Ba (Dissolved)	T281	10:1	1	µg/l	U	001,009
Be (Dissolved)	T281	10:1	0.05	µg/l	U	001,009
Naphthalene	T149	10:1	0.01	µg/l	U	001,009
Acenaphthylene	T149	10:1	0.01	µg/l	U	001,009
Acenaphthene	T149	10:1	0.01	µg/l	U	001,009
Fluorene	T149	10:1	0.01	µg/l	U	001,009

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Phenanthrene	T149	10:1	0.01	µg/l	U	001,009
Anthracene	T149	10:1	0.01	µg/l	U	001,009
Fluoranthene	T149	10:1	0.01	µg/l	U	001,009
Pyrene	T149	10:1	0.01	µg/l	U	001,009
Benzo(a)Anthracene	T149	10:1	0.01	µg/l	U	001,009
Chrysene	T149	10:1	0.01	µg/l	U	001,009
Benzo(b)fluoranthene	T149	10:1	0.01	µg/l	U	001,009
Benzo(k)fluoranthene	T149	10:1	0.01	µg/l	U	001,009
Benzo(a)Pyrene	T149	10:1	0.01	µg/l	U	001,009
Indeno(123-cd)Pyrene	T149	10:1	0.01	µg/l	U	001,009
Dibenzo(ah)Anthracene	T149	10:1	0.01	µg/l	U	001,009
Benzo(ghi)Perylene	T149	10:1	0.01	µg/l	U	001,009
PAH(total)	T149	10:1	0.01	µg/l	U	001,009
Phenol	T71	10:1	1	µg/l	U	001,009
Bis (2-chloroethyl) ether	T71	10:1	1	µg/l	U	001,009
2-Chlorophenol	T71	10:1	1	µg/l	U	001,009
1,3-Dichlorobenzene	T71	10:1	1	µg/l	U	001,009
1,4-Dichlorobenzene	T71	10:1	1	µg/l	U	001,009
1,2-Dichlorobenzene	T71	10:1	1	µg/l	U	001,009
Bis (2-chloroisopropyl) ether	T71	10:1	1	µg/l	U	001,009
2-methyl phenol	T71	10:1	1	µg/l	U	001,009
3/4-Methylphenol	T71	10:1	1	µg/l	U	001,009
Hexachloroethane	T71	10:1	1	µg/l	U	001,009
Nitrobenzene	T71	10:1	1	µg/l	U	001,009
Isophorone	T71	10:1	1	µg/l	U	001,009
2-Nitrophenol	T71	10:1	1	µg/l	U	001,009
2,4-Dimethylphenol	T71	10:1	1	µg/l	U	001,009
Bis (2-chloroethoxy) methane	T71	10:1	1	µg/l	U	001,009
2,4-Dichlorophenol	T71	10:1	1	µg/l	U	001,009
1,2,4-Trichlorobenzene	T71	10:1	1	µg/l	U	001,009
Naphthalene	T71	10:1	1	µg/l	U	001,009
4-Chloroaniline	T71	10:1	1	µg/l	U	001,009
Hexachlorobutadiene	T71	10:1	1	µg/l	U	001,009
4-Chloro-3-methylphenol	T71	10:1	1	µg/l	U	001,009
2-Methylnaphthalene	T71	10:1	1	µg/l	U	001,009
Hexachlorocyclopentadiene	T71	10:1	1	µg/l	U	001,009
2,4,6-Trichlorophenol	T71	10:1	1	µg/l	U	001,009
2,4,5-Trichlorophenol	T71	10:1	1	µg/l	U	001,009
2-Chloronaphthalene	T71	10:1	1	µg/l	U	001,009
2-Nitroaniline	T71	10:1	1	µg/l	U	001,009
Dimethyl phthalate	T71	10:1	1	µg/l	U	001,009
2,6-Dinitrotoluene	T71	10:1	1	µg/l	U	001,009
Acenaphthylene	T71	10:1	1	µg/l	U	001,009
Acenaphthene	T71	10:1	1	µg/l	U	001,009
3-Nitroaniline	T71	10:1	1	µg/l	U	001,009
Dibenzofuran	T71	10:1	1	µg/l	U	001,009
2,4-Dinitrotoluene	T71	10:1	1	µg/l	U	001,009
Diethyl phthalate	T71	10:1	1	µg/l	U	001,009
Fluorene	T71	10:1	1	µg/l	U	001,009
4-Chlorophenyl phenylether	T71	10:1	1	µg/l	U	001,009
4-Nitroaniline	T71	10:1	1	µg/l	U	001,009
Azobenzene	T71	10:1	1	µg/l	U	001,009
4-Bromophenyl phenylether	T71	10:1	1	µg/l	U	001,009
Hexachlorobenzene	T71	10:1	1	µg/l	U	001,009
Pentachlorophenol	T71	10:1	1	µg/l	U	001,009
Phenanthrene	T71	10:1	1	µg/l	U	001,009
Anthracene	T71	10:1	1	µg/l	U	001,009
Carbazole	T71	10:1	1	µg/l	U	001,009
Di-n-butylphthalate	T71	10:1	1	µg/l	U	001,009
Fluoranthene	T71	10:1	1	µg/l	U	001,009
Pyrene	T71	10:1	1	µg/l	U	001,009
Butyl benzylphthalate	T71	10:1	1	µg/l	U	001,009
Benzo(a)Anthracene	T71	10:1	1	µg/l	U	001,009
Chrysene	T71	10:1	1	µg/l	U	001,009
Bis (2-ethylhexyl)phthalate	T71	10:1	1	µg/l	U	001,009
Di-n-octylphthalate	T71	10:1	1	µg/l	U	001,009
Benzo(a)Pyrene	T71	10:1	1	µg/l	U	001,009
Indeno(123-cd)Pyrene	T71	10:1	1	µg/l	U	001,009
Dibenzo(ah)Anthracene	T71	10:1	1	µg/l	U	001,009
Benzo(ghi)Perylene	T71	10:1	1	µg/l	U	001,009

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Benzo(b)fluoranthene	T71	10:1	1	µg/l	U	001,009
Benzo(k)fluoranthene	T71	10:1	1	µg/l	U	001,009
Dichlorodifluoromethane	T54	10:1	1	µg/l	U	001,009
Chloromethane	T54	10:1	1	µg/l	U	001,009
Vinyl chloride	T54	10:1	1	µg/l	U	001,009
Bromomethane	T54	10:1	1	µg/l	U	001,009
Chloroethane	T54	10:1	1	µg/l	U	001,009
Trichlorofluoromethane	T54	10:1	1	µg/l	U	001,009
1,1-Dichloroethylene	T54	10:1	1	µg/l	U	001,009
Dichloromethane	T54	10:1	50	µg/l	N	001,009
Trans-1,2-Dichloroethene	T54	10:1	1	µg/l	U	001,009
1,1-Dichloroethane	T54	10:1	1	µg/l	U	001,009
Cis-1,2-Dichloroethylene	T54	10:1	1	µg/l	U	001,009
2,2-Dichloropropane	T54	10:1	1	µg/l	U	001,009
Chloroform	T54	10:1	1	µg/l	U	001,009
Bromochloromethane	T54	10:1	1	µg/l	U	001,009
1,1,1-Trichloroethane	T54	10:1	1	µg/l	U	001,009
1,1-Dichloropropene	T54	10:1	1	µg/l	U	001,009
Carbon tetrachloride	T54	10:1	1	µg/l	U	001,009
1,2-Dichloroethane	T54	10:1	1	µg/l	U	001,009
Benzene	T54	10:1	1	µg/l	U	001,009
1,2-Dichloropropane	T54	10:1	1	µg/l	U	001,009
1,1,2-Trichloroethylene	T54	10:1	1	µg/l	U	001,009
Bromodichloromethane	T54	10:1	1	µg/l	U	001,009
Dibromomethane	T54	10:1	1	µg/l	U	001,009
Cis-1,3-Dichloropropene	T54	10:1	1	µg/l	U	001,009
Toluene	T54	10:1	1	µg/l	U	001,009
Trans-1,3-Dichloropropene	T54	10:1	1	µg/l	U	001,009
1,1,2-Trichloroethane	T54	10:1	1	µg/l	U	001,009
1,3-Dichloropropane	T54	10:1	1	µg/l	U	001,009
Tetrachloroethene	T54	10:1	1	µg/l	U	001,009
Chlorodibromomethane	T54	10:1	1	µg/l	U	001,009
1,2-dibromoethane	T54	10:1	1	µg/l	U	001,009
Chlorobenzene	T54	10:1	1	µg/l	U	001,009
1,1,1,2-Tetrachloroethane	T54	10:1	1	µg/l	U	001,009
EthylBenzene	T54	10:1	1	µg/l	U	001,009
M/P Xylene	T54	10:1	1	µg/l	U	001,009
O Xylene	T54	10:1	1	µg/l	U	001,009
Styrene	T54	10:1	1	µg/l	U	001,009
Bromoform	T54	10:1	1	µg/l	U	001,009
Isopropyl benzene	T54	10:1	1	µg/l	U	001,009
1,1,2,2-Tetrachloroethane	T54	10:1	1	µg/l	U	001,009
1,2,3-Trichloropropane	T54	10:1	1	µg/l	U	001,009
n-Propylbenzene	T54	10:1	1	µg/l	U	001,009
Bromobenzene	T54	10:1	1	µg/l	U	001,009
1,3,5-Trimethylbenzene	T54	10:1	1	µg/l	U	001,009
T-Butylbenzene	T54	10:1	1	µg/l	U	001,009
1,2,4-Trimethylbenzene	T54	10:1	1	µg/l	U	001,009
S-Butylbenzene	T54	10:1	1	µg/l	U	001,009
p-Isopropyltoluene	T54	10:1	1	µg/l	U	001,009
2-Chlorotoluene	T54	10:1	1	µg/l	U	001,009
4-Chlorotoluene	T54	10:1	1	µg/l	U	001,009
1,3-Dichlorobenzene	T54	10:1	1	µg/l	U	001,009
1,4-Dichlorobenzene	T54	10:1	1	µg/l	U	001,009
1,2-Dichlorobenzene	T54	10:1	1	µg/l	U	001,009
TPH (C5-C6 aliphatic)	T215	10:1	10	µg/l	N	001,009
TPH (C6-C8 aliphatic)	T215	10:1	10	µg/l	N	001,009
TPH (C8-C10 aliphatic)	T215	10:1	10	µg/l	N	001,009
TPH (C10-C12 aliphatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (C12-C16 aliphatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (C16-C21 aliphatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (C21-C35 aliphatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (Aliphatic) total	T85	10:1		mg/l	N	001,009
TPH (C6-C7 aromatic)	T215	10:1	10	µg/l	N	001,009
TPH (C7-C8 aromatic)	T215	10:1	10	µg/l	N	001,009
TPH (C8-C10 aromatic)	T215	10:1	10	µg/l	N	001,009
TPH (C10-C12 aromatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (C12-C16 aromatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (C16-C21 aromatic)	T910	10:1	0.01	mg/l	N	001,009
TPH (C21-C35 aromatic)	T910	10:1	0.01	mg/l	N	001,009

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
TPH (Aromatic) total	T85	10:1		mg/l	N	001,009
TPH (Aliphatic+Aromatic) (sum)	T85	10:1		mg/l	N	001,009

CONCEPT LIFE SCIENCES
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Date of Report: 10-Jan-2019

Customer: Fugro GeoServices
Fugro House
Hithercroft Road
Wallingford
Oxfordshire
OX10 9RB

Customer Contact: Ms Karen Blackmore

Customer Job Reference: G180030U
Customer Purchase Order: 74376KB-WAL
Customer Site Reference: St Ola Pier, Scrabster
Date Job Received at Concept: 20-Nov-2018
Date Analysis Started: 28-Nov-2018
Date Analysis Completed: 10-Jan-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

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Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aleksandra Pacula
Senior Customer Service Advisor

[Redacted]

Issued by :
Aleksandra Pacula
Senior Customer Servic Advisor

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
MCERTS Preparation

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Moisture @105C	T162	AR	0.1	%	**9.9**
Retained on 10mm sieve	T2	M40	0.1	%	<0.1

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Asbestos ID	T27	A40			N.D.
Cyanide(Total)	T4	AR	1	mg/kg	<1
Sulphur (total)	T6	A40	0.01	%	**0.39**
(Acid Soluble) SO4	T192	A40	0.01	%	**0.09**
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	**0.32**
pH	T7	A40			**8.3**
Moisture @105C	T162	AR	0.1	%	**9.9**
Soil Organic Matter	T287	A40	0.1	%	**0.7**
Dibutyl tin	T72	AR	0.01	mg/kg	<0.01
Benzo(j)fluoranthrene	T16	AR	0.1	mg/kg	<0.1
Tributyl tin	T72	AR	0.01	mg/kg	<0.01

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Heavy Metals(9)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Arsenic	T6	M40	2	mg/kg	**20**
Boron (water-soluble)	T6	A40	1	mg/kg	<1
Barium	T6	A40	1	mg/kg	**200**
Beryllium	T6	A40	2	mg/kg	<2
Cadmium	T6	M40	1	mg/kg	<1
Chromium	T6	M40	1	mg/kg	**39**
Chromium VI	T6	A40	1	mg/kg	<1
Copper	T6	M40	1	mg/kg	**27**
Iron	T6	A40	1	mg/kg	**1500**
Mercury	T6	M40	1	mg/kg	<1
Nickel	T6	M40	1	mg/kg	**42**
Lead	T6	M40	1	mg/kg	**23**
Selenium	T6	M40	3	mg/kg	<3
Vanadium	T6	M40	1	mg/kg	**48**
Zinc	T6	M40	1	mg/kg	**73**

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Naphthalene	T207	M105	0.1	mg/kg	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1
PAH(total)	T207	M105	0.1	mg/kg	<0.1

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Phenols (Speciated)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Resorcinol	T17	AR	0.05	mg/kg	<0.05
Catechol	T17	AR	0.05	mg/kg	<0.05
Phenol	T17	AR	0.1	mg/kg	<0.1
Cresols	T17	AR	0.05	mg/kg	<0.05
Xylenols	T17	AR	0.05	mg/kg	<0.06
Naphthols	T17	AR	0.05	mg/kg	<0.05
Trimethyl phenol	T17	AR	0.05	mg/kg	<0.05
Total Phenols	T17	AR	0.1	mg/kg	<0.2

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
TPH UKCWG

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Benzene	T209	M105	10	µg/kg	<10(13)
Toluene	T209	M105	10	µg/kg	<10
EthylBenzene	T209	M105	10	µg/kg	<10
M/P Xylene	T209	M105	10	µg/kg	<10
O Xylene	T209	M105	10	µg/kg	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10
TPH (C5-C6 aliphatic)	T209	M105	100	µg/kg	<100
TPH (C6-C8 aliphatic)	T209	M105	100	µg/kg	<100
TPH (C8-C10 aliphatic)	T209	M105	100	µg/kg	<100
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	<1(13)
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	**1(13)**
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	**1(13)**
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	**3(13)**
TPH (Aliphatic) total	T85	M105		mg/kg	**5.0(13)**
TPH (C6-C7 aromatic)	T209	M105	100	µg/kg	<100
TPH (C7-C8 aromatic)	T209	M105	100	µg/kg	<100
TPH (C8-C10 aromatic)	T209	M105	100	µg/kg	<100
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	<2(13)
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	<1(13)
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	<1(13)
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	<1(13)
TPH (Aromatic) total	T85	M105		mg/kg	N.D.(13)
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	**5.00(13)**

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil

Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
PCB BZ#77	T1	AR	0.05	µg/kg	<0.05
PCB BZ#81	T1	AR	0.05	µg/kg	<0.05
PCB BZ#105	T1	AR	0.05	µg/kg	<0.05
PCB BZ#114	T1	AR	0.05	µg/kg	<0.05
PCB BZ#118	T1	AR	0.05	µg/kg	<0.05
PCB BZ#123	T1	AR	0.05	µg/kg	<0.05
PCB BZ#126	T1	AR	0.05	µg/kg	<0.05
PCB BZ#156	T1	AR	0.05	µg/kg	<0.05
PCB BZ#157	T1	AR	0.05	µg/kg	<0.05
PCB BZ#167	T1	AR	0.05	µg/kg	<0.05
PCB BZ#169	T1	AR	0.05	µg/kg	<0.05
PCB BZ#189	T1	AR	0.05	µg/kg	<0.05

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Phenol	T207	M105	0.1	mg/kg	<0.1
Bis (2-chloroethyl) ether	T207	M105	0.1	mg/kg	<0.1
2-Chlorophenol	T207	M105	0.1	mg/kg	<0.1
1,3-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1
1,4-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1
1,2-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1
Bis (2-chloroisopropyl) ether	T207	M105	0.1	mg/kg	<0.1
2-methyl phenol	T207	M105	0.1	mg/kg	<0.1
3/4-Methylphenol	T207	M105	0.1	mg/kg	<0.1
Hexachloroethane	T207	M105	0.1	mg/kg	<0.1
Nitrobenzene	T207	M105	0.1	mg/kg	<0.1
Isophorone	T207	M105	0.1	mg/kg	<0.1
2-Nitrophenol	T207	M105	0.1	mg/kg	<0.1
2,4-Dimethylphenol	T207	M105	0.1	mg/kg	<0.1
Bis (2-chloroethoxy) methane	T207	M105	0.1	mg/kg	<0.1(131)
2,4-Dichlorophenol	T207	M105	0.1	mg/kg	<0.1
1,2,4-Trichlorobenzene	T207	M105	0.1	mg/kg	<0.1(131)
Naphthalene	T207	M105	0.1	mg/kg	<0.1
4-Chloroaniline	T207	M105	0.1	mg/kg	<0.1
Hexachlorobutadiene	T207	M105	0.1	mg/kg	<0.1
4-Chloro-3-methylphenol	T207	M105	0.1	mg/kg	<0.1
2-Methylnaphthalene	T207	M105	0.1	mg/kg	<0.1
Hexachlorocyclopentadiene	T207	M105	0.1	mg/kg	<0.1
2,4,6-Trichlorophenol	T207	M105	0.1	mg/kg	<0.1
2,4,5-Trichlorophenol	T207	M105	0.1	mg/kg	<0.1
2-Chloronaphthalene	T207	M105	0.1	mg/kg	<0.1
2-Nitroaniline	T207	M105	0.1	mg/kg	<0.1
Dimethyl phthalate	T207	M105	0.1	mg/kg	<0.1
2,6-Dinitrotoluene	T207	M105	0.1	mg/kg	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1
3-Nitroaniline	T207	M105	0.1	mg/kg	<0.1
Dibenzofuran	T207	M105	0.1	mg/kg	<0.1
2,4-Dinitrotoluene	T207	M105	0.1	mg/kg	<0.1
Diethyl phthalate	T207	M105	0.1	mg/kg	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1
4-Chlorophenyl phenylether	T207	M105	0.1	mg/kg	<0.1
4-Nitroaniline	T207	M105	0.1	mg/kg	<0.1
Azobenzene	T207	M105	0.1	mg/kg	<0.1
4-Bromophenyl phenylether	T207	M105	0.1	mg/kg	<0.1
Hexachlorobenzene	T207	M105	0.1	mg/kg	<0.1
Pentachlorophenol	T207	M105	0.1	mg/kg	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1
Carbazole	T207	M105	0.1	mg/kg	<0.1
Di-n-butylphthalate	T207	M105	0.1	mg/kg	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1
Butyl benzylphthalate	T207	M105	0.1	mg/kg	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1
Bis (2-ethylhexyl)phthalate	T207	M105	0.1	mg/kg	<0.1
Di-n-octylphthalate	T207	M105	0.1	mg/kg	<0.1

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Volatile Organic Compounds (USEPA 624) (MCERTS)

Concept Reference	**785882 005**
Customer Sample Reference	**BH30**
Top Depth	**0.60**
Depth	**0.60**
Bottom Depth	**1.15**
Hole ID	**BH30**
Date Sampled	**16-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**4**
Matrix Class	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units	
Dichlorodifluoromethane	T209	M105	50	µg/kg	<50
Chloromethane	T209	M105	50	µg/kg	<50
Vinyl chloride	T209	M105	50	µg/kg	<50
Bromomethane	T209	M105	50	µg/kg	<50
Chloroethane	T209	M105	50	µg/kg	<50
Trichlorofluoromethane	T209	M105	50	µg/kg	<50
1,1-Dichloroethylene	T209	M105	50	µg/kg	<50
Dichloromethane	T209	M105	50	µg/kg	<50
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	<50
1,1-Dichloroethane	T209	M105	50	µg/kg	<50
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	<50
2,2-Dichloropropane	T209	M105	50	µg/kg	<50
Chloroform	T209	M105	50	µg/kg	<50
Bromochloromethane	T209	M105	50	µg/kg	<50
1,1,1-Trichloroethane	T209	M105	50	µg/kg	<50
1,1-Dichloropropene	T209	M105	50	µg/kg	<50
Carbon tetrachloride	T209	M105	50	µg/kg	<50
1,2-Dichloroethane	T209	M105	50	µg/kg	<50
Benzene	T209	M105	10	µg/kg	<10(13)
1,2-Dichloropropane	T209	M105	50	µg/kg	<50
Trichloroethene	T209	M105	50	µg/kg	<50
Bromodichloromethane	T209	M105	50	µg/kg	<50
Dibromomethane	T209	M105	50	µg/kg	<50
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	<50
Toluene	T209	M105	10	µg/kg	<10
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	<50
1,1,2-Trichloroethane	T209	M105	50	µg/kg	<50
1,3-Dichloropropane	T209	M105	50	µg/kg	<50
Tetrachloroethene	T209	M105	50	µg/kg	<50
Chlorodibromomethane	T209	M105	50	µg/kg	<50
1,2-dibromoethane	T209	M105	50	µg/kg	<50
Chlorobenzene	T209	M105	50	µg/kg	<50
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	<50
EthylBenzene	T209	M105	10	µg/kg	<10
M/P Xylene	T209	M105	10	µg/kg	<10
O Xylene	T209	M105	10	µg/kg	<10
Styrene	T209	M105	50	µg/kg	<50
Bromoform	T209	M105	50	µg/kg	<50
Isopropyl benzene	T209	M105	50	µg/kg	<50
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	<50
1,2,3-Trichloropropane	T209	M105	50	µg/kg	<50
n-Propylbenzene	T209	M105	50	µg/kg	<50
Bromobenzene	T209	M105	50	µg/kg	<50
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	<50
T-Butylbenzene	T209	M105	50	µg/kg	<50
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	<50
S-Butylbenzene	T209	M105	50	µg/kg	<50
p-Isopropyltoluene	T209	M105	50	µg/kg	<50
2-Chlorotoluene	T209	M105	50	µg/kg	<50
4-Chlorotoluene	T209	M105	50	µg/kg	<50
1,3-Dichlorobenzene	T209	M105	50	µg/kg	<50
1,4-Dichlorobenzene	T209	M105	50	µg/kg	<50
1,2-Dichlorobenzene	T209	M105	50	µg/kg	<50

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**785882 001**	**785882 002**	**785882 007**
				Customer Sample Reference	**BH30**	**BH30**	**Method Blank**
				Top Depth	**0.10**	**0.60**	
				Depth	**0.10**	**0.60**	
				Bottom Depth	**0.50**	**1.15**	
				Hole ID	**BH30**	**BH30**	
				Date Sampled	**16-NOV-2018**	**16-NOV-2018**	
				AGS Type	**ES**	**ES**	
				AGS Sample Reference	**2**	**4**	
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Naphthalene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Acenaphthylene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Acenaphthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Fluorene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Phenanthrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(a)Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Chrysene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(a)Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Indeno(123-cd)Pyrene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(ghi)Perylene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(b)fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Benzo(k)fluoranthene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
Dibenzo(ah)Anthracene	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0
PAH(total)	T1	AR	2.0	µg/kg	<2.0	<2.0	<2.0

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**785882 001**	**785882 002**	**785882 007**
				Customer Sample Reference	**BH30**	**BH30**	**Method Blank**
				Top Depth	**0.10**	**0.60**	
				Depth	**0.10**	**0.60**	
				Bottom Depth	**0.50**	**1.15**	
				Hole ID	**BH30**	**BH30**	
				Date Sampled	**16-NOV-2018**	**16-NOV-2018**	
				AGS Type	**ES**	**ES**	
				AGS Sample Reference	**2**	**4**	
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
PCB BZ#28	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#52	T1	AR	0.10	µg/kg	<0.10	<0.10	<0.10
PCB BZ#101	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#118	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#153	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#138	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB BZ#180	T1	AR	0.1	µg/kg	<0.1	<0.1	<0.1
PCB EC7 (Sum)	T85	AR	0.7	µg/kg	<0.7	<0.7	<0.7

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

Concept Reference	**785882 001**	**785882 002**
Customer Sample Reference	**BH30**	**BH30**
Top Depth	**0.10**	**0.60**
Depth	**0.10**	**0.60**
Bottom Depth	**0.50**	**1.15**
Hole ID	**BH30**	**BH30**
Date Sampled	**16-NOV-2018**	**16-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**2**	**4**

Determinand	Method	Test Sample	LOD	Units		
As (Total)	T301	AR	1.0	mg/kg	**20**	**17**
Cd (Total)	T301	AR	0.05	mg/kg	**0.14**	**0.16**
Cr (Total)	T301	AR	0.2	mg/kg	**55**	**57**
Cu (Total)	T301	AR	0.1	mg/kg	**21**	**20**
Mercury	T355	AR	0.01	mg/kg	<0.01	<0.01
Pb (Total)	T301	AR	0.2	mg/kg	**25**	**25**
Ni (Total)	T301	AR	0.2	mg/kg	**34**	**37**
Zinc	T740	AR	1	mg/kg	**77**	**72**
Tributyl tin	T16	AR	10	µg/kg	<10	<10
Dibutyl tin	T16	AR	10	µg/kg	<10	<10
Total Organic Carbon	T21	AR	0.1	%	<0.1	<0.1
Dry solids @40C	T277	AR	0.1	%	**90**	**91**
Dry solids @105C	T162	AR	0.1	%	**90**	**90**
GRO (C5-C10)	T54	AR	10	µg/kg	<10	<10
TPH (C10-C12)	T250	AR	0.1	mg/kg	<1.0	<1.0
TPH (C12-C16)	T250	AR	0.1	mg/kg	<1.0	<1.0
TPH (C16-C21)	T250	AR	0.1	mg/kg	<1.0	<1.0
TPH (C21-C35)	T250	AR	0.1	mg/kg	<1.0	<1.0
TPH (C40-C44)	T250	AR	0.1	mg/kg	<1.0	<1.0
PCB (Total Tri-Hepta)	T1	AR	1.4	µg/kg	<1.4	<1.4

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Blank Suite

Concept Reference	**785882 007**
Customer Sample Reference	**Method Blank**

Determinand	Method	Test Sample	LOD	Units	
As (Total)	T301	AR	1.0	mg/kg	<1.0
Cd (Total)	T301	AR	0.05	mg/kg	<0.05
Cr (Total)	T301	AR	0.2	mg/kg	<0.2
Cu (Total)	T301	AR	0.1	mg/kg	<0.1
Mercury	T355	AR	0.01	mg/kg	<0.01
Pb (Total)	T301	AR	0.2	mg/kg	<0.2
Ni (Total)	T301	AR	0.2	mg/kg	<0.2
Zinc	T740	AR	1	mg/kg	<1
Tributyl tin	T16	AR	10	µg/kg	<10
Dibutyl tin	T16	AR	10	µg/kg	<10
Total Organic Carbon	T21	AR	0.1	%	<0.1
Dry solids @40C	T277	AR	0.1	%	(NR)
Dry solids @105C	T162	AR	0.1	%	(NR)
GRO (C5-C10)	T54	AR	10	µg/kg	<10
TPH (C10-C12)	T250	AR	0.1	mg/kg	<1.0
TPH (C12-C16)	T250	AR	0.1	mg/kg	<1.0
TPH (C16-C21)	T250	AR	0.1	mg/kg	<1.0
TPH (C21-C35)	T250	AR	0.1	mg/kg	<1.0
TPH (C40-C44)	T250	AR	0.1	mg/kg	<1.0
PCB (Total Tri-Hepta)	T1	AR	1.4	µg/kg	<1.4

Concept Reference: 785882
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Recovery Suite

				Concept Reference	**785882 006**
				Customer Sample Reference	**Matrix Spike**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**	
Acenaphthene Recovery	T434	AR	1	%	**98**
Acenaphthylene Recovery	T434	AR	1	%	**100**
Anthracene Recovery	T434	AR	1	%	**100**
Benzo(a)Anthracene Recovery	T434	AR	1	%	**100**
Benzo(a)Pyrene Recovery	T434	AR	1	%	**100**
Benzo(b)fluoranthene Recovery	T434	AR	1	%	**96**
Benzo(b/k)Fluoranthene Recovery	T434	AR	1	%	**100**
Benzo(ghi)Perylene Recovery	T434	AR	1	%	**100**
Benzo(k)fluoranthene Recovery	T434	AR	1	%	**100**
Phenanthrene Recovery	T434	AR	1	%	**100**
Dibenzo(ah)Anthracene Recovery	T434	AR	1	%	**100**
Fluoranthene Recovery	T434	AR	1	%	**100**
Fluorene Recovery	T434	AR	1	%	**100**
Indeno(123-cd)Pyrene Recovery	T434	AR	1	%	**98**
Naphthalene Recovery	T434	AR	1	%	**98**
As Recovery	T750	AR	1	%	**100**
Cd Recovery	T750	AR	1	%	**100**
Cr Recovery	T750	AR	1	%	**96**
Cu Recovery	T750	AR	1	%	**98**
Hg Recovery	T751	AR	1	%	**150**
Ni Recovery	T750	AR	1	%	**100**
Pb Recovery	T750	AR	1	%	**97**
Zn Recovery	T750	AR	1	%	**96**
PCB (Total Tri-Hepta) Recovery	T434	AR	1	%	**100**
PCB BZ#101 Recovery	T434	AR	1	%	**100**
PCB BZ#118 Recovery	T434	AR	1	%	**110**
PCB BZ#138 Recovery	T434	AR	1	%	**96**
PCB BZ#153 Recovery	T434	AR	1	%	**98**
PCB BZ#180 Recovery	T434	AR	1	%	**110**
PCB BZ#28 Recovery	T434	AR	1	%	**110**
PCB BZ#52 Recovery	T434	AR	1	%	**100**
Dibutyl tin Recovery	T429	AR	1	%	**99**
Tributyl tin Recovery	T429	AR	1	%	**120**
Total Organic Carbon	T849	AR	1	%	**12**

Index to symbols used in 785882-1

Value	Description
AR	As Received
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
A40	Assisted dried < 40C
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
N.D.	Not Detected
131	Result is outside of the scope of accreditation due to a QC Failure
13	Results have been blank corrected.
NR	No Result
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Phenols Speciated (soil) testing was subcontracted to Exova Jones.
These samples have been analysed exceeding recommended holding times for pH, TPH and PAH. It is possible therefore that the results provided may be compromised.
Asbestos testing was subcontracted to REC Asbestos.

Method Index

Value	Description
T17	HPLC
T192	HCl Extraction/ICP/OES (TRL 447 T2)
T277	Grav (1 Dec) (40 C)
T16	GC/MS
T750	ICP/MS (Recovery)
T909	GCxGC
T6	ICP/OES
T1	GC/MS (HR)
T7	Probe
T740	ICP/MS (HF)
T849	OX/IR (Recovery)
T301	ICP/MS (Total)
T207	GC/MS (MCERTS)
T429	GC/MS (Recovery)
T434	GC/MS (HR) (Recovery)
T250	GC/FID (LD)
T355	CVAFS
T4	Colorimetry
T27	PLM
T751	CVAFS (Recovery)
T287	Calc TOC/0.58
T21	OX/IR
T85	Calc
T209	GC/MS (Head Space)(MCERTS)
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T2	Grav
T72	GC/MS (Deriv.)
T54	GC/MS (Headspace)
T162	Grav (1 Dec) (105 C)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Naphthalene	T1	AR	2.0	µg/kg	N	001-002,007
Acenaphthylene	T1	AR	2.0	µg/kg	N	001-002,007
Acenaphthene	T1	AR	2.0	µg/kg	N	001-002,007
Fluorene	T1	AR	2.0	µg/kg	N	001-002,007
Phenanthrene	T1	AR	2.0	µg/kg	N	001-002,007
Anthracene	T1	AR	2.0	µg/kg	N	001-002,007
Fluoranthene	T1	AR	2.0	µg/kg	N	001-002,007
Pyrene	T1	AR	2.0	µg/kg	N	001-002,007
Benzo(a)Anthracene	T1	AR	2.0	µg/kg	N	001-002,007
Chrysene	T1	AR	2.0	µg/kg	N	001-002,007
Benzo(a)Pyrene	T1	AR	2.0	µg/kg	N	001-002,007
Indeno(123-cd)Pyrene	T1	AR	2.0	µg/kg	N	001-002,007
Benzo(ghi)Perylene	T1	AR	2.0	µg/kg	N	001-002,007
Benzo(b)fluoranthene	T1	AR	2.0	µg/kg	N	001-002,007
Benzo(k)fluoranthene	T1	AR	2.0	µg/kg	N	001-002,007
Dibenzo(ah)Anthracene	T1	AR	2.0	µg/kg	N	001-002,007
PAH(total)	T1	AR	2.0	µg/kg	N	001-002,007
PCB BZ#28	T1	AR	0.1	µg/kg	U	001-002,007
PCB BZ#52	T1	AR	0.10	µg/kg	U	001-002,007
PCB BZ#101	T1	AR	0.1	µg/kg	U	001-002,007
PCB BZ#118	T1	AR	0.1	µg/kg	U	001-002,007
PCB BZ#153	T1	AR	0.1	µg/kg	U	001-002,007
PCB BZ#138	T1	AR	0.1	µg/kg	U	001-002,007
PCB BZ#180	T1	AR	0.1	µg/kg	U	001-002,007
PCB EC7 (Sum)	T85	AR	0.7	µg/kg	N	001-002,007
Retained on 10mm sieve	T2	M40	0.1	%	N	005
As (Total)	T301	AR	1.0	mg/kg	N	001-002,007
Cd (Total)	T301	AR	0.05	mg/kg	N	001-002,007
Cr (Total)	T301	AR	0.2	mg/kg	N	001-002,007
Cu (Total)	T301	AR	0.1	mg/kg	N	001-002,007
Mercury	T355	AR	0.01	mg/kg	N	001-002,007
Pb (Total)	T301	AR	0.2	mg/kg	N	001-002,007
Ni (Total)	T301	AR	0.2	mg/kg	N	001-002,007

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Zinc	T740	AR	1	mg/kg	N	001-002,007
Tributyl tin	T16	AR	10	µg/kg	N	001-002,007
Dibutyl tin	T16	AR	10	µg/kg	N	001-002,007
Total Organic Carbon	T21	AR	0.1	%	N	001-002,007
Dry solids @40C	T277	AR	0.1	%	N	001-002,007
Dry solids @105C	T162	AR	0.1	%	N	001-002,007
GRO (C5-C10)	T54	AR	10	µg/kg	N	001-002,007
TPH (C10-C12)	T250	AR	0.1	mg/kg	N	001-002,007
TPH (C12-C16)	T250	AR	0.1	mg/kg	N	001-002,007
TPH (C16-C21)	T250	AR	0.1	mg/kg	N	001-002,007
TPH (C21-C35)	T250	AR	0.1	mg/kg	N	001-002,007
TPH (C40-C44)	T250	AR	0.1	mg/kg	N	001-002,007
PCB (Total Tri-Hepta)	T1	AR	1.4	µg/kg	U	001-002,007
Asbestos ID	T27	A40			SU	005
Cyanide(Total)	T4	AR	1	mg/kg	M	005
Sulphur (total)	T6	A40	0.01	%	M	005
(Acid Soluble) SO4	T192	A40	0.01	%	M	005
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	M	005
pH	T7	A40			M	005
Moisture @105C	T162	AR	0.1	%	N	005
Soil Organic Matter	T287	A40	0.1	%	N	005
Benzo(j)fluoranthrene	T16	AR	0.1	mg/kg	N	005
Dibutyl tin	T72	AR	0.01	mg/kg	N	005
Tributyl tin	T72	AR	0.01	mg/kg	N	005
Resorcinol	T17	AR	0.05	mg/kg	SM	005
Catechol	T17	AR	0.05	mg/kg	SN	005
Phenol	T17	AR	0.1	mg/kg	SM	005
Cresols	T17	AR	0.05	mg/kg	SM	005
Xylenols	T17	AR	0.05	mg/kg	SM	005
Naphthols	T17	AR	0.05	mg/kg	SN	005
Trimethyl phenol	T17	AR	0.05	mg/kg	SM	005
Total Phenols	T17	AR	0.1	mg/kg	SN	005
Arsenic	T6	M40	2	mg/kg	M	005
Boron (water-soluble)	T6	A40	1	mg/kg	N	005
Barium	T6	A40	1	mg/kg	U	005
Beryllium	T6	A40	2	mg/kg	U	005
Cadmium	T6	M40	1	mg/kg	M	005
Chromium	T6	M40	1	mg/kg	M	005
Chromium VI	T6	A40	1	mg/kg	N	005
Copper	T6	M40	1	mg/kg	M	005
Iron	T6	A40	1	mg/kg	U	005
Mercury	T6	M40	1	mg/kg	M	005
Nickel	T6	M40	1	mg/kg	M	005
Lead	T6	M40	1	mg/kg	M	005
Selenium	T6	M40	3	mg/kg	M	005
Vanadium	T6	M40	1	mg/kg	M	005
Zinc	T6	M40	1	mg/kg	M	005
Acenaphthene	T207	M105	0.1	mg/kg	M	005
Phenanthrene	T207	M105	0.1	mg/kg	M	005
Anthracene	T207	M105	0.1	mg/kg	U	005
Pyrene	T207	M105	0.1	mg/kg	M	005
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	005
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	005
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	005
PAH(total)	T207	M105	0.1	mg/kg	U	005
PCB BZ#77	T1	AR	0.05	µg/kg	U	005
PCB BZ#81	T1	AR	0.05	µg/kg	U	005
PCB BZ#105	T1	AR	0.05	µg/kg	U	005
PCB BZ#114	T1	AR	0.05	µg/kg	U	005
PCB BZ#118	T1	AR	0.05	µg/kg	U	005
PCB BZ#123	T1	AR	0.05	µg/kg	U	005
PCB BZ#126	T1	AR	0.05	µg/kg	U	005
PCB BZ#156	T1	AR	0.05	µg/kg	U	005
PCB BZ#157	T1	AR	0.05	µg/kg	U	005
PCB BZ#167	T1	AR	0.05	µg/kg	U	005
PCB BZ#169	T1	AR	0.05	µg/kg	U	005
PCB BZ#189	T1	AR	0.05	µg/kg	U	005
Phenol	T207	M105	0.1	mg/kg	M	005
Bis (2-chloroethyl) ether	T207	M105	0.1	mg/kg	M	005
2-Chlorophenol	T207	M105	0.1	mg/kg	M	005

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
1,3-Dichlorobenzene	T207	M105	0.1	mg/kg	M	005
1,4-Dichlorobenzene	T207	M105	0.1	mg/kg	M	005
1,2-Dichlorobenzene	T207	M105	0.1	mg/kg	M	005
Bis (2-chloroisopropyl) ether	T207	M105	0.1	mg/kg	M	005
2-methyl phenol	T207	M105	0.1	mg/kg	M	005
3/4-Methylphenol	T207	M105	0.1	mg/kg	M	005
Hexachloroethane	T207	M105	0.1	mg/kg	U	005
Nitrobenzene	T207	M105	0.1	mg/kg	M	005
Isophorone	T207	M105	0.1	mg/kg	U	005
2-Nitrophenol	T207	M105	0.1	mg/kg	U	005
2,4-Dimethylphenol	T207	M105	0.1	mg/kg	U	005
Bis (2-chloroethoxy) methane	T207	M105	0.1	mg/kg	M	005
2,4-Dichlorophenol	T207	M105	0.1	mg/kg	U	005
1,2,4-Trichlorobenzene	T207	M105	0.1	mg/kg	M	005
Naphthalene	T207	M105	0.1	mg/kg	M	005
4-Chloroaniline	T207	M105	0.1	mg/kg	U	005
Hexachlorobutadiene	T207	M105	0.1	mg/kg	M	005
4-Chloro-3-methylphenol	T207	M105	0.1	mg/kg	M	005
2-Methylnaphthalene	T207	M105	0.1	mg/kg	M	005
Hexachlorocyclopentadiene	T207	M105	0.1	mg/kg	U	005
2,4,6-Trichlorophenol	T207	M105	0.1	mg/kg	U	005
2,4,5-Trichlorophenol	T207	M105	0.1	mg/kg	U	005
2-Chloronaphthalene	T207	M105	0.1	mg/kg	M	005
2-Nitroaniline	T207	M105	0.1	mg/kg	M	005
Dimethyl phthalate	T207	M105	0.1	mg/kg	U	005
2,6-Dinitrotoluene	T207	M105	0.1	mg/kg	U	005
Acenaphthylene	T207	M105	0.1	mg/kg	U	005
3-Nitroaniline	T207	M105	0.1	mg/kg	U	005
Dibenzofuran	T207	M105	0.1	mg/kg	M	005
2,4-Dinitrotoluene	T207	M105	0.1	mg/kg	M	005
Diethyl phthalate	T207	M105	0.1	mg/kg	U	005
Fluorene	T207	M105	0.1	mg/kg	M	005
4-Chlorophenyl phenylether	T207	M105	0.1	mg/kg	M	005
4-Nitroaniline	T207	M105	0.1	mg/kg	U	005
Azobenzene	T207	M105	0.1	mg/kg	M	005
4-Bromophenyl phenylether	T207	M105	0.1	mg/kg	M	005
Hexachlorobenzene	T207	M105	0.1	mg/kg	M	005
Pentachlorophenol	T207	M105	0.1	mg/kg	U	005
Carbazole	T207	M105	0.1	mg/kg	U	005
Di-n-butylphthalate	T207	M105	0.1	mg/kg	M	005
Fluoranthene	T207	M105	0.1	mg/kg	M	005
Butyl benzylphthalate	T207	M105	0.1	mg/kg	U	005
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	005
Chrysene	T207	M105	0.1	mg/kg	M	005
Bis (2-ethylhexyl)phthalate	T207	M105	0.1	mg/kg	M	005
Di-n-octylphthalate	T207	M105	0.1	mg/kg	M	005
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	M	005
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	005
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	005
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	005
Dichlorodifluoromethane	T209	M105	50	µg/kg	M	005
Chloromethane	T209	M105	50	µg/kg	U	005
Vinyl chloride	T209	M105	50	µg/kg	M	005
Bromomethane	T209	M105	50	µg/kg	U	005
Chloroethane	T209	M105	50	µg/kg	M	005
Trichlorofluoromethane	T209	M105	50	µg/kg	M	005
1,1-Dichloroethylene	T209	M105	50	µg/kg	M	005
Dichloromethane	T209	M105	50	µg/kg	U	005
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	M	005
1,1-Dichloroethane	T209	M105	50	µg/kg	M	005
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	M	005
2,2-Dichloropropane	T209	M105	50	µg/kg	U	005
Chloroform	T209	M105	50	µg/kg	M	005
Bromochloromethane	T209	M105	50	µg/kg	M	005
1,1,1-Trichloroethane	T209	M105	50	µg/kg	M	005
1,1-Dichloropropene	T209	M105	50	µg/kg	M	005
Carbon tetrachloride	T209	M105	50	µg/kg	M	005
1,2-Dichloroethane	T209	M105	50	µg/kg	M	005
1,2-Dichloropropane	T209	M105	50	µg/kg	M	005
Trichloroethene	T209	M105	50	µg/kg	M	005

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Bromodichloromethane	T209	M105	50	µg/kg	M	005
Dibromomethane	T209	M105	50	µg/kg	M	005
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	M	005
Toluene	T209	M105	10	µg/kg	M	005
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	M	005
1,1,2-Trichloroethane	T209	M105	50	µg/kg	M	005
1,3-Dichloropropane	T209	M105	50	µg/kg	M	005
Tetrachloroethene	T209	M105	50	µg/kg	M	005
Chlorodibromomethane	T209	M105	50	µg/kg	M	005
1,2-dibromoethane	T209	M105	50	µg/kg	M	005
Chlorobenzene	T209	M105	50	µg/kg	M	005
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	M	005
O Xylene	T209	M105	10	µg/kg	M	005
Styrene	T209	M105	50	µg/kg	U	005
Bromoform	T209	M105	50	µg/kg	M	005
Isopropyl benzene	T209	M105	50	µg/kg	M	005
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	U	005
1,2,3-Trichloropropane	T209	M105	50	µg/kg	U	005
n-Propylbenzene	T209	M105	50	µg/kg	M	005
Bromobenzene	T209	M105	50	µg/kg	M	005
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	M	005
T-Butylbenzene	T209	M105	50	µg/kg	M	005
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	M	005
S-Butylbenzene	T209	M105	50	µg/kg	M	005
p-Isopropyltoluene	T209	M105	50	µg/kg	M	005
2-Chlorotoluene	T209	M105	50	µg/kg	U	005
4-Chlorotoluene	T209	M105	50	µg/kg	U	005
1,3-Dichlorobenzene	T209	M105	50	µg/kg	M	005
1,4-Dichlorobenzene	T209	M105	50	µg/kg	M	005
1,2-Dichlorobenzene	T209	M105	50	µg/kg	M	005
Benzene	T209	M105	10	µg/kg	M	005
EthylBenzene	T209	M105	10	µg/kg	M	005
M/P Xylene	T209	M105	10	µg/kg	M	005
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	005
TPH (C5-C6 aliphatic)	T209	M105	100	µg/kg	N	005
TPH (C6-C8 aliphatic)	T209	M105	100	µg/kg	N	005
TPH (C8-C10 aliphatic)	T209	M105	100	µg/kg	N	005
TPH (C10-C12 aliphatic)	T909	M105	1	mg/kg	M	005
TPH (C12-C16 aliphatic)	T909	M105	1	mg/kg	M	005
TPH (C16-C21 aliphatic)	T909	M105	1	mg/kg	M	005
TPH (C21-C35 aliphatic)	T909	M105	2	mg/kg	M	005
TPH (Aliphatic) total	T85	M105		mg/kg	N	005
TPH (C6-C7 aromatic)	T209	M105	100	µg/kg	N	005
TPH (C7-C8 aromatic)	T209	M105	100	µg/kg	N	005
TPH (C8-C10 aromatic)	T209	M105	100	µg/kg	N	005
TPH (C10-C12 aromatic)	T909	M105	2	mg/kg	M	005
TPH (C12-C16 aromatic)	T909	M105	1	mg/kg	M	005
TPH (C16-C21 aromatic)	T909	M105	1	mg/kg	M	005
TPH (C21-C35 aromatic)	T909	M105	1	mg/kg	M	005
TPH (Aromatic) total	T85	M105		mg/kg	N	005
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N	005
Acenaphthene Recovery	T434	AR	1	%	N	006
Acenaphthylene Recovery	T434	AR	1	%	N	006
Anthracene Recovery	T434	AR	1	%	N	006
Benzo(a)Anthracene Recovery	T434	AR	1	%	N	006
Benzo(a)Pyrene Recovery	T434	AR	1	%	N	006
Benzo(b)fluoranthene Recovery	T434	AR	1	%	N	006
Benzo(b/k)Fluoranthene Recovery	T434	AR	1	%	N	006
Benzo(ghi)Perylene Recovery	T434	AR	1	%	N	006
Benzo(k)fluoranthene Recovery	T434	AR	1	%	N	006
Phenanthrene Recovery	T434	AR	1	%	N	006
Dibenzo(ah)Anthracene Recovery	T434	AR	1	%	N	006
Fluoranthene Recovery	T434	AR	1	%	N	006
Fluorene Recovery	T434	AR	1	%	N	006
Indeno(123-cd)Pyrene Recovery	T434	AR	1	%	N	006
Naphthalene Recovery	T434	AR	1	%	N	006
As Recovery	T750	AR	1	%	N	006
Cd Recovery	T750	AR	1	%	N	006
Cr Recovery	T750	AR	1	%	N	006
Cu Recovery	T750	AR	1	%	N	006

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Hg Recovery	T751	AR	1	%	N	006
Ni Recovery	T750	AR	1	%	N	006
Pb Recovery	T750	AR	1	%	N	006
Zn Recovery	T750	AR	1	%	N	006
PCB (Total Tri-Hepta) Recovery	T434	AR	1	%	N	006
PCB BZ#101 Recovery	T434	AR	1	%	N	006
PCB BZ#118 Recovery	T434	AR	1	%	N	006
PCB BZ#138 Recovery	T434	AR	1	%	N	006
PCB BZ#153 Recovery	T434	AR	1	%	N	006
PCB BZ#180 Recovery	T434	AR	1	%	N	006
PCB BZ#28 Recovery	T434	AR	1	%	N	006
PCB BZ#52 Recovery	T434	AR	1	%	N	006
Dibutyl tin Recovery	T429	AR	1	%	N	006
Tributyl tin Recovery	T429	AR	1	%	N	006
Total Organic Carbon	T849	AR	1	%	N	006

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Concept Life Sciences Analytical & Development Services Limited registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
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Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 785646-2

Date of Report: 22-Jan-2019

Customer: Fugro GeoServices
Fugro House
Hithercroft Road
Wallingford
Oxfordshire
OX10 9RB

Customer Contact: Ms Karen Blackmore

Customer Job Reference: G180030U, CoC_181611_REV
Customer Purchase Order: 74376KB-WAL
Customer Site Reference: St Ola Pier, Scrabster
Date Job Received at Concept: 21-Nov-2018
Date Analysis Started: 28-Nov-2018
Date Analysis Completed: 22-Jan-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aleksandra Pacula
Senior Customer Service Advisor

Issued by :
Aleksandra Pacula
Senior Customer Ser Advisor

[Redacted]

Waste Acceptance Criteria

Customer Sample Reference : BH22
Our Sample Reference : 785646 008
Project Site : St Ola Pier, Scrabster
Customer Reference : G180030U, CoC_181611_REV
Sample in Dish @ 105C : 57.6
Test Portion Mass (g) : 175
Hole ID : BH22
Wet Sample in Dish Weight : 100
Empty Dish Weight : 0
Top Depth : 3.00
Bottom Depth : 3.50
Date Sampled : 13-NOV-2018
AGS Type : ES
AGS Sample Reference : 8
Matrix Class : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
PCB EC7 (Sum)	Calc	0.007	mg/kg	M	<0.007	1.0		
Acid Neutralising Capacity (pH 4)	Titration	2	Mol/kg	N	<2			
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.040	mg/kg	U	(13) <0.040	6.0		
Loss on Ignition	Grav	0.1	%	N	**1.0**			10.0
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
pH	Probe			M	**8.6**		> 6.0	
Total Organic Carbon	OX/IR	0.1	%	N	**0.2**	3.0	5.0	6.0
Total Petroleum Hydrocarbons C10-C40 (Sum)	Calc	1	mg/kg	N	(13) <1	500.0		

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	**0.040**	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.062**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.66**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	<0.00020	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**5000**	**800.0**	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.015**	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.0055**	2.0	50.0	100.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**17**	500.0	800.0	1000.0
Fluoride	Calc (W)	0.50	mg/kg	N	**1.2**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	<0.0030	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.055**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	**13**	**0.4**	**10.0**	40.0
Phenols (Total-Mono)	Calc	1.0	mg/kg	N	<1.0	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
Sulphate	Calc (W)	5	mg/kg	N	**780**	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	1000	mg/kg	N	**11000**	**4000.0**	60000.0	100000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	<0.020	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

*** Waste Sampling and Testing for Disposal at Landfill, EBPRI 11507B, Environment Agency (England and Wales) March 2013**

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**785646 003**	**785646 007**	**785646 008**	**785646 011**	**785646 012**
				Customer Sample Reference	**BH05**	**BH22**	**BH22**	**BH24A**	**BH05**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**2.50**	**1.00**	**3.50**	**2.00**	**1.00**
				Top Depth	**1.50**	**0.00**	**3.00**	**1.50**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH22**	**BH24A**	**BH05**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**8**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**21**	**17**	**15**	**18**	**21**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**785646 013**
				Customer Sample Reference	**BH20**
				Test Sample	**AR**
				Bottom Depth	**0.50**
				Top Depth	**0.00**
				Hole ID	**BH20**
				Date Sampled	**12-NOV-2018**
				AGS Type	**ES**
				AGS Sample Reference	**1**
				Matrix Class	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**	
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**22**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**785646 003**	**785646 007**	**785646 008**	**785646 011**	**785646 012**
				Customer Sample Reference	**BH05**	**BH22**	**BH22**	**BH24A**	**BH05**
				Test Sample	**M40**	**M40**	**M40**	**M40**	**M40**
				Bottom Depth	**2.50**	**1.00**	**3.50**	**2.00**	**1.00**
				Top Depth	**1.50**	**0.00**	**3.00**	**1.50**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH22**	**BH24A**	**BH05**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**8**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Retained on 10mm sieve	Grav	0.1	%	N	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
MCERTS Preparation

Concept Reference	**785646 013**
Customer Sample Reference	**BH20**
Test Sample	**M40**
Bottom Depth	**0.50**
Top Depth	**0.00**
Hole ID	**BH20**
Date Sampled	**12-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Retained on 10mm sieve	Grav	0.1	%	N	<0.1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Heavy Metals(9)

Concept Reference					**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
Customer Sample Reference					**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Test Sample					**A40**	**A40**	**A40**	**A40**	**A40**
Bottom Depth					**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
Top Depth					**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
Hole ID					**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Date Sampled					**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
AGS Type					**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference					**6**	**1**	**8**	**1**	**1**
Matrix Class					**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Boron (water-soluble)	ICP/OES	1	mg/kg	N	<1	<1	<1	<1	<1
Barium	ICP/OES	1	mg/kg	U	**140**	**120**	**67**	**130**	**150**
Beryllium	ICP/OES	2	mg/kg	U	<2	<2	<2	<2	<2
Chromium VI	ICP/OES	1	mg/kg	N	<1	<1	<1	<1	<1
Iron	ICP/OES	1	mg/kg	U	**11000**	**15000**	**12000**	**12000**	**13000**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Heavy Metals(9)

				Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Test Sample	**M40**	**M40**	**M40**	**M40**	**M40**
				Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
				Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Arsenic	ICP/OES	2	mg/kg	M	**5**	**6**	**8**	**4**	**6**
Cadmium	ICP/OES	1	mg/kg	M	<1	<1	<1	<1	<1
Chromium	ICP/OES	1	mg/kg	M	**14**	**18**	**16**	**14**	**18**
Copper	ICP/OES	1	mg/kg	M	**5**	**16**	**6**	**5**	**11**
Mercury	ICP/OES	1	mg/kg	M	<1	<1	<1	<1	<1
Nickel	ICP/OES	1	mg/kg	M	**10**	**14**	**12**	**10**	**13**
Lead	ICP/OES	1	mg/kg	M	**9**	**11**	**7**	**6**	**10**
Selenium	ICP/OES	3	mg/kg	M	<3	<3	<3	<3	<3
Vanadium	ICP/OES	1	mg/kg	M	**20**	**23**	**22**	**19**	**24**
Zinc	ICP/OES	1	mg/kg	M	**31**	**50**	**35**	**24**	**39**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

				Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Test Sample	**A40**	**A40**	**A40**	**A40**	**A40**
				Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
				Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Asbestos ID	PLM			SU	N.D.	N.D.	N.D.	N.D.	N.D.
Sulphur (total)	ICP/OES	0.01	%	M	**0.16**	**0.14**	**0.11**	**0.14**	**0.13**
(Acid Soluble) Sulphate	HCl Extraction/ICP/OES (TRL 447 T2)	0.01	%	M	**0.32**	**0.31**	**0.26**	**0.31**	**0.29**
(Water Soluble) Sulphate expressed as SO4	2:1 Extraction/ICP/OES (TRL 447 T1)	0.01	g/l	M	**0.46**	**0.32**	**0.27**	**0.28**	**0.33**
pH	Probe			M	**8.2**	**8.3**	**8.4**	**8.5**	**8.4**
Soil Organic Matter	Calc TOC/0.58	0.1	%	N	**0.9**	**1.0**	**0.4**	**0.6**	**0.6**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

	Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
	Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
	Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
	Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
	Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
	Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
	Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
	AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
	AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
	Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Cyanide (Total)	Colorimetry	1	mg/kg	M	<1	<1	<1	<1	<1
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**21**	**17**	**18**	**21**	**22**
Benzo(j)fluoranthene	GC/MS	0.1	mg/kg	N	<0.1	<0.1	<0.1	<0.1	<0.1
Dibutyl tin	GC/MS (Deriv.)	0.01	mg/kg	N	<0.01	<0.01	<0.01	<0.01	<0.01
Tributyl tin	GC/MS (Deriv.)	0.01	mg/kg	N	<0.01	**0.02**	<0.01	<0.01	<0.01

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
BTEX

	Concept Reference	**785646 008**
	Customer Sample Reference	**BH22**
	Test Sample	**M105**
	Bottom Depth	**3.50**
	Top Depth	**3.00**
	Hole ID	**BH22**
	Date Sampled	**13-NOV-2018**
	AGS Type	**ES**
	AGS Sample Reference	**8**
	Matrix Class	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**	
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10[13]
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
PCB EC7 and Total

Concept Reference	**785646 008**
Customer Sample Reference	**BH22**
Test Sample	**AR**
Bottom Depth	**3.50**
Top Depth	**3.00**
Hole ID	**BH22**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**8**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Polychlorinated biphenyl BZ#101	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#118	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#138	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#153	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#180	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#28	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#52	GC/MS (SIR)	1	µg/kg	M	<1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference					**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
Customer Sample Reference					**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Test Sample					**AR**	**AR**	**AR**	**AR**	**AR**
Bottom Depth					**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
Top Depth					**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
Hole ID					**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Date Sampled					**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
AGS Type					**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference					**6**	**1**	**8**	**1**	**1**
Matrix Class					**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Polychlorinated biphenyl BZ#77	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#81	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#105	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#114	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#123	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#126	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#156	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#157	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#167	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#169	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#189	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Total and Speciated USEPA16 PAH

Concept Reference	**785646 008**
Customer Sample Reference	**BH22**
Test Sample	**M105**
Bottom Depth	**3.50**
Top Depth	**3.00**
Hole ID	**BH22**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**8**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Coronene	GC/MS	0.1	mg/kg	N	<0.1
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

				Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
				Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	**0.2**
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	**0.2**
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	**0.4**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Total Petroleum Hydrocarbons

				Concept Reference	**785646 008**
				Customer Sample Reference	**BH22**
				Test Sample	**M105**
				Bottom Depth	**3.50**
				Top Depth	**3.00**
				Hole ID	**BH22**
				Date Sampled	**13-NOV-2018**
				AGS Type	**ES**
				AGS Sample Reference	**8**
				Matrix Class	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**	
Total Petroleum Hydrocarbons	GC/FID	1	mg/kg	M	<1[13]
Total Petroleum Hydrocarbons (C35-C40)	GC/FID	1	mg/kg	N	<1[13]

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
TPH UKCWG

Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol					
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20[13,110]	<10[13]	<20[13,110]	<20[110,13]	<10[13]
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<100[110]	<10	<20[110]	<20[110]	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20[110]	<10	<20[110]	<20[110]	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20[110]	<10	<20[110]	<20[110]	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20[110]	<10	<20[110]	<20[110]	<10
Methyl tert-Butyl Ether	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20[110]	<10	<20[110]	<20[110]	<10
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<200[110]	<100	<200[110]	<200[110]	<100
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<200[110]	<100	<200[110]	<200[110]	<100
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<200[110]	<100	<200[110]	<200[110]	<100
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GCxGC	1	mg/kg	M	**5[13]**	<1[13]	<1[13]	<1[13]	<1[13]
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GCxGC	1	mg/kg	M	**3[13]**	<1[13]	<1[13]	<1[13]	<1[13]
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GCxGC	1	mg/kg	M	<1[13]	<1[13]	<1[13]	<1[13]	<1[13]
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GCxGC	2	mg/kg	M	<2[13]	**3[13]**	<2[13]	<2[13]	<2[13]
Total Petroleum Hydrocarbons (Aliphatic) total	Calc		mg/kg	N	**8.0[13]**	**3.0[13]**	N.D.[13]	N.D.[13]	N.D.[13]
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<200[110]	<100	<200[110]	<200[110]	<100
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<200[110]	<100	<200[110]	<200[110]	<100
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<200[110]	<100	<200[110]	<200[110]	<100
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GCxGC	2	mg/kg	M	**4[13]**	<2[13]	<2[13]	<2[13]	<2[13]
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GCxGC	1	mg/kg	M	<1[13]	<1[13]	<1[13]	<1[13]	<1[13]
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GCxGC	1	mg/kg	M	<1[13]	**6[13]**	<1[13]	<1[13]	<1[13]
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GCxGC	1	mg/kg	M	<1[13]	**12[13]**	<1[13]	<1[13]	<1[13]
Total Petroleum Hydrocarbons (Aromatic) total	Calc		mg/kg	N	**4.0[13]**	**18[13]**	N.D.[13]	N.D.[13]	N.D.[13]
Total Petroleum Hydrocarbons (Aliphatic+Aromatic)	Calc		mg/kg	N	**12.0[13]**	**21.0[13]**	N.D.[13]	N.D.[13]	N.D.[13]

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Phenols (Speciated)

Concept Reference					**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
Customer Sample Reference					**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Test Sample					**AR**	**AR**	**AR**	**AR**	**AR**
Bottom Depth					**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
Top Depth					**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
Hole ID					**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
Date Sampled					**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
AGS Type					**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference					**6**	**1**	**8**	**1**	**1**
Matrix Class					**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Resorcinol	HPLC	0.05	mg/kg	SM	<0.05	<0.05	<0.05	<0.05	<0.05
Catechol	HPLC	0.05	mg/kg	SN	-[NR]	-[NR]	-[NR]	-[NR]	-[NR]
Phenol	HPLC	0.1	mg/kg	SM	<0.1	<0.1	<0.1	<0.1	<0.1
Cresols	HPLC	0.05	mg/kg	SM	<0.05	<0.05	<0.05	<0.05	<0.05
Xylenols	HPLC	0.05	mg/kg	SM	<0.06	<0.06	<0.06	<0.06	<0.06
Naphthols	HPLC	0.05	mg/kg	SN	<0.05	<0.05	<0.05	<0.05	<0.05
Trimethyl phenol	HPLC	0.05	mg/kg	SM	<0.05	<0.05	<0.05	<0.05	<0.05
Total Phenols	HPLC	0.1	mg/kg	SN	-[NR]	-[NR]	-[NR]	-[NR]	-[NR]

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Semi-Volatile Organic Compounds (USEPA 625)

				Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
				Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroethyl) ether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chlorophenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroisopropyl) ether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-methyl phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
3/4-Methylphenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachloroethane	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Isophorone	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dimethylphenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroethoxy) methane	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
1,2,4-Trichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1(131)	<0.1(131)	<0.1(131)	<0.1(131)	<0.1(131)
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobutadiene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chloronaphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethyl phthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-Dinitrotoluene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
3-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzofuran	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrotoluene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Diethyl phthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chlorophenyl phenylether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Azobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Bromophenyl phenylether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Carbazole	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-butylphthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	**0.2**
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	**0.2**
Butyl benzylphthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-ethylhexyl)phthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-octylphthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

				Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
				Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	**0.1**
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Soil Analysed as Soil
Volatile Organic Compounds (USEPA 624) (MCERTS)

				Concept Reference	**785646 003**	**785646 007**	**785646 011**	**785646 012**	**785646 013**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**2.50**	**1.00**	**2.00**	**1.00**	**0.50**
				Top Depth	**1.50**	**0.00**	**1.50**	**0.00**	**0.00**
				Hole ID	**BH05**	**BH22**	**BH24A**	**BH05**	**BH20**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**8**	**1**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Dichlorodifluoromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Chloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
Vinyl chloride monomer	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Bromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
Chloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Trichlorofluoromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Dichloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
Trans-1,2-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1-Dichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Cis-1,2-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
2,2-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
Chloroform	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Bromochloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1,1-Trichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Carbon tetrachloride	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,2-Dichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(13,110)	<10(13)	<20(13,110)	<20(110,13)	<10(13)
1,2-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Trichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Bromodichloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Dibromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Cis-1,3-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<100(110)	<10	<20(110)	<20(110)	<10
Trans-1,3-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1,2-Trichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,3-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Tetrachloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Chlorodibromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,2-dibromoethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Chlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1,1,2-Tetrachloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<10	<20(110)	<20(110)	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<10	<20(110)	<20(110)	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<10	<20(110)	<20(110)	<10
Styrene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
Bromoform	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Isopropyl benzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,1,2,2-Tetrachloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
1,2,3-Trichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
n-Propylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Bromobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,3,5-Trimethylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Tert-Butylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,2,4-Trimethylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
Sec-Butylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
p-Isopropyltoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
2-Chlorotoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
4-Chlorotoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<100(110)	<50	<100(110)	<100(110)	<50
1,3-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,4-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50
1,2-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<100(110)	<50	<100(110)	<100(110)	<50

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Waste Acceptance Criteria

Concept Reference	**785646 008**
Customer Sample Reference	**BH22**
Test Sample	**10:1**
Bottom Depth	**3.50**
Top Depth	**3.00**
Hole ID	**BH22**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**8**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**6.2**
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**66**
Molybdenum (Dissolved)	ICP/MS (Filtered)	1	µg/l	N	**6**
Total Dissolved Solids	Grav	100	mg/l	N	**1100**
Phenols (Total-Mono)	Colorimetry	0.1	mg/l	U	<0.1
Dissolved Organic Carbon	OX/IR	1	mg/l	N	**2**
Electrical Conductivity	Probe	10	µS/cm	N	**1800**
Antimony (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**4**
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	<0.02
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**1**
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	**0.5**
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	<0.3
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<1
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<0.5
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	<2
Chloride	Discrete Analyser	1	mg/l	U	**500**
Fluoride	Discrete Analyser	0.05	mg/l	U	**0.12**
Sulphate	Discrete Analyser	0.5	mg/l	U	**78**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Special Waste Leachate Suite - Clause 15.7

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
pH	Probe			U	**7.75**	**7.74**	**7.66**
Sulphate	Discrete Analyser	0.5	mg/l	U	**100**	**78**	**96**
Chloride	Discrete Analyser	1	mg/l	U	**730**	**500**	**590**
Ammonia expressed as N	Discrete Analyser	0.05	mg/l	U	<0.05	**0.06**	**0.05**
Nitrate	Discrete Analyser	0.5	mg/l	U	**1.1**	**1.3**	**1.1**
Nitrite	Discrete Analyser	0.1	mg/l	U	<0.1	<0.1	<0.1
orthophosphate	Discrete Analyser	0.5	mg/l	N	<0.5	<0.5	<0.5
Cyanide (Total)	Colorimetry	0.05	mg/l	U	<0.05	<0.05	<0.05
Benzo(j)fluoranthene	GC/MS (SIR)	0.01	mg/l	N	<0.01(13)	<0.01(13)	<0.01(13)
Dibutyl tin	GC/MS (Deriv.)	0.01	µg/l	N	<0.01	<0.01	<0.01
Tributyl tin	GC/MS (Deriv.)	0.01	µg/l	N	<0.01	<0.01	<0.01

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Metals ICP MS

				Concept Reference	**785646 003**	**785646 008**	**785646 011**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**
				Test Sample	**10:1**	**10:1**	**10:1**
				Bottom Depth	**2.50**	**3.50**	**2.00**
				Top Depth	**1.50**	**3.00**	**1.50**
				Hole ID	**BH05**	**BH22**	**BH24A**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**8**	**8**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**2.2**	**6.2**	**4.0**
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	<0.02	<0.02	<0.02
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**1**	**1**	**1**
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<0.5	**0.5**	**0.6**
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<1	<1	**1**
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	<0.3	<0.3	**0.8**
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	<2	<2	<2
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05	<0.05	<0.05
Vanadium (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	**3**	**6**	**5**
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<0.5	<0.5	<0.5
Manganese (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**1**	**3**	**1**
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**42**	**66**	**38**
Beryllium (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05	<0.05	<0.05

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Metals ICP OES

				Concept Reference	**785646 003**	**785646 008**	**785646 011**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**
				Test Sample	**10:1**	**10:1**	**10:1**
				Bottom Depth	**2.50**	**3.50**	**2.00**
				Top Depth	**1.50**	**3.00**	**1.50**
				Hole ID	**BH05**	**BH22**	**BH24A**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**8**	**8**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Calcium	ICP/OES	0.1	mg/l	N	**37**	**24**	**28**
Sodium	ICP/OES	0.1	mg/l	N	**440**	**290**	**320**
Magnesium	ICP/OES	0.1	mg/l	N	**46**	**29**	**35**
Potassium	ICP/OES	0.1	mg/l	N	**19**	**14**	**16**
Aluminium	ICP/OES	0.02	mg/l	U	**0.08**	**0.10**	**0.10**
Chromium VI	Discrete Analyser	0.003	mg/l	U	<0.003	<0.003	<0.003
Boron	ICP/OES	0.01	mg/l	N	**0.30**	**0.22**	**0.25**
Iron	ICP/OES	0.01	mg/l	U	<0.01	<0.01	<0.01

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

PAH US EPA 16 (B and K split)

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Naphthalene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Acenaphthylene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Acenaphthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Fluorene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Phenanthrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Benzo(a)Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Chrysene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Benzo(b)fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Benzo(k)fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Benzo(a)Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Indeno(123-cd)Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Dibenzo(ah)Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Benzo(ghi)Perylene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)	<0.01(13)	<0.01(13)
Polyaromatic Hydrocarbons (Total)	GC/MS (SIR)	0.01	µg/l	U	<0.01	<0.01	<0.01

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

TPH (CWG)

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (Aliphatic) total	Calc		mg/l	N	N.D.[13]	N.D.[13]	N.D.[13]
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GCxGC (LV)	0.01	mg/l	N	**0.01[13]**	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	**0.01[13]**
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (Aromatic) total	Calc		mg/l	N	**0.01[13]**	N.D.[13]	**0.01[13]**
Total Petroleum Hydrocarbons (Aliphatic+Aromatic)	Calc		mg/l	N	**0.01[13]**	N.D.[13]	**0.01[13]**

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Phenols (Speciated)

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Catechol	HPLC	0.005	mg/l	N	<0.005	<0.005	<0.005
Cresols	HPLC	0.005	mg/l	N	<0.005	<0.005	<0.005
Naphthols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01
Phenol	HPLC	0.005	mg/l	N	<0.005[13]	<0.005[13]	<0.005[13]
Resorcinol	HPLC	0.005	mg/l	N	<0.005	<0.005	<0.005
Total Phenols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01
Trimethyl phenols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01
Xylenols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Polychlorinated biphenyl BZ#81	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#77	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#105	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#114	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#118	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#123	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#126	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#156	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#157	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#167	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#169	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#189	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

SVOC (USEPA 625) (B and K split)

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Phenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Bis (2-chloroethyl) ether	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2-Chlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
1,3-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
1,4-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
1,2-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Bis (2-chloroisopropyl) ether	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2-methyl phenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
3/4-Methylphenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Hexachloroethane	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Nitrobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Isophorone	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2-Nitrophenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2,4-Dimethylphenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Bis (2-chloroethoxy) methane	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2,4-Dichlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
1,2,4-Trichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Naphthalene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
4-Chloroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Hexachlorobutadiene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
4-Chloro-3-methylphenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2-Methylnaphthalene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Hexachlorocyclopentadiene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2,4,6-Trichlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2,4,5-Trichlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2-Chloronaphthalene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2-Nitroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Dimethyl phthalate	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2,6-Dinitrotoluene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Acenaphthylene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Acenaphthene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
3-Nitroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Dibenzofuran	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
2,4-Dinitrotoluene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Diethyl phthalate	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Fluorene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
4-Chlorophenyl phenylether	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
4-Nitroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Azobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
4-Bromophenyl phenylether	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Hexachlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Pentachlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Phenanthrene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Anthracene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Carbazole	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Di-n-butylphthalate	GC/MS (1l ext.)	1	µg/l	SU	<2	<2	<2
Fluoranthene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Pyrene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Butyl benzylphthalate	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Benzo(a)Anthracene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Chrysene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Bis (2-ethylhexyl)phthalate	GC/MS (1l ext.)	1	µg/l	SU	<5	<5	<5
Di-n-octylphthalate	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

SVOC (USEPA 625) (B and K split)

				Concept Reference	**785646 003**	**785646 008**	**785646 011**
				Customer Sample Reference	**BH05**	**BH22**	**BH24A**
				Test Sample	**10:1**	**10:1**	**10:1**
				Bottom Depth	**2.50**	**3.50**	**2.00**
				Top Depth	**1.50**	**3.00**	**1.50**
				Hole ID	**BH05**	**BH22**	**BH24A**
				Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**8**	**8**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Benzo(a)Pyrene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Indeno(123-cd)Pyrene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Dibenzo(ah)Anthracene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Benzo(ghi)Perylene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Benzo(b)fluoranthene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1
Benzo(k)fluoranthene	GC/MS (1l ext.)	1	µg/l	SU	<1	<1	<1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Volatile Organic Compounds (USEPA 624)

Concept Reference	**785646 003**	**785646 008**	**785646 011**
Customer Sample Reference	**BH05**	**BH22**	**BH24A**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.50**	**3.50**	**2.00**
Top Depth	**1.50**	**3.00**	**1.50**
Hole ID	**BH05**	**BH22**	**BH24A**
Date Sampled	**11-NOV-2018**	**13-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**8**	**8**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Dichlorodifluoromethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chloromethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Vinyl chloride monomer	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromomethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Trichlorofluoromethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Dichloromethane	GC/MS (Headspace)	50	µg/l	N	<50	<50	<50
Trans-1,2-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1-Dichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Cis-1,2-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
2,2-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chloroform	GC/MS (Headspace)	1	µg/l	U	**22**[13]	<1	**12**
Bromochloromethane	GC/MS (Headspace)	1	µg/l	U	**4**	<1	**2**
1,1,1-Trichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Carbon tetrachloride	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2-Dichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Benzene	GC/MS (Headspace)	1	µg/l	U	<1[13]	<1[13]	<1[13]
1,2-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,2-Trichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromodichloromethane	GC/MS (Headspace)	1	µg/l	U	**2**	<1	**3**
Dibromomethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Cis-1,3-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Toluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Trans-1,3-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,2-Trichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,3-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Tetrachloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chlorodibromomethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2-dibromoethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,1,2-Tetrachloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
EthylBenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Meta/Para-Xylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Ortho-Xylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Styrene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromoform	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Isopropyl benzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,2,2-Tetrachloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2,3-Trichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
n-Propylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,3,5-Trimethylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Tert-Butylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2,4-Trimethylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Sec-Butylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
p-Isopropyltoluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
2-Chlorotoluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
4-Chlorotoluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,3-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,4-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

				Concept Reference	**785646 001**	**785646 002**	**785646 004**	**785646 005**	**785646 006**
				Customer Sample Reference	**BH05**	**BH05**	**BH20**	**BH20**	**BH20**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**1.00**	**1.50**	**0.50**	**1.00**	**2.00**
				Top Depth	**0.00**	**1.00**	**0.00**	**0.50**	**1.50**
				Hole ID	**BH05**	**BH05**	**BH20**	**BH20**	**BH20**
				Date Sampled	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**	**12-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**4**	**1**	**4**	**8**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Arsenic (Total)	ICP/MS (Total)	1.0	mg/kg	N	**5.5**	**6.2**	**6.9**	**17**	**6.1**
Cadmium (Total)	ICP/MS (Total)	0.05	mg/kg	N	**0.11**	<0.05	**0.06**	**0.13**	<0.05
Chromium (Total)	ICP/MS (Total)	0.2	mg/kg	N	**26**	**36**	**60**	**95**	**25**
Copper (Total)	ICP/MS (Total)	0.1	mg/kg	N	**4.3**	**6.8**	**7.9**	**19**	**8.1**
Mercury	CVAFS	0.01	mg/kg	N	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (Total)	ICP/MS (Total)	0.2	mg/kg	N	**10**	**10**	**14**	**31**	**10**
Nickel (Total)	ICP/MS (Total)	0.2	mg/kg	N	**13**	**12**	**16**	**41**	**12**
Zinc	ICP/MS (HF)	1	mg/kg	N	**62**	**50**	**53**	**100**	**35**
Tributyl tin	GC/MS	10	µg/kg	N	<10	<10	<10	<10	<10
Dibutyl tin	GC/MS	10	µg/kg	N	<10	<10	<10	<10	<10
Total Organic Carbon	OX/IR	0.1	%	N	**0.4**	**0.3**	**0.5**	**0.5**	**0.5**
Dry solids @105C	Grav (1 Dec) (105 C)	0.1	%	N	**79**	**78**	**74**	**73**	**76**
Dry solids @40C	Grav (1 Dec) (40 C)	0.1	%	N	**77**	**77**	**74**	**80**	**76**
Gasoline Range Organics (C5-C10)	GC/MS (Headspace)	10	µg/kg	N	<10	<10	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C12-C16)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C16-C21)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C21-C35)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C40-C44)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Poly-Chlorinated Biphenyls (Total Tri-Hepta)	GC/MS (HR)	1.4	µg/kg	U	<1.4(3)	<1.4(3)	<1.4(3)	<1.4(3)	<1.4(3)

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

Concept Reference	**785646 009**	**785646 010**
Customer Sample Reference	**BH24A**	**BH24A**
Test Sample	**AR**	**AR**
Bottom Depth	**0.50**	**1.00**
Top Depth	**0.00**	**0.50**
Hole ID	**BH24A**	**BH24A**
Date Sampled	**11-NOV-2018**	**11-NOV-2018**
AGS Type	**ES**	**ES**
AGS Sample Reference	**1**	**4**

Determinand	Method	LOD	Units	Symbol		
Arsenic (Total)	ICP/MS (Total)	1.0	mg/kg	N	**6.9**	**8.0**
Cadmium (Total)	ICP/MS (Total)	0.05	mg/kg	N	**0.06**	<0.05
Chromium (Total)	ICP/MS (Total)	0.2	mg/kg	N	**30**	**34**
Copper (Total)	ICP/MS (Total)	0.1	mg/kg	N	**8.2**	**7.3**
Mercury	CVAFS	0.01	mg/kg	N	**0.01**	<0.01
Lead (Total)	ICP/MS (Total)	0.2	mg/kg	N	**12**	**13**
Nickel (Total)	ICP/MS (Total)	0.2	mg/kg	N	**14**	**17**
Zinc	ICP/MS (HF)	1	mg/kg	N	**49**	**44**
Tributyl tin	GC/MS	10	µg/kg	N	<10	<10
Dibutyl tin	GC/MS	10	µg/kg	N	<10	<10
Total Organic Carbon	OX/IR	0.1	%	N	**0.5**	**0.6**
Dry solids @105C	Grav (1 Dec) (105 C)	0.1	%	N	**79**	**88**
Dry solids @40C	Grav (1 Dec) (40 C)	0.1	%	N	**79**	**89**
Gasoline Range Organics (C5-C10)	GC/MS (Headspace)	10	µg/kg	N	<10	<10
Total Petroleum Hydrocarbons (C10-C12)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0
Total Petroleum Hydrocarbons (C12-C16)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0
Total Petroleum Hydrocarbons (C16-C21)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0
Total Petroleum Hydrocarbons (C21-C35)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0
Total Petroleum Hydrocarbons (C40-C44)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0
Poly-Chlorinated Biphenyls (Total Tri-Hepta)	GC/MS (HR)	1.4	µg/kg	U	<1.4[3]	<1.4[3]

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**785646 001**	**785646 002**	**785646 004**	**785646 005**	**785646 006**
				Customer Sample Reference	**BH05**	**BH05**	**BH20**	**BH20**	**BH20**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**1.00**	**1.50**	**0.50**	**1.00**	**2.00**
				Top Depth	**0.00**	**1.00**	**0.00**	**0.50**	**1.50**
				Hole ID	**BH05**	**BH05**	**BH20**	**BH20**	**BH20**
				Date Sampled	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**	**12-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**4**	**1**	**4**	**8**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Naphthalene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Acenaphthylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Acenaphthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Fluorene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Phenanthrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(a)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Chrysene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(a)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Indeno(123-cd)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(ghi)Perylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(b)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(k)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Dibenzo(ah)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Polyaromatic Hydrocarbons (Total)	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**785646 009**	**785646 010**
				Customer Sample Reference	**BH24A**	**BH24A**
				Test Sample	**AR**	**AR**
				Bottom Depth	**0.50**	**1.00**
				Top Depth	**0.00**	**0.50**
				Hole ID	**BH24A**	**BH24A**
				Date Sampled	**11-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**
				AGS Sample Reference	**1**	**4**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Naphthalene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Acenaphthylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Acenaphthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Fluorene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Phenanthrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(a)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Chrysene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(a)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Indeno(123-cd)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(ghi)Perylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(b)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(k)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Dibenzo(ah)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Polyaromatic Hydrocarbons (Total)	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**785646 001**	**785646 002**	**785646 004**	**785646 005**	**785646 006**
				Customer Sample Reference	**BH05**	**BH05**	**BH20**	**BH20**	**BH20**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**1.00**	**1.50**	**0.50**	**1.00**	**2.00**
				Top Depth	**0.00**	**1.00**	**0.00**	**0.50**	**1.50**
				Hole ID	**BH05**	**BH05**	**BH20**	**BH20**	**BH20**
				Date Sampled	**11-NOV-2018**	**11-NOV-2018**	**12-NOV-2018**	**12-NOV-2018**	**12-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**4**	**1**	**4**	**8**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.10	µg/kg	U	<0.50[3]	<0.50[3]	<0.50[3]	<0.50[3]	<0.50[3]
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]	<0.5[3]
PCB EC7 (Sum)	Calc	0.7	µg/kg	N	<0.7[3]	<0.7[3]	<0.7[3]	<0.7[3]	<0.7[3]

Concept Reference: 785646
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_181611_REV

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**785646 009**	**785646 010**
				Customer Sample Reference	**BH24A**	**BH24A**
				Test Sample	**AR**	**AR**
				Bottom Depth	**0.50**	**1.00**
				Top Depth	**0.00**	**0.50**
				Hole ID	**BH24A**	**BH24A**
				Date Sampled	**11-NOV-2018**	**11-NOV-2018**
				AGS Type	**ES**	**ES**
				AGS Sample Reference	**1**	**4**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.10	µg/kg	U	<0.50[3]	<0.50[3]
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.1	µg/kg	U	<0.5[3]	<0.5[3]
PCB EC7 (Sum)	Calc	0.7	µg/kg	N	<0.7[3]	<0.7[3]

Index to symbols used in 785646-2

Value	Description
A40	Assisted dried < 40C
10:1 S	Data for BS EN 12457-2 (10:1)
AR	As Received
10:1	Leachate to BS EN 12457-2 (10:1)
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
N.D.	Not Detected
13	Results have been blank corrected.
131	Result is outside of the scope of accreditation due to a QC Failure
110	LOD raised due to low internal standard recovery.
3	LOD Raised Due to Elevated Blank
NR	No Result
S	Analysis was subcontracted

M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Speciated Phenols (leachate) were transferred to Concept Braintree.
Speciated Phenols (soils) were subcontracted to Exova Jones.
SVOC (leachate) was subcontracted to Exova Jones.
Asbestos was subcontracted to REC Asbestos.
Please Note: The recoveries in several samples for PCB EC7 HR and PCB Who12 HR are low, however the S/N is >20:1, therefore the data is considered valid.
These samples have been analysed exceeding recommended holding times for pH, TPH, PAH, PCB, VOC and SVOC. It is possible therefore that the results provided may be compromised.

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

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Concept Life Sciences

Certificate of Analysis

Hadfield House
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Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 785568-2

Date of Report: 22-Jan-2019

Customer: Fugro GeoServices
Fugro House
Hithercroft Road
Wallingford
Oxfordshire
OX10 9RB

Customer Contact: Ms Karen Blackmore

Customer Job Reference: G180030U, CoC_BH23-BH21-BH09_REV
Customer Purchase Order: 74376KB-WAL
Customer Site Reference: St Ola Pier, Scrabster
Date Job Received at Concept: 15-Nov-2018
Date Analysis Started: 28-Nov-2018
Date Analysis Completed: 22-Jan-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

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Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aleksandra Pacula
Senior Customer Service Advisor

Issued by : [Redacted]
Aleksandra Pacula
Senior Customer Ser Advisor

Waste Acceptance Criteria

Customer Sample Reference : BH21
Our Sample Reference : 785568 005
Project Site : St Ola Pier, Scrabster
Customer Reference : G180030U, CoC_BH23-BH21-BH09_REV
Empty Dish Weight : 0
Wet Sample in Dish Weight : 100
Hole ID : BH21
Top Depth : 1.50
Bottom Depth : 2.00
Test Portion Mass (g) : 175
Sample in Dish @ 105C : 80.2
Date Sampled : 13-NOV-2018
AGS Type : ES
AGS Sample Reference : 6
Matrix Class : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
PCB EC7 (Sum)	Calc	0.007	mg/kg	M	<0.007	1.0		
Acid Neutralising Capacity (pH 4)	Titration	2	Mol/kg	N	<2			
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
Loss on Ignition	Grav	0.1	%	N	**1.0**			10.0
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
pH	Probe			M	**8.9**		> 6.0	
Total Organic Carbon	OX/IR	0.1	%	N	**0.3**	3.0	5.0	6.0
Total Petroleum Hydrocarbons C10-C40 (Sum)	Calc	1	mg/kg	N	(13) <1	500.0		

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.036**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.71**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	**0.0011**	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**4000**	**800.0**	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.034**	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.095**	2.0	50.0	100.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**19**	500.0	800.0	1000.0
Fluoride	Calc (W)	0.50	mg/kg	N	**2.0**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	**0.017**	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.029**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	**0.11**	0.4	10.0	40.0
Phenols (Total-Mono)	Calc	1.0	mg/kg	N	<1.0	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
Sulphate	Calc (W)	5	mg/kg	N	**820**	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	1000	mg/kg	N	**9600**	**4000.0**	60000.0	100000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	**1.1**	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

*** Waste Sampling and Testing for Disposal at Landfill, EBPRI 11507B, Environment Agency (England and Wales) March 2013**

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**785568 004**	**785568 005**
				Customer Sample Reference	**BH21**	**BH21**
				Test Sample	**AR**	**AR**
				Hole ID	**BH21**	**BH21**
				Top Depth	**0.00**	**1.50**
				Bottom Depth	**0.50**	**2.00**
				Date Sampled	**13-NOV-2018**	**13-NOV-2018**
				AGS Type	**ES**	**ES**
				AGS Sample Reference	**1**	**6**
				Matrix Class	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**22**	**20**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**785568 004**	**785568 005**
				Customer Sample Reference	**BH21**	**BH21**
				Test Sample	**M40**	**M40**
				Hole ID	**BH21**	**BH21**
				Top Depth	**0.00**	**1.50**
				Bottom Depth	**0.50**	**2.00**
				Date Sampled	**13-NOV-2018**	**13-NOV-2018**
				AGS Type	**ES**	**ES**
				AGS Sample Reference	**1**	**6**
				Matrix Class	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Retained on 10mm sieve	Grav	0.1	%	N	<0.1	<0.1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Heavy Metals(9)

				Concept Reference	**785568 004**
				Customer Sample Reference	**BH21**
				Test Sample	**A40**
				Hole ID	**BH21**
				Top Depth	**0.00**
				Bottom Depth	**0.50**
				Date Sampled	**13-NOV-2018**
				AGS Type	**ES**
				AGS Sample Reference	**1**
				Matrix Class	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**	
Boron (water-soluble)	ICP/OES	1	mg/kg	N	<1
Barium	ICP/OES	1	mg/kg	U	**120**
Beryllium	ICP/OES	2	mg/kg	U	<2
Chromium VI	ICP/OES	1	mg/kg	N	<1
Iron	ICP/OES	1	mg/kg	U	**290**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Heavy Metals(9)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**M40**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Arsenic	ICP/OES	2	mg/kg	M	**12**
Cadmium	ICP/OES	1	mg/kg	M	<1
Chromium	ICP/OES	1	mg/kg	M	**22**
Copper	ICP/OES	1	mg/kg	M	**18**
Mercury	ICP/OES	1	mg/kg	M	<1
Nickel	ICP/OES	1	mg/kg	M	**18**
Lead	ICP/OES	1	mg/kg	M	**19**
Selenium	ICP/OES	3	mg/kg	M	<3
Vanadium	ICP/OES	1	mg/kg	M	**31**
Zinc	ICP/OES	1	mg/kg	M	**67**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**A40**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Asbestos ID	PLM			SU	N.D.
Sulphur (total)	ICP/OES	0.01	%	M	**0.02**
(Acid Soluble) Sulphate	HCl Extraction/ICP/OES (TRL 447 T2)	0.01	%	M	**0.20**
(Water Soluble) Sulphate expressed as SO4	2:1 Extraction/ICP/OES (TRL 447 T1)	0.01	g/l	M	**0.47**
pH	Probe			M	**8.4**
Soil Organic Matter	Calc TOC/0.58	0.1	%	N	**1.1**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**AR**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Cyanide (Total)	Colorimetry	1	mg/kg	M	<1
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**22**
Benzo(j)fluoranthene	GC/MS	0.1	mg/kg	N	<0.1
Dibutyl tin	GC/MS (Deriv.)	0.01	mg/kg	N	<0.01
Tributyl tin	GC/MS (Deriv.)	0.01	mg/kg	N	<0.01

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
BTEX

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10[13]
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
PCB EC7 and Total

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**AR**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Polychlorinated biphenyl BZ#101	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#118	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#138	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#153	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#180	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#28	GC/MS (SIR)	1	µg/kg	M	<1
Polychlorinated biphenyl BZ#52	GC/MS (SIR)	1	µg/kg	M	<1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**AR**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Polychlorinated biphenyl BZ#77	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#81	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#105	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#114	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#123	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#126	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#156	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#157	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#167	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#169	GC/MS (HR)	0.05	µg/kg	U	<0.05
Polychlorinated biphenyl BZ#189	GC/MS (HR)	0.05	µg/kg	U	<0.05

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Total and Speciated USEPA16 PAH

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.1**
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	**0.1**
Coronene	GC/MS	0.1	mg/kg	N	<0.1
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.4**
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.3**
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Benzo(b)fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.1**
Benzo(k)fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	**1.8**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Total Petroleum Hydrocarbons

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Total Petroleum Hydrocarbons	GC/FID	1	mg/kg	M	<1[13]
Total Petroleum Hydrocarbons (C35-C40)	GC/FID	1	mg/kg	N	<1[13]

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
TPH UKCWG

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10[13]
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Methyl tert-Butyl Ether	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<100
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<100
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<100
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GCxGC	1	mg/kg	M	<1[13]
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GCxGC	1	mg/kg	M	**1[13]**
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GCxGC	1	mg/kg	M	**4[13]**
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GCxGC	2	mg/kg	M	**5[13]**
Total Petroleum Hydrocarbons (Aliphatic) total	Calc		mg/kg	N	**10[13]**
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<100
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<100
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS (Head Space)(MCERTS)	100	µg/kg	N	<100
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GCxGC	2	mg/kg	M	<2[13]
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GCxGC	1	mg/kg	M	<1[13]
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GCxGC	1	mg/kg	M	<1[13]
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GCxGC	1	mg/kg	M	<1[13]
Total Petroleum Hydrocarbons (Aromatic) total	Calc		mg/kg	N	N.D.[13]
Total Petroleum Hydrocarbons (Aliphatic+Aromatic)	Calc		mg/kg	N	**10.0[13]**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Phenols (Speciated)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**AR**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Resorcinol	HPLC	0.05	mg/kg	SM	<0.05
Catechol	HPLC	0.05	mg/kg	SN	-[NR]
Phenol	HPLC	0.1	mg/kg	SM	<0.1
Cresols	HPLC	0.05	mg/kg	SM	<0.05
Xylenols	HPLC	0.05	mg/kg	SM	<0.06
Naphthols	HPLC	0.05	mg/kg	SN	<0.05
Trimethyl phenol	HPLC	0.05	mg/kg	SM	<0.05
Total Phenols	HPLC	0.1	mg/kg	SN	-[NR]

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Semi-Volatile Organic Compounds (USEPA 625)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Bis (2-chloroethyl) ether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
2-Chlorophenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
1,3-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
1,4-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
1,2-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Bis (2-chloroisopropyl) ether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
2-methyl phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
3/4-Methylphenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Hexachloroethane	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Nitrobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Isophorone	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
2-Nitrophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
2,4-Dimethylphenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Bis (2-chloroethoxy) methane	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
2,4-Dichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
1,2,4-Trichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1 (131)
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
4-Chloroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Hexachlorobutadiene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
4-Chloro-3-methylphenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
2-Methylnaphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Hexachlorocyclopentadiene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.3 (162,131)
2,4,6-Trichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
2,4,5-Trichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
2-Chloronaphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
2-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Dimethyl phthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
2,6-Dinitrotoluene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
3-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Dibenzofuran	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
2,4-Dinitrotoluene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Diethyl phthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
4-Chlorophenyl phenylether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
4-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Azobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
4-Bromophenyl phenylether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Hexachlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Pentachlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Carbazole	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Di-n-butylphthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.4**
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.3**
Butyl benzylphthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Bis (2-ethylhexyl)phthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Di-n-octylphthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.3**
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	**0.2**
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Soil Analysed as Soil
Volatile Organic Compounds (USEPA 624) (MCERTS)

Concept Reference	**785568 004**
Customer Sample Reference	**BH21**
Test Sample	**M105**
Hole ID	**BH21**
Top Depth	**0.00**
Bottom Depth	**0.50**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Dichlorodifluoromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Chloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
Vinyl chloride monomer	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Bromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
Chloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Trichlorofluoromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Dichloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
Trans-1,2-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1-Dichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Cis-1,2-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
2,2-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
Chloroform	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Bromochloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1,1-Trichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Carbon tetrachloride	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,2-Dichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10[13]
1,2-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Trichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Bromodichloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Dibromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Cis-1,3-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Trans-1,3-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1,2-Trichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,3-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Tetrachloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Chlorodibromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,2-dibromoethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Chlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1,1,2-Tetrachloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10
Styrene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
Bromoform	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Isopropyl benzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,1,2,2-Tetrachloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
1,2,3-Trichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
n-Propylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Bromobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,3,5-Trimethylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Tert-Butylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,2,4-Trimethylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
Sec-Butylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
p-Isopropyltoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
2-Chlorotoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
4-Chlorotoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50
1,3-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,4-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50
1,2-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Waste Acceptance Criteria

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**3.6**
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**71**
Molybdenum (Dissolved)	ICP/MS (Filtered)	1	µg/l	N	**3**
Total Dissolved Solids	Grav	100	mg/l	N	**960**
Phenols (Total-Mono)	Colorimetry	0.1	mg/l	U	<0.1
Dissolved Organic Carbon	OX/IR	1	mg/l	N	**2**
Electrical Conductivity	Probe	10	µS/cm	N	**1600**
Antimony (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<1
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	**0.11**
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**3**
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	**9.5**
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	**1.7**
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**3**
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<0.5
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	**110**
Chloride	Discrete Analyser	1	mg/l	U	**400**
Fluoride	Discrete Analyser	0.05	mg/l	U	**0.20**
Sulphate	Discrete Analyser	0.5	mg/l	U	**82**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Metals ICP MS

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**3.6**
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	**0.11**
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**3**
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	**9.5**
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**3**
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	**1.7**
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	**110**
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05
Vanadium (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	**2**
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<0.5
Manganese (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**16**
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**71**
Beryllium (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Metals ICP OES

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Calcium	ICP/OES	0.1	mg/l	N	**30**
Sodium	ICP/OES	0.1	mg/l	N	**230**
Magnesium	ICP/OES	0.1	mg/l	N	**26**
Potassium	ICP/OES	0.1	mg/l	N	**12**
Aluminium	ICP/OES	0.02	mg/l	U	**0.06**
Chromium VI	Discrete Analyser	0.003	mg/l	U	<0.003
Boron	ICP/OES	0.01	mg/l	N	**0.20**
Iron	ICP/OES	0.01	mg/l	U	<0.01

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Special Waste Leachate Suite - Clause 15.7

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
pH	Probe			U	**7.70**
Sulphate	Discrete Analyser	0.5	mg/l	U	**82**
Chloride	Discrete Analyser	1	mg/l	U	**400**
Ammonia expressed as N	Discrete Analyser	0.05	mg/l	U	<0.05
Nitrate	Discrete Analyser	0.5	mg/l	U	**5.0**
Nitrite	Discrete Analyser	0.1	mg/l	U	<0.1
orthophosphate	Discrete Analyser	0.5	mg/l	N	<0.5
Cyanide (Total)	Colorimetry	0.05	mg/l	U	<0.05
Benzo(j)fluoranthene	GC/MS (SIR)	0.01	mg/l	N	<0.01[13]
Dibutyl tin	GC/MS (Deriv.)	0.01	µg/l	N	<0.01
Tributyl tin	GC/MS (Deriv.)	0.01	µg/l	N	<0.01

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

PAH US EPA 16 (B and K split)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Naphthalene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Acenaphthylene	GC/MS (SIR)	0.01	µg/l	U	**0.01(13)**
Acenaphthene	GC/MS (SIR)	0.01	µg/l	U	**0.01(13)**
Fluorene	GC/MS (SIR)	0.01	µg/l	U	**0.01(13)**
Phenanthrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Benzo(a)Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Chrysene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Benzo(b)fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Benzo(k)fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Benzo(a)Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Indeno(123-cd)Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Dibenzo(ah)Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Benzo(ghi)Perylene	GC/MS (SIR)	0.01	µg/l	U	<0.01(13)
Polyaromatic Hydrocarbons (Total)	GC/MS (SIR)	0.01	µg/l	U	**0.03**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

TPH (CWG)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]
Total Petroleum Hydrocarbons (Aliphatic) total	Calc		mg/l	N	N.D.[13]
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GCxGC (LV)	0.01	mg/l	N	**0.05[13]**
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GCxGC (LV)	0.01	mg/l	N	**0.01[13]**
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]
Total Petroleum Hydrocarbons (Aromatic) total	Calc		mg/l	N	**0.06[13]**
Total Petroleum Hydrocarbons (Aliphatic+Aromatic)	Calc		mg/l	N	**0.06[13]**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Polychlorinated biphenyl BZ#81	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#77	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#105	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#114	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#118	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#123	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#126	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#156	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#157	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#167	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#169	GC/MS	0.005	µg/l	U	<0.005
Polychlorinated biphenyl BZ#189	GC/MS	0.005	µg/l	U	<0.005

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Phenols (Speciated)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Catechol	HPLC	0.005	mg/l	N	<0.005
Cresols	HPLC	0.005	mg/l	N	<0.005
Naphthols	HPLC	0.01	mg/l	N	<0.01
Phenol	HPLC	0.005	mg/l	N	<0.005(13)
Resorcinol	HPLC	0.005	mg/l	N	<0.005
Total Phenols	HPLC	0.01	mg/l	N	<0.01
Trimethyl phenols	HPLC	0.01	mg/l	N	<0.01
Xylenols	HPLC	0.01	mg/l	N	<0.01

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

SVOC (USEPA 625) (B and K split)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Phenol	GC/MS (1l ext.)	1	µg/l	SU	<1
Bis (2-chloroethyl) ether	GC/MS (1l ext.)	1	µg/l	SU	<1
2-Chlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1
1,3-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
1,4-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
1,2-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
Bis (2-chloroisopropyl) ether	GC/MS (1l ext.)	1	µg/l	SU	<1
2-methyl phenol	GC/MS (1l ext.)	1	µg/l	SU	<1
3/4-Methylphenol	GC/MS (1l ext.)	1	µg/l	SU	<1
Hexachloroethane	GC/MS (1l ext.)	1	µg/l	SU	<1
Nitrobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
Isophorone	GC/MS (1l ext.)	1	µg/l	SU	<1
2-Nitrophenol	GC/MS (1l ext.)	1	µg/l	SU	<1
2,4-Dimethylphenol	GC/MS (1l ext.)	1	µg/l	SU	<1
Bis (2-chloroethoxy) methane	GC/MS (1l ext.)	1	µg/l	SU	<1
2,4-Dichlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1
1,2,4-Trichlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
Naphthalene	GC/MS (1l ext.)	1	µg/l	SU	<1
4-Chloroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1
Hexachlorobutadiene	GC/MS (1l ext.)	1	µg/l	SU	<1
4-Chloro-3-methylphenol	GC/MS (1l ext.)	1	µg/l	SU	<1
2-Methylnaphthalene	GC/MS (1l ext.)	1	µg/l	SU	<1
Hexachlorocyclopentadiene	GC/MS (1l ext.)	1	µg/l	SU	<1
2,4,6-Trichlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1
2,4,5-Trichlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1
2-Chloronaphthalene	GC/MS (1l ext.)	1	µg/l	SU	<1
2-Nitroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1
Dimethyl phthalate	GC/MS (1l ext.)	1	µg/l	SU	<1
2,6-Dinitrotoluene	GC/MS (1l ext.)	1	µg/l	SU	<1
Acenaphthylene	GC/MS (1l ext.)	1	µg/l	SU	<1
Acenaphthene	GC/MS (1l ext.)	1	µg/l	SU	<1
3-Nitroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1
Dibenzofuran	GC/MS (1l ext.)	1	µg/l	SU	<1
2,4-Dinitrotoluene	GC/MS (1l ext.)	1	µg/l	SU	<1
Diethyl phthalate	GC/MS (1l ext.)	1	µg/l	SU	<1
Fluorene	GC/MS (1l ext.)	1	µg/l	SU	<1
4-Chlorophenyl phenylether	GC/MS (1l ext.)	1	µg/l	SU	<1
4-Nitroaniline	GC/MS (1l ext.)	1	µg/l	SU	<1
Azobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
4-Bromophenyl phenylether	GC/MS (1l ext.)	1	µg/l	SU	<1
Hexachlorobenzene	GC/MS (1l ext.)	1	µg/l	SU	<1
Pentachlorophenol	GC/MS (1l ext.)	1	µg/l	SU	<1(131)
Phenanthrene	GC/MS (1l ext.)	1	µg/l	SU	<1
Anthracene	GC/MS (1l ext.)	1	µg/l	SU	<1
Carbazole	GC/MS (1l ext.)	1	µg/l	SU	<1
Di-n-butylphthalate	GC/MS (1l ext.)	1	µg/l	SU	<2
Fluoranthene	GC/MS (1l ext.)	1	µg/l	SU	<1
Pyrene	GC/MS (1l ext.)	1	µg/l	SU	<1
Butyl benzylphthalate	GC/MS (1l ext.)	1	µg/l	SU	<1
Benzo(a)Anthracene	GC/MS (1l ext.)	1	µg/l	SU	<1
Chrysene	GC/MS (1l ext.)	1	µg/l	SU	<1
Bis (2-ethylhexyl)phthalate	GC/MS (1l ext.)	1	µg/l	SU	<5
Di-n-octylphthalate	GC/MS (1l ext.)	1	µg/l	SU	<1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

SVOC (USEPA 625) (B and K split)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Benzo(a)Pyrene	GC/MS (1l ext.)	1	µg/l	SU	<1
Indeno(123-cd)Pyrene	GC/MS (1l ext.)	1	µg/l	SU	<1
Dibenzo(ah)Anthracene	GC/MS (1l ext.)	1	µg/l	SU	<1
Benzo(ghi)Perylene	GC/MS (1l ext.)	1	µg/l	SU	<1
Benzo(b)fluoranthene	GC/MS (1l ext.)	1	µg/l	SU	<1
Benzo(k)fluoranthene	GC/MS (1l ext.)	1	µg/l	SU	<1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Volatile Organic Compounds (USEPA 624)

Concept Reference	**785568 005**
Customer Sample Reference	**BH21**
Test Sample	**10:1**
Hole ID	**BH21**
Top Depth	**1.50**
Bottom Depth	**2.00**
Date Sampled	**13-NOV-2018**
AGS Type	**ES**
AGS Sample Reference	**6**
Matrix Class	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol	
Dichlorodifluoromethane	GC/MS (Headspace)	1	µg/l	U	<1
Chloromethane	GC/MS (Headspace)	1	µg/l	U	<1
Vinyl chloride monomer	GC/MS (Headspace)	1	µg/l	U	<1
Bromomethane	GC/MS (Headspace)	1	µg/l	U	<1
Chloroethane	GC/MS (Headspace)	1	µg/l	U	<1
Trichlorofluoromethane	GC/MS (Headspace)	1	µg/l	U	<1
1,1-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1
Dichloromethane	GC/MS (Headspace)	50	µg/l	N	<50
Trans-1,2-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1
1,1-Dichloroethane	GC/MS (Headspace)	1	µg/l	U	<1
Cis-1,2-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1
2,2-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1
Chloroform	GC/MS (Headspace)	1	µg/l	U	**23**
Bromochloromethane	GC/MS (Headspace)	1	µg/l	U	**4**
1,1,1-Trichloroethane	GC/MS (Headspace)	1	µg/l	U	<1
1,1-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1
Carbon tetrachloride	GC/MS (Headspace)	1	µg/l	U	<1
1,2-Dichloroethane	GC/MS (Headspace)	1	µg/l	U	<1
Benzene	GC/MS (Headspace)	1	µg/l	U	<1(13)
1,2-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1
1,1,2-Trichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1
Bromodichloromethane	GC/MS (Headspace)	1	µg/l	U	**3**
Dibromomethane	GC/MS (Headspace)	1	µg/l	U	<1
Cis-1,3-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1
Toluene	GC/MS (Headspace)	1	µg/l	U	<1
Trans-1,3-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1
1,1,2-Trichloroethane	GC/MS (Headspace)	1	µg/l	U	<1
1,3-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1
Tetrachloroethylene	GC/MS (Headspace)	1	µg/l	U	<1
Chlorodibromomethane	GC/MS (Headspace)	1	µg/l	U	<1
1,2-dibromoethane	GC/MS (Headspace)	1	µg/l	U	<1
Chlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1
1,1,1,2-Tetrachloroethane	GC/MS (Headspace)	1	µg/l	U	<1
EthylBenzene	GC/MS (Headspace)	1	µg/l	U	<1
Meta/Para-Xylene	GC/MS (Headspace)	1	µg/l	U	<1
Ortho-Xylene	GC/MS (Headspace)	1	µg/l	U	<1
Styrene	GC/MS (Headspace)	1	µg/l	U	<1
Bromoform	GC/MS (Headspace)	1	µg/l	U	<1
Isopropyl benzene	GC/MS (Headspace)	1	µg/l	U	<1
1,1,2,2-Tetrachloroethane	GC/MS (Headspace)	1	µg/l	U	<1
1,2,3-Trichloropropane	GC/MS (Headspace)	1	µg/l	U	<1
n-Propylbenzene	GC/MS (Headspace)	1	µg/l	U	<1
Bromobenzene	GC/MS (Headspace)	1	µg/l	U	<1
1,3,5-Trimethylbenzene	GC/MS (Headspace)	1	µg/l	U	<1
Tert-Butylbenzene	GC/MS (Headspace)	1	µg/l	U	<1
1,2,4-Trimethylbenzene	GC/MS (Headspace)	1	µg/l	U	<1
Sec-Butylbenzene	GC/MS (Headspace)	1	µg/l	U	<1
p-Isopropyltoluene	GC/MS (Headspace)	1	µg/l	U	<1
2-Chlorotoluene	GC/MS (Headspace)	1	µg/l	U	<1
4-Chlorotoluene	GC/MS (Headspace)	1	µg/l	U	<1
1,3-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1
1,4-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1
1,2-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

				Concept Reference	**785568 001**	**785568 002**	**785568 003**
				Customer Sample Reference	**BH23**	**BH23**	**BH23**
				Test Sample	**AR**	**AR**	**AR**
				Hole ID	**BH23**	**BH23**	**BH23**
				Top Depth	**0.00**	**0.50**	**1.50**
				Bottom Depth	**0.50**	**1.00**	**2.00**
				Date Sampled	**14-NOV-2018**	**14-NOV-2018**	**14-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**4**	**7**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Arsenic (Total)	ICP/MS (Total)	1.0	mg/kg	N	**5.4**	**5.4**	**7.4**
Cadmium (Total)	ICP/MS (Total)	0.05	mg/kg	N	<0.05	<0.05	**0.08**
Chromium (Total)	ICP/MS (Total)	0.2	mg/kg	N	**26**	**30**	**25**
Copper (Total)	ICP/MS (Total)	0.1	mg/kg	N	**11**	**37**	**7.5**
Mercury	CVAFS	0.01	mg/kg	N	**0.01(13)**	<0.01(13)	<0.01(13)
Lead (Total)	ICP/MS (Total)	0.2	mg/kg	N	**14**	**24**	**13**
Nickel (Total)	ICP/MS (Total)	0.2	mg/kg	N	**12**	**13**	**11**
Zinc	ICP/MS (HF)	1	mg/kg	N	**39**	**69**	**37**
Tributyl tin	GC/MS	10	µg/kg	N	**77**	<10	<10
Dibutyl tin	GC/MS	10	µg/kg	N	<10	<10	<10
Total Organic Carbon	OX/IR	0.1	%	N	**0.4**	**0.3**	**0.3**
Dry solids @105C	Grav (1 Dec) (105 C)	0.1	%	SN	**81**	**79**	**81**
Dry solids @40C	Grav (1 Dec) (40 C)	0.1	%	SN	**81**	**82**	**79**
Gasoline Range Organics (C5-C10)	GC/MS (Headspace)	10	µg/kg	SN	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C12-C16)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C16-C21)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C21-C35)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C40-C44)	GC/FID (LD)	0.1	mg/kg	SN	<1.0	<1.0	<1.0
Poly-Chlorinated Biphenyls (Total Tri-Hepta)	GC/MS (HR)	1.4	µg/kg	U	<1.4	<1.4	**2.1**

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**785568 001**	**785568 002**	**785568 003**
				Customer Sample Reference	**BH23**	**BH23**	**BH23**
				Test Sample	**AR**	**AR**	**AR**
				Hole ID	**BH23**	**BH23**	**BH23**
				Top Depth	**0.00**	**0.50**	**1.50**
				Bottom Depth	**0.50**	**1.00**	**2.00**
				Date Sampled	**14-NOV-2018**	**14-NOV-2018**	**14-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**4**	**7**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Naphthalene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Acenaphthylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Acenaphthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Fluorene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Phenanthrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Benzo(a)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Chrysene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Benzo(a)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Indeno(123-cd)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Benzo(ghi)Perylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Benzo(b)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Benzo(k)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Dibenzo(ah)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0
Polyaromatic Hydrocarbons (Total)	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0

Concept Reference: 785568
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U, CoC_BH23-BH21-BH09_REV

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**785568 001**	**785568 002**	**785568 003**
				Customer Sample Reference	**BH23**	**BH23**	**BH23**
				Test Sample	**AR**	**AR**	**AR**
				Hole ID	**BH23**	**BH23**	**BH23**
				Top Depth	**0.00**	**0.50**	**1.50**
				Bottom Depth	**0.50**	**1.00**	**2.00**
				Date Sampled	**14-NOV-2018**	**14-NOV-2018**	**14-NOV-2018**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**4**	**7**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.10	µg/kg	U	<0.10	<0.10	<0.10
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	**0.4**
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	**0.2**
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	**0.5**
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	**0.6**
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	**0.3**
PCB EC7 (Sum)	Calc	0.7	µg/kg	N	<0.7	<0.7	**5.2**

Index to symbols used in 785568-2

Value	Description
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
A40	Assisted dried < 40C
AR	As Received
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C

10:1	Leachate to BS EN 12457-2 (10:1)
10:1 S	Data for BS EN 12457-2 (10:1)
N.D.	Not Detected
162	LOD determined by matrix spike recovery
13	Results have been blank corrected.
131	Result is outside of the scope of accreditation due to a QC Failure
NR	No Result
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos was subcontracted to REC Asbestos.
Phenols (soils) testing was subcontracted to Exova Jones.
Please Note: The recovery in sample 005 for PCB Who12 was low, however the S/N is >20:1, therefore the data is considered valid.
These samples (except for Marine Sediments) have been analysed exceeding recommended holding times for VOC, TPH, SVOC, PAH, pH, PCB and Phenol. It is possible therefore that the results provided may be compromised.
SVOC (leachate) testing was subcontracted to Exova Jones.
Phenols (leachate) testing was transferred to Concept Braintree.

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

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Concept Life Sciences

Certificate of Analysis

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Report Number: 783470-2

Date of Report: 17-Jan-2019

Customer: Fugro GeoServices
Fugro House
Hithercroft Road
Wallingford
Oxfordshire
OX10 9RB

Customer Contact: Ms Karen Blackmore

Customer Job Reference: G180030U
Customer Purchase Order: 74376KB-WAL
Customer Site Reference: St Ola Pier, Scrabster
Date Job Received at Concept: 15-Nov-2018
Date Analysis Started: 21-Nov-2018
Date Analysis Completed: 17-Jan-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with Section 25 of the Concept Life Sciences, Analytical Services Quality Manual

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Aleksandra Pacula
Senior Customer Service Advisor

Issued by : [Redacted]
Aleksandra Pacula
Senior Customer Ser Advisor

Waste Acceptance Criteria

Customer Sample Reference : BH08
Our Sample Reference : 783470 010
Project Site : St Ola Pier, Scrabster
Customer Reference : G180030U
Sample in Dish @ 105C : 51.4
Wet Sample in Dish Weight : 100
Top Depth : 4.50
Test Portion Mass (g) : 175
Bottom Depth : 5.00
Empty Dish Weight : 0
Hole ID : BH08
Date Sampled : 06-NOV-2018
Time Sampled : 12:00
AGS Type : ES
AGS Sample Reference : 14
Matrix Class : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
PCB EC7 (Sum)	Calc	0.007	mg/kg	M	<0.007	1.0		
Acid Neutralising Capacity (pH 4)	Titration	2	Mol/kg	N	<2			
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.080	mg/kg	U	(110) <0.080	6.0		
Loss on Ignition	Grav	0.1	%	N	**1.1**			10.0
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
pH	Probe			M	**8.7**		> 6.0	
Total Organic Carbon	OX/IR	0.1	%	N	**0.1**	3.0	5.0	6.0
Total Petroleum Hydrocarbons C10-C40 (Sum)	Calc	1	mg/kg	N	(13) <1	500.0		

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	**0.034**	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.034**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.32**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	**0.00026**	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**7600**	**800.0**	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.0072**	2.0	50.0	100.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**24**	500.0	800.0	1000.0
Fluoride	Calc (W)	0.50	mg/kg	N	**1.1**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	<0.0030	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.090**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.4	10.0	40.0
Phenols (Total-Mono)	Calc	1.0	mg/kg	N	<1.0	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
Sulphate	Calc (W)	5	mg/kg	N	**940**	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc	1000	mg/kg	N	**16000**	**4000.0**	60000.0	100000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	**1.0**	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

*** Waste Sampling and Testing for Disposal at Landfill, EBPRI 11507B, Environment Agency (England and Wales) March 2013**

As detailed in- Waste Classification. Guidance on the classification and assessment of waste. Technical Guidance WM3:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf

Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Waste Acceptance Criteria

Customer Sample Reference : BH02
Our Sample Reference : 783470 013
Project Site : St Ola Pier, Scrabster
Customer Reference : G180030U
Hole ID : BH02
Top Depth : 4.50
Bottom Depth : 5.50
Sample in Dish @ 105C : 72.6
Empty Dish Weight : 0
Test Portion Mass (g) : 175
Wet Sample in Dish Weight : 100
Date Sampled : 06-NOV-2018
Time Sampled : 12:00
AGS Type : ES
AGS Sample Reference : 12
Matrix Class : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
PCB EC7 (Sum)	Calc	0.007	mg/kg	M	<0.007	1.0		
Acid Neutralising Capacity (pH 4)	Titration	2	Mol/kg	N	<2			
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.080	mg/kg	U	(110) <0.080	6.0		
Loss on Ignition	Grav	0.1	%	N	**0.9**			10.0
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
pH	Probe			M	**8.9**		> 6.0	
Total Organic Carbon	OX/IR	0.1	%	N	**0.1**	3.0	5.0	6.0
Total Petroleum Hydrocarbons C10-C40 (Sum)	Calc	1	mg/kg	N	(13) **3**	500.0		

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	**0.019**	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.024**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.37**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	**0.00021**	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**12000**	**800.0**	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	2.0	50.0	100.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**22**	500.0	800.0	1000.0
Fluoride	Calc (W)	0.50	mg/kg	N	**0.78**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	<0.0030	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.026**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	**0.014**	0.4	10.0	40.0
Phenols (Total-Mono)	Calc	1.0	mg/kg	N	<1.0	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
Sulphate	Calc (W)	5	mg/kg	N	**1600**	**1000.0**	20000.0	50000.0
Total Dissolved Solids	Calc	1000	mg/kg	N	**26000**	**4000.0**	60000.0	100000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	<0.020	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

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Landfill WAC analysis (specifically leaching test results) should not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Waste Acceptance Criteria

Customer Sample Reference : BH01
Our Sample Reference : 783470 014
Project Site : St Ola Pier, Scrabster
Customer Reference : G180030U
Wet Sample in Dish Weight : 100
Empty Dish Weight : 0
Sample in Dish @ 105C : 74.6
Test Portion Mass (g) : 175
Hole ID : BH01
Top Depth : 0.00
Bottom Depth : 1.00
Date Sampled : 08-NOV-2018
Time Sampled : 12:00
AGS Type : ES
AGS Sample Reference : 1
Matrix Class : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
PCB EC7 (Sum)	Calc	0.007	mg/kg	M	<0.007	1.0		
Acid Neutralising Capacity (pH 4)	Titration	2	Mol/kg	N	<2			
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
Loss on Ignition	Grav	0.1	%	N	**1.2**			10.0
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
pH	Probe			M	**8.7**		> 6.0	
Total Organic Carbon	OX/IR	0.1	%	N	**0.2**	3.0	5.0	6.0
Total Petroleum Hydrocarbons C10-C40 (Sum)	Calc	1	mg/kg	N	(13) **2**	500.0		

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	**0.015**	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.027**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.14**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	<0.00020	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**12000**	**800.0**	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.024**	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	2.0	50.0	100.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**29**	500.0	800.0	1000.0
Fluoride	Calc (W)	0.50	mg/kg	N	**1.6**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	<0.0030	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.18**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	**0.017**	0.4	10.0	40.0
Phenols (Total-Mono)	Calc	1.0	mg/kg	N	<1.0	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	0.1	0.5	7.0
Sulphate	Calc (W)	5	mg/kg	N	**1900**	**1000.0**	20000.0	50000.0
Total Dissolved Solids	Calc	1000	mg/kg	N	**27000**	**4000.0**	60000.0	100000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	<0.020	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

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Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 010**	**783470 012**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH08**	**BH02**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**5.00**	**2.50**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH08**	**BH02**
				Top Depth	**0.00**	**0.00**	**3.00**	**4.50**	**1.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**14**	**5**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**7.1**	**27**	**25**	**26**	**28**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**783470 013**	**783470 014**	**783470 020**
				Customer Sample Reference	**BH02**	**BH01**	**BH01 (SOIL)**
				Test Sample	**AR**	**AR**	**AR**
				Bottom Depth	**5.50**	**1.00**	**6.00**
				Hole ID	**BH02**	**BH01**	**BH01**
				Top Depth	**4.50**	**0.00**	**5.50**
				Date Sampled	**06-NOV-2018**	**08-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**12**	**1**	**16**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**27**	**25**	**22**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
MCERTS Preparation

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 010**	**783470 012**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH08**	**BH02**
				Test Sample	**M40**	**M40**	**M40**	**M40**	**M40**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**5.00**	**2.50**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH08**	**BH02**
				Top Depth	**0.00**	**0.00**	**3.00**	**4.50**	**1.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**14**	**5**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Retained on 10mm sieve	Grav	0.1	%	N	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
MCERTS Preparation

Concept Reference	**783470 013**	**783470 014**	**783470 020**
Customer Sample Reference	**BH02**	**BH01**	**BH01 (SOIL)**
Test Sample	**M40**	**M40**	**M40**
Bottom Depth	**5.50**	**1.00**	**6.00**
Hole ID	**BH02**	**BH01**	**BH01**
Top Depth	**4.50**	**0.00**	**5.50**
Date Sampled	**06-NOV-2018**	**08-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**12**	**1**	**16**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol			
Retained on 10mm sieve	Grav	0.1	%	N	<0.1	<0.1	<0.1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**A40**	**A40**	**A40**	**A40**	**A40**
Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol					
Asbestos ID	PLM			SU	N.D.	N.D.	N.D.	N.D.	N.D.
Sulphur (total)	ICP/OES	0.01	%	M	<0.01	<0.01	<0.01	<0.01	<0.01
(Acid Soluble) Sulphate	HCl Extraction/ICP/OES (TRL 447 T2)	0.01	%	M	**0.11**	**0.16**	**0.10**	**0.11**	**0.08**
(Water Soluble) Sulphate expressed as SO4	2:1 Extraction/ICP/OES (TRL 447 T1)	0.01	g/l	M	**0.18**	**0.16**	**0.20**	**0.23**	**0.13**
pH	Probe			M	**8.6**	**8.9**	**8.8**	**8.8**	**9.1**
Soil Organic Matter	Calc TOC/0.58	0.1	%	N	**0.3**	**0.3**	**0.2**	**0.3**	**0.3**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Waste Classification Testing - Clause 15.4

Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol					
Cyanide (Total)	Colorimetry	1	mg/kg	M	<1	<1	<1	<1	<1
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**7.1**	**27**	**25**	**28**	**22**
Dibutyl tin	GC/MS (Deriv.)	0.01	mg/kg	N	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(j)fluoranthene	GC/MS	0.1	mg/kg	N	<0.1	<0.1	<0.1	<0.1	<0.1
Tributyl tin	GC/MS (Deriv.)	0.01	mg/kg	N	<0.01	<0.01	<0.01	<0.01	<0.01

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Heavy Metals(9)

Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**A40**	**A40**	**A40**	**A40**	**A40**
Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol					
Boron (water-soluble)	ICP/OES	1	mg/kg	N	<1	<1	<1	<1	<1
Barium	ICP/OES	1	mg/kg	U	**210**	**110**	**160**	**130**	**160**
Beryllium	ICP/OES	2	mg/kg	U	<2	<2	<2	<2	<2
Chromium VI	ICP/OES	1	mg/kg	N	<1	<1	<1	<1	<1
Iron	ICP/OES	1	mg/kg	U	**3**	**2**	**24**	**330**	**6**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Heavy Metals(9)

Concept Reference	783470 001	783470 004	783470 009	783470 012	783470 020
Customer Sample Reference	BH04	BH07 (SOIL)	BH08	BH02	BH01 (SOIL)
Test Sample	M40	M40	M40	M40	M40
Bottom Depth	0.50	0.50	3.50	2.50	6.00
Hole ID	BH04	BH07	BH08	BH02	BH01
Top Depth	0.00	0.00	3.00	1.50	5.50
Date Sampled	04-NOV-2018	06-NOV-2018	06-NOV-2018	06-NOV-2018	08-NOV-2018
Time Sampled	12:00	12:00	12:00	12:00	12:00
AGS Type	ES	ES	ES	ES	ES
AGS Sample Reference	1	1	10	5	16
Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil

Determinand	Method	LOD	Units	Symbol					
Arsenic	ICP/OES	2	mg/kg	M	**6**	**3**	**6**	**5**	**6**
Cadmium	ICP/OES	1	mg/kg	M	<1	<1	<1	<1	<1
Chromium	ICP/OES	1	mg/kg	M	**17**	**11**	**16**	**16**	**15**
Copper	ICP/OES	1	mg/kg	M	**11**	**6**	**7**	**7**	**4**
Mercury	ICP/OES	1	mg/kg	M	<1	<1	<1	<1	<1
Nickel	ICP/OES	1	mg/kg	M	**12**	**8**	**13**	**13**	**11**
Lead	ICP/OES	1	mg/kg	M	**9**	**6**	**8**	**8**	**7**
Selenium	ICP/OES	3	mg/kg	M	<3	<3	<3	<3	<3
Vanadium	ICP/OES	1	mg/kg	M	**25**	**17**	**22**	**22**	**22**
Zinc	ICP/OES	1	mg/kg	M	**35**	**22**	**35**	**35**	**27**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
BTEX

Concept Reference	783470 010	783470 013	783470 014
Customer Sample Reference	BH08	BH02	BH01
Test Sample	M105	M105	M105
Bottom Depth	5.00	5.50	1.00
Hole ID	BH08	BH02	BH01
Top Depth	4.50	4.50	0.00
Date Sampled	06-NOV-2018	06-NOV-2018	08-NOV-2018
Time Sampled	12:00	12:00	12:00
AGS Type	ES	ES	ES
AGS Sample Reference	14	12	1
Matrix Class	Sandy Soil	Sandy Soil	Sandy Soil

Determinand	Method	LOD	Units	Symbol			
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<20(110)	<10
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<20(110)	<10
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<20(110)	<10
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<20(110)	<10
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<20(110)	<20(110)	<10

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
PCB EC7 and Total

				Concept Reference	**783470 010**	**783470 013**	**783470 014**
				Customer Sample Reference	**BH08**	**BH02**	**BH01**
				Test Sample	**AR**	**AR**	**AR**
				Bottom Depth	**5.00**	**5.50**	**1.00**
				Hole ID	**BH08**	**BH02**	**BH01**
				Top Depth	**4.50**	**4.50**	**0.00**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**14**	**12**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Polychlorinated biphenyl BZ#101	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1
Polychlorinated biphenyl BZ#118	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1
Polychlorinated biphenyl BZ#138	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1
Polychlorinated biphenyl BZ#153	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1
Polychlorinated biphenyl BZ#180	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1
Polychlorinated biphenyl BZ#28	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1
Polychlorinated biphenyl BZ#52	GC/MS (SIR)	1	µg/kg	M	<1	<1	<1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Poly-Chlorinated Biphenyls (WHO 12)

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
				Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Polychlorinated biphenyl BZ#77	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#81	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#105	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#114	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#123	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#126	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#156	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#157	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#167	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#169	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05
Polychlorinated biphenyl BZ#189	GC/MS (HR)	0.05	µg/kg	U	<0.05	<0.05	<0.05	<0.05	<0.05

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Total and Speciated USEPA16 PAH

				Concept Reference	**783470 010**	**783470 013**	**783470 014**
				Customer Sample Reference	**BH08**	**BH02**	**BH01**
				Test Sample	**M105**	**M105**	**M105**
				Bottom Depth	**5.00**	**5.50**	**1.00**
				Hole ID	**BH08**	**BH02**	**BH01**
				Top Depth	**4.50**	**4.50**	**0.00**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**14**	**12**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1
Coronene	GC/MS	0.1	mg/kg	N	<0.1	<0.1	<0.1
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
				Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Total Petroleum Hydrocarbons

				Concept Reference	**783470 010**	**783470 013**	**783470 014**
				Customer Sample Reference	**BH08**	**BH02**	**BH01**
				Test Sample	**M105**	**M105**	**M105**
				Bottom Depth	**5.00**	**5.50**	**1.00**
				Hole ID	**BH08**	**BH02**	**BH01**
				Top Depth	**4.50**	**4.50**	**0.00**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**14**	**12**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Total Petroleum Hydrocarbons	GC/FID	1	mg/kg	M	<1[13]	**3**[13]	**2**[13]
Total Petroleum Hydrocarbons (C35-C40)	GC/FID	1	mg/kg	N	<1[13]	<1[13]	<1[13]

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
TPH UKCWG

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
				Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20(110)
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20(110)
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20(110)
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20(110)
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20(110)
Methyl tert-Butyl Ether	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20(110)
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS (Head Space)(MCERTS)	0.100	mg/kg	N	<0.100	<0.100	<0.100	<0.100	<0.200(110)
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS (Head Space)(MCERTS)	0.10	mg/kg	N	<0.10	<0.10	<0.10	<0.10	<0.20(110)
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS (Head Space)(MCERTS)	0.10	mg/kg	N	**0.25**	<0.10	<0.10	<0.10	<0.20(110)
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GCxGC	1	mg/kg	M	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GCxGC	1	mg/kg	M	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GCxGC	1	mg/kg	M	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GCxGC	2	mg/kg	M	**11**	<2	<2	<2	<2
Total Petroleum Hydrocarbons (Aliphatic) total	Calc		mg/kg	N	**11(13)**	N.D.(13)	N.D.(13)	N.D.(13)	N.D.(13)
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS (Head Space)(MCERTS)	0.10	mg/kg	N	<0.10	<0.10	<0.10	<0.10	<0.20(110)
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS (Head Space)(MCERTS)	0.10	mg/kg	N	<0.10	<0.10	<0.10	<0.10	<0.20(110)
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS (Head Space)(MCERTS)	0.10	mg/kg	N	<0.10	<0.10	<0.10	<0.10	<0.20(110)
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GCxGC	2	mg/kg	M	<2	<2	<2	<2	<2
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GCxGC	1	mg/kg	M	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GCxGC	1	mg/kg	M	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GCxGC	1	mg/kg	M	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons (Aromatic) total	Calc		mg/kg	N	N.D.(13)	N.D.(13)	N.D.(13)	N.D.(13)	N.D.(13)
Total Petroleum Hydrocarbons (Aliphatic+Aromatic)	Calc		mg/kg	N	**11.0(13)**	N.D.(13)	N.D.(13)	N.D.(13)	N.D.(13)

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Phenols (Speciated)

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
				Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Resorcinol	HPLC	0.05	mg/kg	SM	<0.05	<0.05	<0.05	<0.05	<0.05
Catechol	HPLC	0.05	mg/kg	SN	_(NR)	_(NR)	_(NR)	_(NR)	_(NR)
Phenol	HPLC	0.1	mg/kg	SM	<0.1	<0.1	<0.1	<0.1	<0.1
Cresols	HPLC	0.05	mg/kg	SM	<0.05	<0.05	<0.05	<0.05	<0.05
Xylenols	HPLC	0.05	mg/kg	SM	<0.06	<0.06	<0.06	<0.06	<0.06
Naphthols	HPLC	0.05	mg/kg	SN	<0.05	<0.05	<0.05	<0.05	<0.05
Trimethyl phenol	HPLC	0.05	mg/kg	SM	<0.05	<0.05	<0.05	<0.05	<0.05
Total Phenols	HPLC	0.1	mg/kg	SN	_(NR)	_(NR)	_(NR)	_(NR)	_(NR)

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Semi-Volatile Organic Compounds (USEPA 625)

				Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
				Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
				Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
				Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
				Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
				Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroethyl) ether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chlorophenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-Dichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroisopropyl) ether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-methyl phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
3/4-Methylphenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachloroethane	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Isophorone	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dimethylphenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroethoxy) methane	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
1,2,4-Trichlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1(131)	<0.1(131)	<0.1(131)	<0.1(131)	<0.1(131)
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobutadiene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chloronaphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethyl phthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-Dinitrotoluene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
3-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzofuran	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrotoluene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Diethyl phthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chlorophenyl phenylether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitroaniline	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Azobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
4-Bromophenyl phenylether	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobenzene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Carbazole	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-butylphthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Butyl benzylphthalate	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-ethylhexyl)phthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

Concept Reference	**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
Customer Sample Reference	**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**M105**	**M105**	**M105**	**M105**	**M105**
Bottom Depth	**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
Hole ID	**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
Top Depth	**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
Date Sampled	**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference	**1**	**1**	**10**	**5**	**16**
Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol					
Di-n-octylphthalate	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1	<0.1	<0.1	<0.1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Volatile Organic Compounds (USEPA 624) (MCERTS)

Concept Reference				**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
Customer Sample Reference				**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample				**M105**	**M105**	**M105**	**M105**	**M105**
Bottom Depth				**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
Hole ID				**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
Top Depth				**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
Date Sampled				**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled				**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type				**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference				**1**	**1**	**10**	**5**	**16**
Matrix Class				**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**				
Dichlorodifluoromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Chloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
Vinyl chloride monomer	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Bromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
Chloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Trichlorofluoromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Dichloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
Trans-1,2-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1-Dichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Cis-1,2-Dichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
2,2-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
Chloroform	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Bromochloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1,1-Trichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Carbon tetrachloride	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,2-Dichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Benzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20[110]
1,2-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Trichloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Bromodichloromethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Dibromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Cis-1,3-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Toluene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20[110]
Trans-1,3-Dichloropropene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1,2-Trichloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,3-Dichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Tetrachloroethylene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Chlorodibromomethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,2-dibromoethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Chlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1,1,2-Tetrachloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
EthylBenzene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20[110]
Meta/Para-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20[110]
Ortho-Xylene	GC/MS (Head Space)(MCERTS)	10	µg/kg	M	<10	<10	<10	<10	<20[110]
Styrene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
Bromoform	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Isopropyl benzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,1,2,2-Tetrachloroethane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
1,2,3-Trichloropropane	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
n-Propylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Bromobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,3,5-Trimethylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Tert-Butylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,2,4-Trimethylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
Sec-Butylbenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
p-Isopropyltoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
2-Chlorotoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
4-Chlorotoluene	GC/MS (Head Space)(MCERTS)	50	µg/kg	U	<50	<50	<50	<50	<100[110]
1,3-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]
1,4-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Soil Analysed as Soil
Volatile Organic Compounds (USEPA 624) (MCERTS)

Concept Reference		**783470 001**	**783470 004**	**783470 009**	**783470 012**	**783470 020**
Customer Sample Reference		**BH04**	**BH07 (SOIL)**	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample		**M105**	**M105**	**M105**	**M105**	**M105**
Bottom Depth		**0.50**	**0.50**	**3.50**	**2.50**	**6.00**
Hole ID		**BH04**	**BH07**	**BH08**	**BH02**	**BH01**
Top Depth		**0.00**	**0.00**	**3.00**	**1.50**	**5.50**
Date Sampled		**04-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled		**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type		**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference		**1**	**1**	**10**	**5**	**16**
Matrix Class		**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
1,2-Dichlorobenzene	GC/MS (Head Space)(MCERTS)	50	µg/kg	M	<50	<50	<50	<50	<100[110]

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water
Waste Acceptance Criteria

Concept Reference		**783470 010**	**783470 013**	**783470 014**		
Customer Sample Reference		**BH08**	**BH02**	**BH01**		
Test Sample		**10:1**	**10:1**	**10:1**		
Bottom Depth		**5.00**	**5.50**	**1.00**		
Hole ID		**BH08**	**BH02**	**BH01**		
Top Depth		**4.50**	**4.50**	**0.00**		
Date Sampled		**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**		
Time Sampled		**12:00**	**12:00**	**12:00**		
AGS Type		**ES**	**ES**	**ES**		
AGS Sample Reference		**14**	**12**	**1**		
Matrix Class		**Sandy Soil**	**Sandy Soil**	**Sandy Soil**		
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**3.4**	**2.4**	**2.7**
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**32**	**37**	**14**
Molybdenum (Dissolved)	ICP/MS (Filtered)	1	µg/l	N	**9**	<5[9]	**18**
Total Dissolved Solids	Grav	100	mg/l	N	**1600**	**2600**	**2700**
Phenols (Total-Mono)	Colorimetry	0.1	mg/l	U	<0.1	<0.1	<0.1
Dissolved Organic Carbon	OX/IR	1	mg/l	N	**2**	**2**	**3**
Electrical Conductivity	Probe	10	µS/cm	N	**2600**	**4300**	**4500**
Antimony (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<5[9]	<5[9]	<5[9]
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	<0.10[9]	<0.10[9]	<0.10[9]
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<5[9]	<5[9]	<5[9]
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<2.5[9]	<2.5[9]	<2.5[9]
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	<1.5[9]	<1.5[9]	<1.5[9]
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.25[9]	<0.25[9]	<0.25[9]
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<5[9]	<5[9]	<5[9]
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<2.5[9]	<2.5[9]	<2.5[9]
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	**100**	<10[9]	<10[9]
Chloride	Discrete Analyser	1	mg/l	U	**760**	**1200**	**1200**
Fluoride	Discrete Analyser	0.05	mg/l	U	**0.11**	**0.08**	**0.16**
Sulphate	Discrete Analyser	0.5	mg/l	U	**94**	**160**	**190**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Metals ICP MS

				Concept Reference	**783470 008**	**783470 011**	**783470 019**
				Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**10:1**	**10:1**	**10:1**
				Bottom Depth	**2.00**	**0.50**	**3.50**
				Hole ID	**BH08**	**BH02**	**BH01**
				Top Depth	**1.50**	**0.00**	**2.50**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**9**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**4.4**	**3.5**	**2.6**
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	<0.10[9]	<0.10[9]	<0.02
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<5[9]	<5[9]	<1
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<2.5[9]	<2.5[9]	**0.9**
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<5[9]	<5[9]	<1
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	<1.5[9]	<1.5[9]	<1.5[9]
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	**20**	<10[9]	<2
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.25[9]	<0.25[9]	<0.25[9]
Vanadium (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	<10[9]	<10[9]	**4**
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	<2.5[9]	<2.5[9]	<0.5
Manganese (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<5[9]	<5[9]	<1
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**25**	**16**	**31**
Beryllium (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.25[9]	<0.25[9]	<0.05

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Metals ICP OES

				Concept Reference	**783470 008**	**783470 011**	**783470 019**
				Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**10:1**	**10:1**	**10:1**
				Bottom Depth	**2.00**	**0.50**	**3.50**
				Hole ID	**BH08**	**BH02**	**BH01**
				Top Depth	**1.50**	**0.00**	**2.50**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**9**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Calcium	ICP/OES	0.1	mg/l	N	<0.1	<0.1	<0.1
Sodium	ICP/OES	0.1	mg/l	N	<0.1	<0.1	<0.1
Magnesium	ICP/OES	0.1	mg/l	N	**1400**	**1400**	**670**
Potassium	ICP/OES	0.1	mg/l	N	**130**	**130**	<0.1
Aluminium	ICP/OES	0.02	mg/l	U	**0.35**	**3.4**	**1.1**
Chromium VI	Discrete Analyser	0.003	mg/l	U	<0.003	<0.003	<0.003
Boron	ICP/OES	0.01	mg/l	N	**8.3**	**8.1**	**5.3**
Iron	ICP/OES	0.01	mg/l	U	<0.01	<0.01	<0.01

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

PAH US EPA 16 (B and K split)

Concept Reference	**783470 008**	**783470 011**	**783470 019**
Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.00**	**0.50**	**3.50**
Hole ID	**BH08**	**BH02**	**BH01**
Top Depth	**1.50**	**0.00**	**2.50**
Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**1**	**9**

Determinand	Method	LOD	Units	Symbol			
Naphthalene	GC/MS (SIR)	0.01	µg/l	U	**0.18**(13)	**0.05**(13)	**0.11**(13)
Acenaphthylene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(100,13)	<0.02(100,13)
Acenaphthene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(100,13)	<0.02(100,13)
Fluorene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(13,100)	<0.02(100,13)
Phenanthrene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(13,100)
Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(100,13)
Fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(100,13)	<0.02(13,100)
Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(100,13)
Benzo(a)Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(100,13)
Chrysene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(100,13)	<0.02(100,13)
Benzo(b)fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(13,100)	<0.02(100,13)
Benzo(k)fluoranthene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(13,100)
Benzo(a)Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(100,13)
Indeno(123-cd)Pyrene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(13,100)	<0.02(100,13)
Dibenzo(ah)Anthracene	GC/MS (SIR)	0.01	µg/l	U	<0.02(13,100)	<0.02(100,13)	<0.02(100,13)
Benzo(ghi)Perylene	GC/MS (SIR)	0.01	µg/l	U	<0.02(100,13)	<0.02(100,13)	<0.02(13,100)
Polyaromatic Hydrocarbons (Total)	GC/MS (SIR)	0.01	µg/l	U	**0.18**	**0.05**	**0.11**

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

TPH (CWG)

				Concept Reference	**783470 008**	**783470 011**	**783470 019**
				Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
				Test Sample	**10:1**	**10:1**	**10:1**
				Bottom Depth	**2.00**	**0.50**	**3.50**
				Hole ID	**BH08**	**BH02**	**BH01**
				Top Depth	**1.50**	**0.00**	**2.50**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**
				AGS Sample Reference	**6**	**1**	**9**
Determinand	**Method**	**LOD**	**Units**	**Symbol**			
Total Petroleum Hydrocarbons (C5 - C6 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C6-C8 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C8-C10 aliphatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C12-C16 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C16-C21 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C21-C35 aliphatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (Aliphatic) total	Calc		mg/l	N	N.D.[13]	N.D.[13]	N.D.[13]
Total Petroleum Hydrocarbons (C6 - C7 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C7-C8 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C8-C10 aromatic)	GC/MS (Headspace)(LV)	10	µg/l	N	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C12-C16 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C16-C21 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (C21-C35 aromatic)	GCxGC (LV)	0.01	mg/l	N	<0.01[13]	<0.01[13]	<0.01[13]
Total Petroleum Hydrocarbons (Aromatic) total	Calc		mg/l	N	N.D.[13]	N.D.[13]	N.D.[13]
Total Petroleum Hydrocarbons (Aliphatic+Aromatic)	Calc		mg/l	N	N.D.[13]	N.D.[13]	N.D.[13]

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Volatile Organic Compounds (USEPA 624)

Concept Reference	**783470 008**	**783470 011**	**783470 019**
Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.00**	**0.50**	**3.50**
Hole ID	**BH08**	**BH02**	**BH01**
Top Depth	**1.50**	**0.00**	**2.50**
Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**1**	**9**

Determinand	Method	LOD	Units	Symbol			
Dichlorodifluoromethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chloromethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Vinyl chloride monomer	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromomethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Trichlorofluoromethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Dichloromethane	GC/MS (Headspace)	50	µg/l	N	<50	<50	<50
Trans-1,2-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1-Dichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Cis-1,2-Dichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
2,2-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chloroform	GC/MS (Headspace)	1	µg/l	U	**6**	**23**	**2**
Bromochloromethane	GC/MS (Headspace)	1	µg/l	U	<1	**5**	<1
1,1,1-Trichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Carbon tetrachloride	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2-Dichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Benzene	GC/MS (Headspace)	1	µg/l	U	<1[13]	<1[13]	<1[13]
1,2-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,2-Trichloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromodichloromethane	GC/MS (Headspace)	1	µg/l	U	**2**	**3**	<1
Dibromomethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Cis-1,3-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Toluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Trans-1,3-Dichloropropene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,2-Trichloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,3-Dichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Tetrachloroethylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chlorodibromomethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2-dibromoethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Chlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,1,2-Tetrachloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
EthylBenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Meta/Para-Xylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Ortho-Xylene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Styrene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromoform	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Isopropyl benzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,1,2,2-Tetrachloroethane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2,3-Trichloropropane	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
n-Propylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Bromobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,3,5-Trimethylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Tert-Butylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2,4-Trimethylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
Sec-Butylbenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
p-Isopropyltoluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
2-Chlorotoluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
4-Chlorotoluene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,3-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,4-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1
1,2-Dichlorobenzene	GC/MS (Headspace)	1	µg/l	U	<1	<1	<1

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

SVOC (USEPA 625) (B and K split)

Concept Reference	**783470 008**	**783470 011**	**783470 019**
Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.00**	**0.50**	**3.50**
Hole ID	**BH08**	**BH02**	**BH01**
Top Depth	**1.50**	**0.00**	**2.50**
Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**1**	**9**

Determinand	Method	LOD	Units	Symbol			
Phenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Bis (2-chloroethyl) ether	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2-Chlorophenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
1,3-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
1,4-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
1,2-Dichlorobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Bis (2-chloroisopropyl) ether	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2-methyl phenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
3/4-Methylphenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Hexachloroethane	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Nitrobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Isophorone	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2-Nitrophenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2,4-Dimethylphenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Bis (2-chloroethoxy) methane	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2,4-Dichlorophenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
1,2,4-Trichlorobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Naphthalene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
4-Chloroaniline	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Hexachlorobutadiene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
4-Chloro-3-methylphenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2-Methylnaphthalene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Hexachlorocyclopentadiene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2,4,6-Trichlorophenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2,4,5-Trichlorophenol	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2-Chloronaphthalene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2-Nitroaniline	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Dimethyl phthalate	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2,6-Dinitrotoluene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Acenaphthylene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Acenaphthene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
3-Nitroaniline	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Dibenzofuran	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
2,4-Dinitrotoluene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Diethyl phthalate	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Fluorene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
4-Chlorophenyl phenylether	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
4-Nitroaniline	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Azobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
4-Bromophenyl phenylether	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Hexachlorobenzene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Pentachlorophenol	GC/MS (1l ext.)	1	µg/l	U	<1[131]	<1[131]	<1[131]
Phenanthrene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Anthracene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Carbazole	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Di-n-butylphthalate	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Fluoranthene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Pyrene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Butyl benzylphthalate	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Benzo(a)Anthracene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Chrysene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Bis (2-ethylhexyl)phthalate	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Di-n-octylphthalate	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

SVOC (USEPA 625) (B and K split)

Concept Reference	**783470 008**	**783470 011**	**783470 019**
Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.00**	**0.50**	**3.50**
Hole ID	**BH08**	**BH02**	**BH01**
Top Depth	**1.50**	**0.00**	**2.50**
Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**1**	**9**

Determinand	Method	LOD	Units	Symbol			
Benzo(a)Pyrene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Indeno(123-cd)Pyrene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Dibenzo(ah)Anthracene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Benzo(ghi)Perylene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Benzo(b)fluoranthene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]
Benzo(k)fluoranthene	GC/MS (1l ext.)	1	µg/l	U	<10[26]	<10[26]	<10[26]

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Poly-Chlorinated Biphenyls (WHO 12)

Concept Reference	**783470 008**	**783470 011**	**783470 019**
Customer Sample Reference	**BH08**	**BH02**	**BH01 (SOIL)**
Test Sample	**10:1**	**10:1**	**10:1**
Bottom Depth	**2.00**	**0.50**	**3.50**
Hole ID	**BH08**	**BH02**	**BH01**
Top Depth	**1.50**	**0.00**	**2.50**
Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**
Time Sampled	**12:00**	**12:00**	**12:00**
AGS Type	**ES**	**ES**	**ES**
AGS Sample Reference	**6**	**1**	**9**

Determinand	Method	LOD	Units	Symbol			
Polychlorinated biphenyl BZ#81	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#77	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#105	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#114	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#118	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#123	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#126	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#156	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#157	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#167	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#169	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005
Polychlorinated biphenyl BZ#189	GC/MS	0.005	µg/l	U	<0.005	<0.005	<0.005

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Phenols (Speciated)

	Concept Reference	783470 008	783470 011	783470 019
	Customer Sample Reference	BH08	BH02	BH01 (SOIL)
	Test Sample	10:1	10:1	10:1
	Bottom Depth	2.00	0.50	3.50
	Hole ID	BH08	BH02	BH01
	Top Depth	1.50	0.00	2.50
	Date Sampled	06-NOV-2018	06-NOV-2018	08-NOV-2018
	Time Sampled	12:00	12:00	12:00
	AGS Type	ES	ES	ES
	AGS Sample Reference	6	1	9

Determinand	Method	LOD	Units	Symbol			
Catechol	HPLC	0.005	mg/l	N	<0.005	<0.005	<0.005
Cresols	HPLC	0.005	mg/l	N	<0.005	<0.005	<0.005
Naphthols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01
Phenol	HPLC	0.005	mg/l	N	<0.005(13)	<0.005(13)	<0.005(13)
Resorcinol	HPLC	0.005	mg/l	N	<0.005	<0.005	<0.005
Total Phenols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01
Trimethyl phenols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01
Xylenols	HPLC	0.01	mg/l	N	<0.01	<0.01	<0.01

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Special Waste Leachate Suite - Clause 15.7

	Concept Reference	783470 008	783470 011	783470 019
	Customer Sample Reference	BH08	BH02	BH01 (SOIL)
	Test Sample	10:1	10:1	10:1
	Bottom Depth	2.00	0.50	3.50
	Hole ID	BH08	BH02	BH01
	Top Depth	1.50	0.00	2.50
	Date Sampled	06-NOV-2018	06-NOV-2018	08-NOV-2018
	Time Sampled	12:00	12:00	12:00
	AGS Type	ES	ES	ES
	AGS Sample Reference	6	1	9

Determinand	Method	LOD	Units	Symbol			
pH	Probe			U	**7.59**	**7.63**	**7.70**
Sulphate	Discrete Analyser	0.5	mg/l	U	**150**	**130**	**92**
Chloride	Discrete Analyser	1	mg/l	U	**930**	**940**	**470**
Ammonia expressed as N	Discrete Analyser	0.05	mg/l	U	<0.05	**0.50**	<0.05
Nitrate	Discrete Analyser	0.5	mg/l	U	<0.5	<0.5	<0.5
Nitrite	Discrete Analyser	0.1	mg/l	U	<0.1	<0.1	<0.1
orthophosphate	Discrete Analyser	0.5	mg/l	N	<0.5	<0.5	<0.5
Cyanide (Total)	Colorimetry	0.05	mg/l	U	<0.05	<0.05	<0.05
Benzo(j)fluoranthene	GC/MS (SIR)	0.01	mg/l	N	<0.02(100,13)	<0.02(100,13)	<0.02(13,100)
Dibutyl tin	GC/MS (Deriv.)	0.01	µg/l	N	<0.01	<0.01	<0.01
Tributyl tin	GC/MS (Deriv.)	0.01	µg/l	N	<0.01	<0.01	<0.01

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**783470 005**	**783470 006**	**783470 015**	**783470 016**	**783470 017**
				Customer Sample Reference	**BH07**	**BH07**	**BH01**	**BH01**	**BH07 (MARINE SEDIMENT)**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**1.50**	**3.50**	**3.50**	**6.00**	**0.50**
				Hole ID	**BH07**	**BH07**	**BH01**	**BH01**	**BH07**
				Top Depth	**1.00**	**2.50**	**2.50**	**5.50**	**0.00**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**	**08-NOV-2018**	**06-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**4**	**8**	**9**	**16**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Naphthalene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Acenaphthylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Acenaphthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Fluorene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Phenanthrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(a)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Chrysene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(a)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Indeno(123-cd)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(ghi)Perylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(b)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Benzo(k)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Dibenzo(ah)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0
Polyaromatic Hydrocarbons (Total)	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0	<2.0	<2.0	<2.0

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
PAH US EPA 16 (B and K split)

				Concept Reference	**783470 018**	**783470 022**
				Customer Sample Reference	**BH01 (MARINE SEDIMENT)**	**Method Blank**
				Test Sample	**AR**	**AR**
				Bottom Depth	**1.00**	
				Hole ID	**BH01**	
				Top Depth	**0.00**	
				Date Sampled	**08-NOV-2018**	
				Time Sampled	**12:00**	
				AGS Type	**ES**	
				AGS Sample Reference	**1**	
				Matrix Class		
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Naphthalene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Acenaphthylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Acenaphthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Fluorene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Phenanthrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(a)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Chrysene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(a)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Indeno(123-cd)Pyrene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(ghi)Perylene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(b)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Benzo(k)fluoranthene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Dibenzo(ah)Anthracene	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0
Polyaromatic Hydrocarbons (Total)	GC/MS (HR)	2.0	µg/kg	N	<2.0	<2.0

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
PCB EC7

				Concept Reference	**783470 005**	**783470 006**	**783470 015**	**783470 016**	**783470 017**
				Customer Sample Reference	**BH07**	**BH07**	**BH01**	**BH01**	**BH07 (MARINE SEDIMENT)**
				Test Sample	**AR**	**AR**	**AR**	**AR**	**AR**
				Bottom Depth	**1.50**	**3.50**	**3.50**	**6.00**	**0.50**
				Hole ID	**BH07**	**BH07**	**BH01**	**BH01**	**BH07**
				Top Depth	**1.00**	**2.50**	**2.50**	**5.50**	**0.00**
				Date Sampled	**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**	**08-NOV-2018**	**06-NOV-2018**
				Time Sampled	**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
				AGS Type	**ES**	**ES**	**ES**	**ES**	**ES**
				AGS Sample Reference	**4**	**8**	**9**	**16**	**1**
				Matrix Class	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.10	µg/kg	U	<0.10	<0.10	<0.10	<0.10	<0.10
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1	<0.1	<0.1	<0.1
PCB EC7 (Sum)	Calc	0.7	µg/kg	N	<0.7	<0.7	<0.7	<0.7	<0.7

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
PCB EC7

Concept Reference	**783470 018**	**783470 022**
Customer Sample Reference	**BH01 (MARINE SEDIMENT)**	**Method Blank**
Test Sample	**AR**	**AR**
Bottom Depth	**1.00**	
Hole ID	**BH01**	
Top Depth	**0.00**	
Date Sampled	**08-NOV-2018**	
Time Sampled	**12:00**	
AGS Type	**ES**	
AGS Sample Reference	**1**	
Matrix Class		

Determinand	Method	LOD	Units	Symbol		
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.10	µg/kg	U	<0.10	<0.10
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.1	µg/kg	U	<0.1	<0.1
PCB EC7 (Sum)	Calc	0.7	µg/kg	N	<0.7	<0.7

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

Concept Reference					**783470 005**	**783470 006**	**783470 015**	**783470 016**	**783470 017**
Customer Sample Reference					**BH07**	**BH07**	**BH01**	**BH01**	**BH07 (MARINE SEDIMENT)**
Test Sample					**AR**	**AR**	**AR**	**AR**	**AR**
Bottom Depth					**1.50**	**3.50**	**3.50**	**6.00**	**0.50**
Hole ID					**BH07**	**BH07**	**BH01**	**BH01**	**BH07**
Top Depth					**1.00**	**2.50**	**2.50**	**5.50**	**0.00**
Date Sampled					**06-NOV-2018**	**06-NOV-2018**	**08-NOV-2018**	**08-NOV-2018**	**06-NOV-2018**
Time Sampled					**12:00**	**12:00**	**12:00**	**12:00**	**12:00**
AGS Type					**ES**	**ES**	**ES**	**ES**	**ES**
AGS Sample Reference					**4**	**8**	**9**	**16**	**1**
Matrix Class					**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	
Determinand	**Method**	**LOD**	**Units**	**Symbol**					
Arsenic (Total)	ICP/MS (Total)	1.0	mg/kg	N	**7.6**	**7.0**	**6.2**	**6.1**	**4.1**
Cadmium (Total)	ICP/MS (Total)	0.05	mg/kg	N	**0.13**	**0.09**	**0.10**	**0.10**	**0.08**
Chromium (Total)	ICP/MS (Total)	0.2	mg/kg	N	**30**	**30**	**30**	**25**	**23**
Copper (Total)	ICP/MS (Total)	0.1	mg/kg	N	**6.8**	**4.6**	**5.2**	**3.4**	**3.2**
Mercury	CVAFS	0.01	mg/kg	N	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]	<0.01[13]
Lead (Total)	ICP/MS (Total)	0.2	mg/kg	N	**12**	**11**	**12**	**10**	**11**
Nickel (Total)	ICP/MS (Total)	0.2	mg/kg	N	**15**	**15**	**14**	**12**	**9.8**
Zinc	ICP/MS (HF)	1	mg/kg	N	**100**	**56**	**66**	**38**	**25**
Tributyl tin	GC/MS	10	µg/kg	N	<10	<10	<10	<10	<10
Dibutyl tin	GC/MS	10	µg/kg	N	<10	<10	<10	<10	<10
Total Organic Carbon	OX/IR	0.1	%	N	**0.4**	**1.0**	**1.1**	**0.5**	**1.2**
Dry solids @105C	Grav (1 Dec) (105 C)	0.1	%	N	**74**	**74**	**74**	**76**	**80**
Dry solids @40C	Grav (1 Dec) (40 C)	0.1	%	N	**74**	**76**	**73**	**77**	**78**
Gasoline Range Organics (C5-C10)	GC/MS (Headspace)	10	µg/kg	N	<10	<10	<10	<10	<10
Total Petroleum Hydrocarbons (C10-C12)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C12-C16)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C16-C21)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C21-C35)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Total Petroleum Hydrocarbons (C40-C44)	GC/FID (LD)	0.1	mg/kg	N	<1.0	<1.0	<1.0	<1.0	<1.0
Poly-Chlorinated Biphenyls (Total Tri-Hepta)	GC/MS (HR)	1.4	µg/kg	U	<1.4	<1.4	<1.4	<1.4	<1.4

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Testing

Concept Reference	**783470 018**
Customer Sample Reference	**BH01 (MARINE SEDIMENT)**
Test Sample	**AR**
Bottom Depth	**1.00**
Hole ID	**BH01**
Top Depth	**0.00**
Date Sampled	**08-NOV-2018**
Time Sampled	**12:00**
AGS Type	**ES**
AGS Sample Reference	**1**
Matrix Class	

Determinand	Method	LOD	Units	Symbol	
Arsenic (Total)	ICP/MS (Total)	1.0	mg/kg	N	**5.3**
Cadmium (Total)	ICP/MS (Total)	0.05	mg/kg	N	**0.11**
Chromium (Total)	ICP/MS (Total)	0.2	mg/kg	N	**30**
Copper (Total)	ICP/MS (Total)	0.1	mg/kg	N	**3.6**
Mercury	CVAFS	0.01	mg/kg	N	<0.01(13)
Lead (Total)	ICP/MS (Total)	0.2	mg/kg	N	**13**
Nickel (Total)	ICP/MS (Total)	0.2	mg/kg	N	**12**
Zinc	ICP/MS (HF)	1	mg/kg	N	**41**
Tributyl tin	GC/MS	10	µg/kg	N	<10
Dibutyl tin	GC/MS	10	µg/kg	N	<10
Total Organic Carbon	OX/IR	0.1	%	N	**1.1**
Dry solids @105C	Grav (1 Dec) (105 C)	0.1	%	N	**73**
Dry solids @40C	Grav (1 Dec) (40 C)	0.1	%	N	**71**
Gasoline Range Organics (C5-C10)	GC/MS (Headspace)	10	µg/kg	N	<10
Total Petroleum Hydrocarbons (C10-C12)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C12-C16)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C16-C21)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C21-C35)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C40-C44)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Poly-Chlorinated Biphenyls (Total Tri-Hepta)	GC/MS (HR)	1.4	µg/kg	U	<1.4

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Disposal Blank Suite

				Concept Reference	**783470 022**
				Customer Sample Reference	**Method Blank**
				Test Sample	**AR**
Determinand	**Method**	**LOD**	**Units**	**Symbol**	
Arsenic (Total)	ICP/MS (Total)	1.0	mg/kg	N	<1.0
Cadmium (Total)	ICP/MS (Total)	0.05	mg/kg	N	<0.05
Chromium (Total)	ICP/MS (Total)	0.2	mg/kg	N	<0.2
Copper (Total)	ICP/MS (Total)	0.1	mg/kg	N	<0.1
Mercury	CVAFS	0.01	mg/kg	N	<0.01
Lead (Total)	ICP/MS (Total)	0.2	mg/kg	N	**0.6**
Nickel (Total)	ICP/MS (Total)	0.2	mg/kg	N	<0.2
Zinc	ICP/MS (HF)	1	mg/kg	N	**4**
Tributyl tin	GC/MS	10	µg/kg	N	<10
Dibutyl tin	GC/MS	10	µg/kg	N	<10
Total Organic Carbon	OX/IR	0.1	%	N	<0.1
Dry solids @40C	Grav (1 Dec) (40 C)	0.1	%	N	-(NR)
Dry solids @105C	Grav (1 Dec) (105 C)	0.1	%	N	-(NR)
Gasoline Range Organics (C5-C10)	GC/MS (Headspace)	10	µg/kg	N	<10
Total Petroleum Hydrocarbons (C10-C12)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C12-C16)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C16-C21)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C21-C35)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Total Petroleum Hydrocarbons (C40-C44)	GC/FID (LD)	0.1	mg/kg	N	<1.0
Poly-Chlorinated Biphenyls (Total Tri-Hepta)	GC/MS (HR)	1.4	µg/kg	U	<1.4

Concept Reference: 783470
Project Site: St Ola Pier, Scrabster
Customer Reference: G180030U

Marine Sediment Analysed as Marine Sediment
Marine Scotland Recovery Suite

Concept Reference	**783470 021**
Customer Sample Reference	**Matrix Spike**
Test Sample	**AR**

Determinand	Method	LOD	Units	Symbol	
Acenaphthene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Acenaphthylene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Anthracene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Benzo(a)Anthracene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Benzo(a)Pyrene Recovery	GC/MS (HR) (Recovery)	1	%	N	**98**
Benzo(b)fluoranthene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Benzo(b/k)Fluoranthene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Benzo(ghi)Perylene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Benzo(k)fluoranthene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Phenanthrene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Dibenzo(ah)Anthracene Recovery	GC/MS (HR) (Recovery)	1	%	N	**110**
Fluoranthene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Fluorene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Indeno(123-cd)Pyrene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Naphthalene Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Arsenic Recovery	ICP/MS (Recovery)	1	%	N	**100**
Cadmium Recovery	ICP/MS (Recovery)	1	%	N	**100**
Chromium Recovery	ICP/MS (Recovery)	1	%	N	**100**
Copper Recovery	ICP/MS (Recovery)	1	%	N	**100**
Mercury Recovery	CVAFS (Recovery)	1	%	N	**210**
Nickel Recovery	ICP/MS (Recovery)	1	%	N	**100**
Lead Recovery	ICP/MS (Recovery)	1	%	N	**100**
Zinc Recovery	ICP/MS (Recovery)	1	%	N	**97**
Poly-Chlorinated Biphenyls (Total Tri-Hepta) Recovery	GC/MS (HR) (Recovery)	1	%	N	**110**
Polychlorinated biphenyl BZ#101 Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Polychlorinated biphenyl BZ#118 Recovery	GC/MS (HR) (Recovery)	1	%	N	**110**
Polychlorinated biphenyl BZ#138 Recovery	GC/MS (HR) (Recovery)	1	%	N	**120**
Polychlorinated biphenyl BZ#153 Recovery	GC/MS (HR) (Recovery)	1	%	N	**96**
Polychlorinated biphenyl BZ#180 Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Polychlorinated biphenyl BZ#28 Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Polychlorinated biphenyl BZ#52 Recovery	GC/MS (HR) (Recovery)	1	%	N	**100**
Dibutyl tin Recovery	GC/MS (Recovery)	1	%	N	**92**
Tributyl tin Recovery	GC/MS (Recovery)	1	%	N	**130**
Total Organic Carbon	OX/IR (Recovery)	1	%	N	**12**

Index to symbols used in 783470-2

Value	Description
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
AR	As Received
10:1 S	Data for BS EN 12457-2 (10:1)
A40	Assisted dried < 40C
10:1	Leachate to BS EN 12457-2 (10:1)
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
N.D.	Not Detected
131	Result is outside of the scope of accreditation due to a QC Failure
13	Results have been blank corrected.
9	LOD raised due to dilution of sample
26	LOD raised because the analysis was performed by an alternative technique
110	LOD raised due to low internal standard recovery.
100	LOD determined by sample aliquot used for analysis
NR	No Result
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

These samples have been analysed exceeding recommended holding times for pH, PAH, BTEX, TPH, VOC, SVOC, PCB. It is possible therefore that the results provided may be compromised.
SVOC (leachate) testing was transferred to Concept East Kilbride.
Speciated Phenols (soil) testing was subcontracted to Exova Jones.
Speciated Phenols (leachate) testing was transferred to Concept Braintree.
Asbestos was subcontracted to REC Asbestos.

Appendix 11.1 Underwater Noise Report

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Underwater Noise Assessment

St. Ola Pier Redevelopment

www.rpsgroup.com

Quality Management

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Reviewed & checked by	Josh Wilson BSc (Hons), MIOA	Consultant		27/06/2019
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Date of Issue	02/05/2019		**Report Number**	JA10934–REPT–01–R0

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Rev	Date	Status	Reason for revision	Comments
0	02/05/2019	Issued for comment	-	-

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Contents

1 Introduction 6

2 Acoustic Concepts and Terminology 7

3 Review of Sound Propagation Concepts 11

4 Underwater Noise Assessment Methodology 15

Assessment Criteria 15

Source Noise Levels 21

Noise Propagation Modelling Methodology 23

5 Baseline Noise 25

6 Results and Assessment 31

Impact Piling Noise Modelling Results 31

Construction and Operational Vessel Noise Modelling Results 34

7 Conclusions 35

Tables, Figures and Appendices

Tables

Table 4.1: Summary of PTS onset acoustic thresholds (NMFS 2018)

Table 4.2: Criteria for onset of injury to fish due to impulsive piling (Popper *et al.*, 2014)

Table 4.3: Criteria for onset of behavioural effects in fish for impulsive piling (Popper et al., 2014)

Table 4.4 Piling noise source levels used in assessment (un-weighted)

Table 4.5: Source noise data for vessels.

Table 5.1: Summary of average background levels of noise around the UK coast (Brooker *et al.*, 2012).

Table 6.1 Summary of injury ranges for marine mammals due to impact piling (N/E = threshold not exceeded)

Table 6.2 Summary of injury ranges for fish due to impact piling

Table 6.3 Summary of injury and disturbance ranges for marine mammals due to vessels (N/E = threshold not exceeded)

Table 6.4 Summary of injury and disturbance ranges for fish due to vessels (N/E = threshold not exceeded)

Figures

Figure 2.1: Graphical representation of acoustic wave descriptors

Figure 2.2: Comparison between hearing thresholds of different marine animals and humans

Figure 3.1: Lower cut-off frequency as a function of depth for a range of seabed types.

Figure 3.2: Absorption loss coefficient (α), dB/km (pH 8, 5 ºC, salinity 35 ppt).

Figure 4.1 Hearing weighting functions for pinnipeds and cetaceans (NMFS, 2018)

Figure 5.1: Generalised ambient noise spectra attributable to various noise sources (Wenz 1962).

Figure 5.2: Summary of Power Spectral Density levels of background underwater noise at Sea State 1 at sites around the UK coast (Brooker, Barham, and Mason 2012).

Figure 5.3: Summary of Power Spectral Density levels of background underwater noise at Sea State 3 at sites around the UK coast (Brooker *et al.*, 2012).

Figure 5.4: Summary of power spectral density levels and third octave band sound pressure levels of background underwater noise measured in the Inner Sound (Meygen), August 2011 (Kongsberg, 2012).

Figure 6.1: Unweighted single pulse SEL contours due to impact piling

Figure 6.2: Probability of disturbance contours due to impact piling

1 Introduction

1.1 This report presents the results of a desktop appraisal considering the potential effects of underwater noise on the marine environment from construction and operation of the proposed redevelopment of St. Ola Pier at Scrabster Harbour.

1.2 Noise is readily transmitted underwater and there is potential for sound emissions from the installation and operation of the project to affect marine mammals and fish. It is considered that the key issues will be the effects of underwater noise on marine mammals and fish from the following project activities:

- construction of the new pier wall structure including impact piling of tubular steel piles and infill sheet piles;
- dredging of the inner and outer berths using a back-hoe dredger; and
- operational noise due to vessels.

1.3 This report provides an overview of the potential effects due to underwater noise from the project on the surrounding marine environment. The results from this desktop underwater noise appraisal will be used to inform the Marine Biodiversity impact assessment chapter of the EIAR in order to determine the potential impact of underwater noise on marine life. Consequently, the primary purpose of the underwater noise appraisal is to predict the likely range of onset for potential physiological and behavioural effects due to increased anthropogenic noise due to the installation, operation and maintenance, or decommissioning phases of the project. The sensitivity of species, magnitude of impact and significance of impact from underwater noise associated with the project are dealt with in the Marine Biodiversity chapter of the EIAR.

2 Acoustic Concepts and Terminology

2.1 Sound travels through water as vibrations of the fluid particles in a series of pressure waves. The waves comprise a series of alternating compressions (positive pressure variations) and rarefactions (negative pressure fluctuations). Because sound consists of variations in pressure, the unit for measuring sound is usually referenced to a unit of pressure, the Pascal (Pa). The unit usually used to describe sound is the decibel (dB) and, in the case of underwater sound, the reference unit is taken as 1 µPa, whereas airborne sound is usually referenced to a pressure of 20 µPa. To convert from a sound pressure level referenced to 20 µPa to one referenced to 1 µPa, a factor of 20 log (20/1) i.e. 26 dB has to be added to the former quantity. Thus, a sound pressure of 60 dB re 20 µPa is the same as 86 dB re 1 µPa, although care also needs to be taken when converting from in air noise to in water noise levels due to the different sound speeds and densities of the two mediums resulting in a conversion factor of 62 dB. All underwater sound pressure levels in this report are described in dB re 1 µPa. In water, the sound source strength is defined by its sound pressure level in dB re 1 µPa, referenced back to a representative distance of 1 m from an assumed (infinitesimally small) point source. This allows calculation of sound levels in the far-field. For large distributed sources, the actual sound pressure level in the near-field will be lower than predicted.

2.2 There are several descriptors used to characterise a sound wave. The difference between the lowest pressure variation (rarefaction) and the highest pressure variation (compression) is the peak to peak (or pk-pk) sound pressure level. The difference between the highest variation (either positive or negative) and the ambient pressure is called the peak pressure level. Lastly, the root mean square (rms) sound pressure level is used as a description of the average amplitude of the variations in pressure over a specific time window. These descriptions are shown graphically in Figure 2.1.

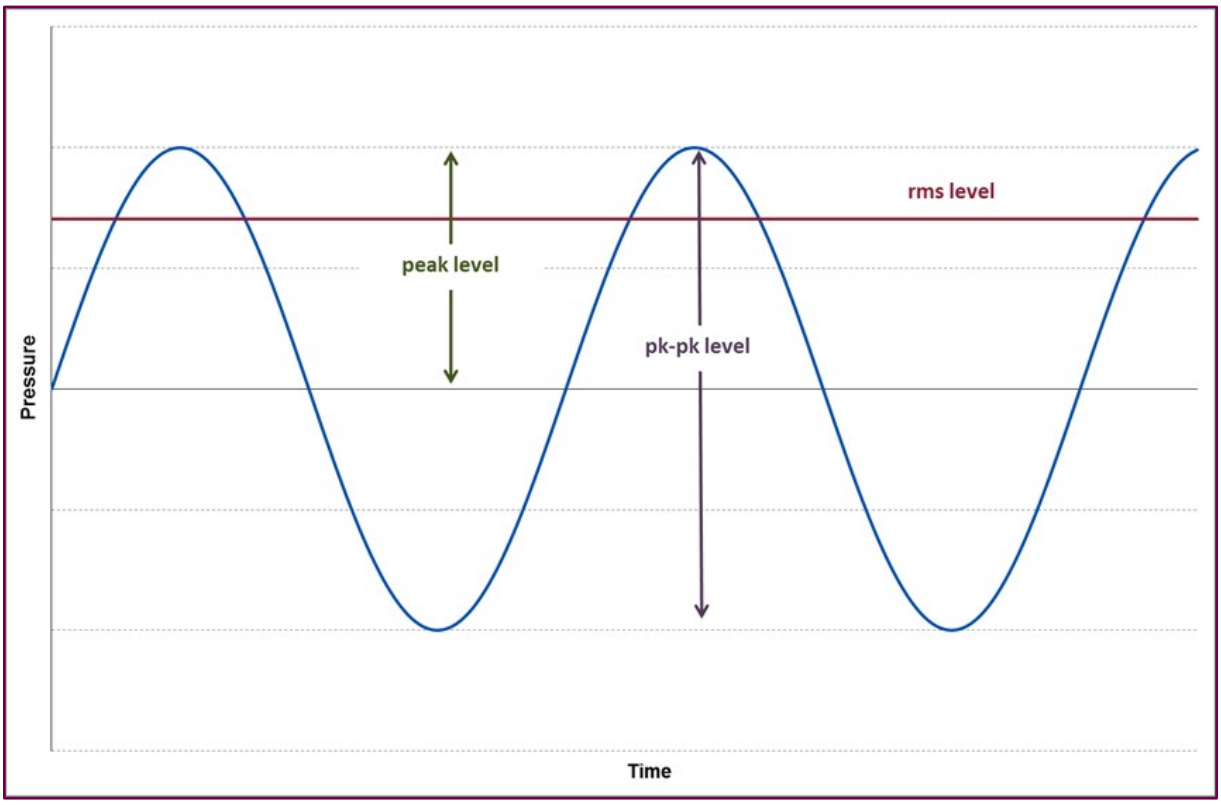

Figure 2.1: Graphical representation of acoustic wave descriptors

2.3 The rms sound pressure level (SPL) is defined as follows:

$$SPL_{rms} = 10log_{10}\left(\frac{1}{T}\int_{0}^{T}\left(\frac{p^2}{p_{ref}^2}\right)dt\right)$$

2.4 Another useful measure of sound used in underwater acoustics is the Sound Exposure Level, or SEL. This descriptor is used as a measure of the total sound energy of an event or a number of events (e.g. over the course of a day) and is normalised to one second. This allows the total acoustic energy contained in events lasting a different amount of time to be compared on a like for like basis. Historically, use was primarily made of rms and peak sound pressure level metrics for assessing the potential effects of sound on marine life. However, the SEL is increasingly being used as it allows exposure duration and the effect of exposure to multiple events over a 24 hour period to be taken into account. The SEL is defined as follows:

$$SEL = 10log_{10}\left(\int_{0}^{T}\left(\frac{p^2(t)}{p_{ref}^2 t_{ref}}\right)dt\right)$$

2.5 The frequency, or pitch, of the sound is the rate at which these oscillations occur and is measured in cycles per second, or Hertz (Hz). When sound is measured in a way which approximates to how a human would perceive it using an A-weighting filter on a sound level meter, the resulting level is described in values of dBA. However, the hearing faculties of marine mammals and fish are not the same as humans, with marine mammals hearing over a wider range of frequencies, fish over a typically smaller range of frequencies and both with different sensitivities. It is therefore important to understand how an animal's hearing varies over the entire frequency range in order to assess the effects of sound on marine life. Consequently, use can be made of frequency weighting scales to determine the level of the sound in comparison with the auditory response of the animal concerned. A comparison between the typical hearing response curves for fish, humans and marine mammals is shown in Figure 2.2. It is worth noting that hearing thresholds are sometimes shown as audiograms with sound level on the y axis rather than sensitivity, resulting in the graph shape being the inverse of the graph shown. It is also worth noting that some fish are sensitive to particle velocity rather than pressure, although paucity of data relating to particle velocity levels for anthropogenic noise sources means that it is often not possible to quantify this effect.

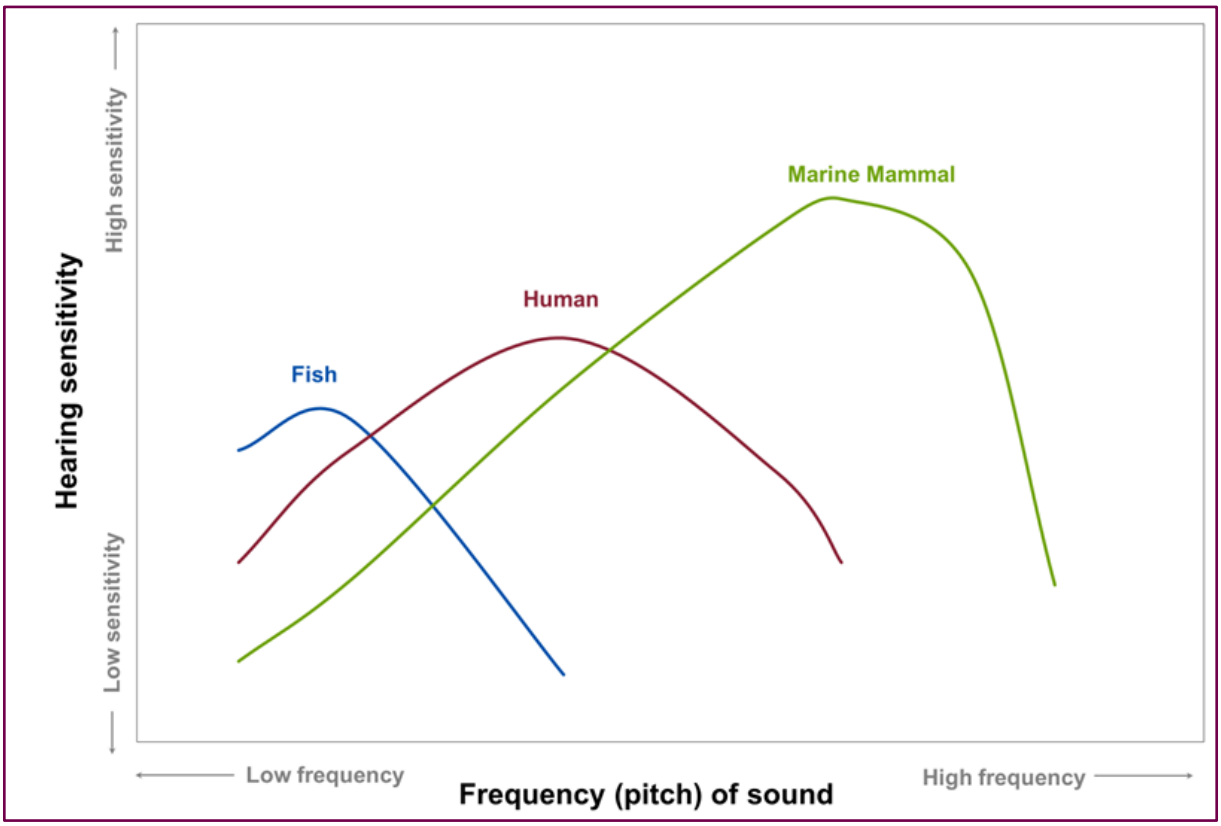

Figure 2.2: Comparison between hearing thresholds of different marine animals and humans.

3 Review of Sound Propagation Concepts

3.1 Increasing the distance from the noise source usually results in the level of noise getting lower, due primarily to the spreading of the sound energy with distance, analogous to the way in which the ripples in a pond spread after a stone has been thrown in.

3.2 The way that the noise spreads will depend upon several factors such as water column depth, pressure, temperature gradients, salinity, as well as water surface and seabed conditions. Thus, even for a given locality, there are temporal variations to the way that sound will propagate. However, in simple terms, the sound energy may spread out in a spherical pattern (close to the source) or a cylindrical pattern (much further from the source), although other factors mean that decay in sound energy may be somewhere between these two simplistic cases.

3.3 In acoustically shallow waters[1] in particular, the propagation mechanism is coloured by multiple interactions with the seabed and the water surface (Lurton, 2002; Etter, 2013; Urick, 1983; Brekhovskikh and Lysanov 2003, Kinsler *et al.,* 1999). Whereas in deeper waters, the sound will propagate further without encountering the surface or bottom of the sea, in shallower waters the sound may be reflected from either or both boundaries (potentially more than once).

3.4 At the sea surface, the majority of sound is reflected back in to the water due to the difference in acoustic impedance (i.e. sound speed and density) between air and water. However, scattering of sound at the surface of the sea is an important factor with respect to the propagation of sound from a source. In an ideal case (i.e. for a perfectly smooth sea surface), the majority of sound wave energy will be reflected back into the sea. However, for rough waters, much of the sound energy is scattered (Eckart, 1953; Fortuin, 1970; Marsh, Schulkin, and Kneale, 1961; Urick and Hoover, 1956). Scattering can also occur due to bubbles near the surface such as those generated by wind or fish or due to suspended solids in the water such as particulates and marine life. Scattering is more pronounced for higher frequencies than for low frequencies and is dependent on the sea state (i.e. wave height). However, the various factors affecting this mechanism are complex.

3.5 Because surface scattering results in differences in reflected sound, its effect will be more important at longer ranges from the source sound and in acoustically shallow water (i.e. where

[1] Acoustically, shallow water conditions exist whenever the propagation is characterised by multiple reflections with both the sea surface and seabed (Etter, 2013). Consequently, the depth at which water can be classified as acoustically deep or shallow depends upon numerous factors including the sound speed gradient, water depth, frequency of the sound and distance between the source and receiver.

there are multiple reflections between the source and receiver). The degree of scattering will depend upon the water surface smoothness / wind speed, water depth, frequency of the sound, temperature gradient, grazing angle and range from source. Depending upon variations in the aforementioned factors, significant scattering could occur at sea state 3 or more for higher frequencies (e.g. 15 kHz or more). It should be noted that variations in propagation due to scattering will vary temporally (primarily due to different sea-states / wind speeds at different times) and that more sheltered areas (which are more likely to experience calmer waters) could experience surface scattering to a lesser extent and less frequently than less sheltered areas which are likely to encounter rougher waters. However, over shorter ranges (e.g. a few hundred meters or less) the sound will experience fewer reflections and so the effect of scattering should not be significant. Consequently, taking into account the sheltered location and likely distances over which injury will occur, this effect is unlikely to significantly affect the injury ranges presented in this report, although it is possible that disturbance ranges could vary depending on local and seasonal conditions.

3.6 When sound waves encounter the seabed, the amount of sound reflected will depend on the geoacoustic properties of the seabed (e.g. grain size, porosity, density, sound speed, absorption coefficient and roughness) as well as the grazing angle and frequency of the sound (Cole, 1965; Hamilton, 1970; Mackenzie, 1960; McKinney and Anderson, 1964; Etter, 2013; Lurton, 2002; Urick, 1983). Thus, seabeds comprising primarily mud or other acoustically soft sediment will reflect less sound than acoustically harder seabeds such as rock or sand. This will also depend on the profile of the seabed (e.g. the depth of the sediment layer and how the geoacoustic properties vary with depth below the sea floor). The effect is less pronounced at low frequencies (a few kHz and below) and so might not be a significant factor to take into account with respect to drilled pin piling noise (where most of the acoustic energy is at frequencies of a few hundred Hz). A scattering effect (similar to that which occurs at the surface) also occurs at the seabed (Essen, 1994; Greaves and Stephen, 2003; McKinney and Anderson, 1964; Kuo, 1992), particularly on rough substrates (e.g. pebbles).

3.7 Another phenomenon is the waveguide effect which means that shallow water columns do not allow the propagation of low frequency sound (Urick, 1983; Etter, 2013). The cut-off frequency of the lowest mode in a channel can be calculated based on the water depth and knowledge of the sediment geoacoustic properties. Any sound below this frequency will not propagate far due to energy losses through multiple reflections. The cut-off frequency as a function of water depth is shown in Figure 3.1 for a range of seabed types. Thus, for a water depth of 10 m (i.e. shallow waters typical of coastal areas) the cut-off frequency would be approximately 70 Hz for sand, 100 Hz for silt, 140 Hz for clayey silt and 40 Hz for bedrock.

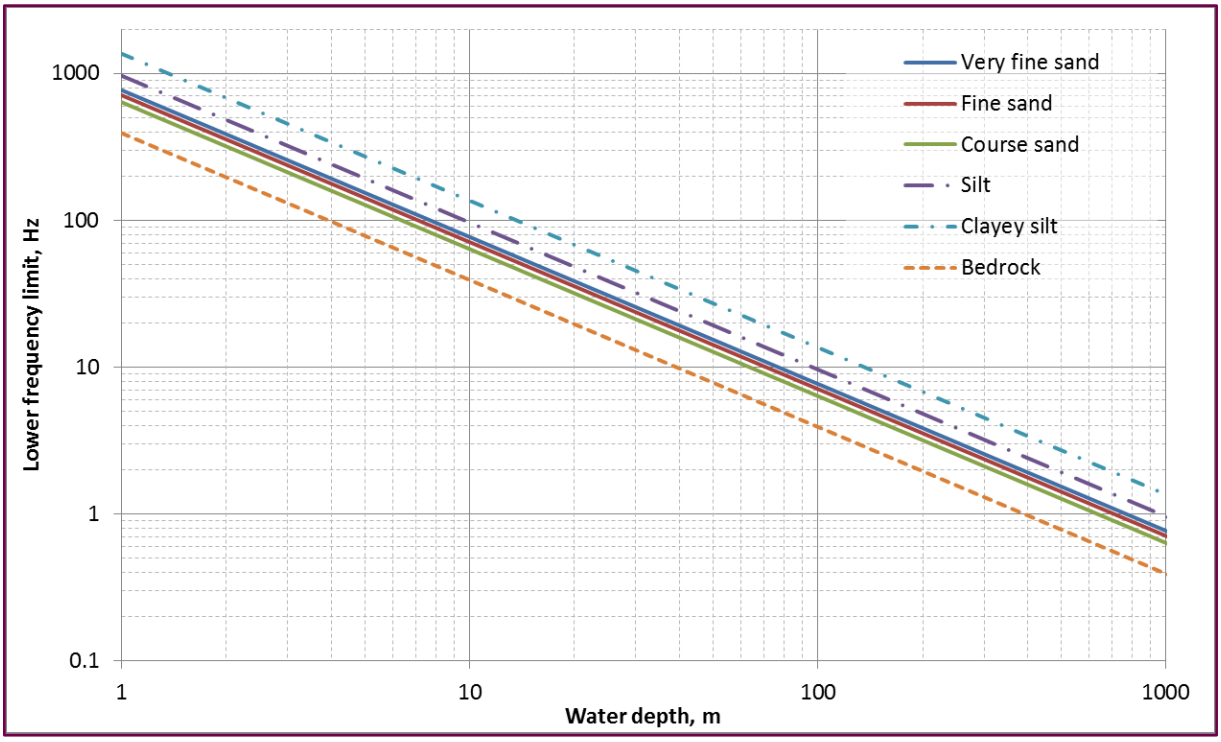

Figure 3.1: Lower cut-off frequency as a function of depth for a range of seabed types.

3.8 Sound energy can also be absorbed due to interactions at the molecular level converting the acoustic energy into heat. This is another frequency dependent effect with higher frequencies experiencing much higher losses than lower frequencies. This is shown in Figure 3.2. Although the effect of this absorption will be higher in cold water and with higher levels of MgSO4, these variations are relatively insignificant.

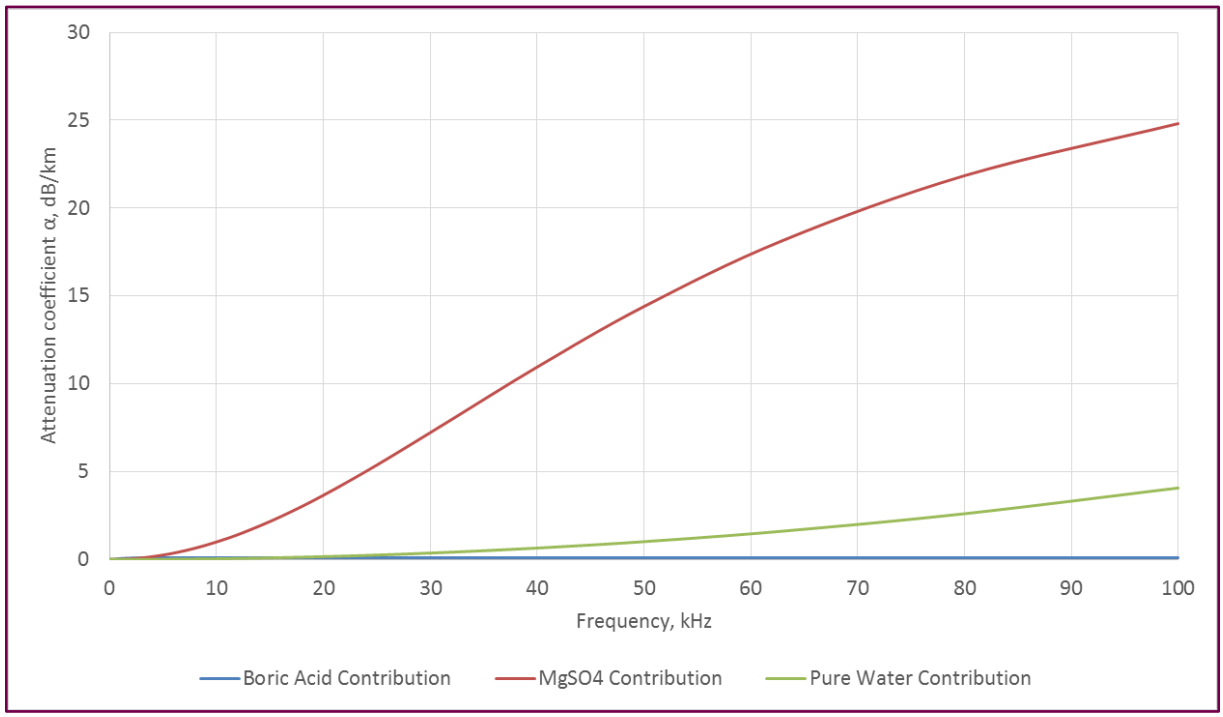

Figure 3.2: Absorption loss coefficient (α), dB/km (pH 8, 5 ºC, salinity 35 ppt).

4 Underwater Noise Assessment Methodology

Assessment Criteria

General

4.1 In order to determine the potential spatial range of injury and disturbance, assessment criteria have been developed based on a review of available evidence including national and international guidance and scientific literature. The following sections summarise the relevant criteria and describe the evidence base used to derive them.

4.2 Underwater noise has the potential to affect marine life in different ways depending on its noise level and characteristics. Assessment criteria generally separate sound into two distinct types, as follows:

- **Impulsive sounds** which are typically transient, brief (less than one second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (ANSI 1986; NIOSH 1998; ANSI 2005). This category includes sound sources such as seismic surveys, impact piling and underwater explosions; and
- **Non-impulsive (continuous) sounds** which can be broadband, narrowband or tonal, brief or prolonged, continuous or intermittent and typically do not have a high peak sound pressure with rapid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH 1998). This category includes sound sources such as continuous running machinery, sonar and vessels.

4.3 The proposed project does not include any potential sources of impulsive sound. Consequently, only the non-impulsive (continuous) sound criteria are of relevance.

4.4 The acoustic assessment criteria for marine mammals and fish in this report has followed the latest International guidance, (based on the best available scientific information), that are widely accepted for assessments in the UK, Europe and worldwide.

Injury and Disturbance to Marine mammals

4.5 Richardson *et al*. (Richardson and Thomson 1995) defined four zones of noise influence which vary with distance from the source and level as follows:

- injury/hearing loss;
- responsiveness;

- masking; and
- audibility.

4.6 For this study, it is the zones of injury and responsiveness (i.e. behavioural effects) that are of concern; there is insufficient evidence to properly evaluate masking.

4.7 The zone of injury in this study is classified as the distance over which a marine mammal can suffer a Permanent Threshold Shift (PTS) leading to non-reversible auditory injury. Injury thresholds are based on a dual criteria approach using both linear (i.e. un-weighted) peak SPL and marine mammal hearing-weighted SELs. The hearing weighting function is designed to represent the bandwidth for each group within which acoustic exposures can have auditory effects. The categories include:

- **Low-frequency (LF) cetaceans** (i.e. marine mammal species such as baleen whales with an estimated functional hearing range between 7 Hz and 35 kHz);
- **Mid-frequency (MF) cetaceans** (i.e. marine mammal species such as dolphins, toothed whales, beaked whales and bottlenose whales with an estimated functional hearing range between 150 Hz and 160 kHz);
- **High-frequency (HF) cetaceans** (i.e. marine mammal species such as true porpoises, Kogia, river dolphins and cephalorhynchid with an estimated functional hearing range between 275 Hz and 160 kHz); and
- **Phocid pinnipeds (PW)** (i.e. true seals with an estimated functional hearing range between 50 Hz and 86 kHz); and
- **Otariid pinnipeds (OW)** (i.e. sea lions and fur seals with an estimated functional hearing range between 60 Hz and 39 kHz)[2].

4.8 These weightings have therefore been used in this study and are shown in Figure 4.1.

[2] As no sea lions or fur seals are predicted to occur within the marine mammal regional study area, this category is provided for information only.

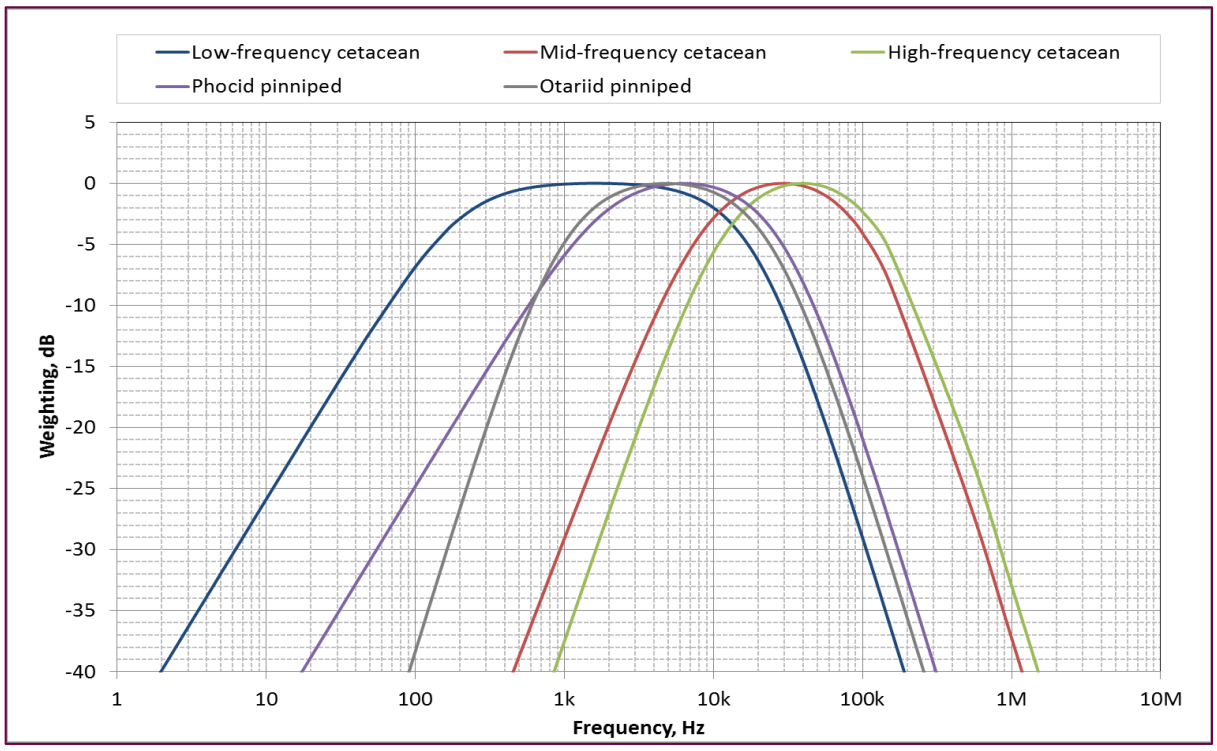

Figure 4.1 Hearing weighting functions for pinnipeds and cetaceans (NMFS, 2018).

4.9 Injury criteria are proposed in NOAA (NMFS, 2018) are for two different types of sound as follows:

- **Impulsive sounds** which are typically transient, brief (less than 1 second), broadband, and consist of high peak sound pressure with rapid rise time and rapid decay (ANSI 1986; NIOSH 1998; ANSI 2005). This category includes sound sources such as seismic surveys, impact piling and underwater explosions; and
- **Non-impulsive sounds** which can be broadband, narrowband or tonal, brief or prolonged, continuous or intermittent and typically do not have a high peak sound pressure with rapid rise/decay time that impulsive sounds do (ANSI 1995; NIOSH 1998). This category includes sound sources such as continuous running machinery, sonar and vessels.

4.10 The criteria for impulsive sound has been adopted for this study given the nature of the sound produced by impulsive piling, where the pile is driven into pre-drilled socket utilising a percussive hammer. The relevant criteria proposed by NOAA are as summarised in Table 4.1. The SEL criteria are marine mammal hearing weighted whereas the peak criteria are unweighted.

Table 4.1: Summary of PTS onset acoustic thresholds (NMFS 2018).

Hearing Group	Parameter	Impulsive	Non-impulsive
Low-frequency (LF) cetaceans	Peak, dB re 1 µPa (unweighted)	219	-
	SEL, dB re 1 µPa^{2}s (LF weighted)	183	199
Mid-frequency (MF) cetaceans	Peak, dB re 1 µPa (unweighted)	230	-
	SEL, dB re 1 µPa^{2}s (MF weighted)	185	198
High-frequency (HF) cetaceans	Peak, dB re 1 µPa (unweighted)	202	-
	SEL, dB re 1 µPa^{2}s (HF weighted)	155	173
Phocid pinnipeds (PW)	Peak, dB re 1 µPa (unweighted)	218	-
	SEL, dB re 1 µPa^{2}s (PW weighted)	185	201
Otariid pinnipeds (OW)	Peak, dB re 1 µPa (unweighted)	232	-
	SEL, dB re 1 µPa^{2}s (OW weighted)	203	219

4.11 Beyond the area in which injury may occur, the effect on marine mammal behaviour is the most important measure of impact. Significant (i.e. non-trivial) disturbance may occur when there is a risk of animals incurring sustained or chronic disruption of behaviour or when animals are displaced from an area, with subsequent redistribution being significantly different from that occurring due to natural variation.

4.12 To consider the possibility of significant disturbance resulting from the project, it is therefore necessary to consider the likelihood that the sound could cause non-trivial disturbance, the likelihood that the sensitive receptors will be exposed to that sound and whether the number of animals exposed are likely to be significant at the population level. Assessing this is however a very difficult task due to the complex and variable nature of sound propagation, the variability of documented animal responses to similar levels of sound, and the availability of population estimates and regional density estimates for all marine mammal species.

4.13 The approach taken in this assessment follows that set out in Graham *et al.* (2017). This approach uses recent empirical evidence from piling at the Beatrice offshore wind farm which was used to derive a dose-response curve for harbour porpoise. The unweighted single pulse SEL contours are plotted in 5 dB increments and applied the dose-response curve to estimate the number of animals that would be disturbed by piling within each stepped contour. This approach was recently applied to the Hornsea Three offshore wind farm. The same dose-response curve has been used for all species groups as a precautionary approach.

4.14 The (NMFS, 2005) guidance sets the marine mammal level B harassment threshold for continuous noise at 120 dB re 1 µPa (rms). This value sits approximately mid-way between the range of values identified in Southall *et al*. (2007) for continuous sound but is lower than the value

at which the majority of mammals responded at a response score of 6 (i.e. once the received rms sound pressure level is greater than 140 dB re 1 µPa). Taking into account the paucity and high-level variation of data relating to onset of behavioural effects due to continuous sound, it is recommended that any ranges predicted using this number are viewed as probabilistic and potentially over-precautionary.

Injury and Disturbance to Fish

4.15 Adult fish not in the immediate vicinity of the noise generating activity are generally able to vacate the area and avoid physical injury. However, larvae and spawn are not highly mobile and are therefore more likely to incur injuries from the sound energy in the immediate vicinity of the sound source, including damage to their hearing, kidneys, hearts and swim bladders. Such effects are unlikely to happen outside of the immediate vicinity of even the highest energy sound sources.

4.16 For fish, the most relevant criteria for injury are considered to be those contained in the recent Sound Exposure Guidelines for Fishes and Sea Turtles (Popper *et al.*, 2014). The guidelines set out criteria for injury due to different sources of noise. Those relevant to the Proposals are considered to be those for injury due to impulsive piling[3]. The criteria include a range of indices including SEL, rms and peak sound pressure levels. Where insufficient data exist to determine a quantitative guideline value, the risk is categorised in relative terms as “high”, “moderate” or “low” at three distances from the source: “near” (i.e. in the tens of metres), “intermediate” (i.e. in the hundreds of metres) or “far” (i.e. in the thousands of metres). It should be noted that these qualitative criteria cannot differentiate between exposures to different noise levels and therefore all sources of noise, no matter how noisy, would theoretically elicit the same assessment result. However, because the qualitative risks are generally qualified as “low”, with the exception of a moderate risk at “near” range (i.e. within tens of metres) for some types of animal and impairment effects, this is not considered to be a significant issue with respect to determining the potential effect of noise on fish.

4.17 The criteria used in this noise assessment are given in Table 4.2. In the table, both peak and SEL criteria are unweighted.

[3] Guideline exposure criteria for explosions, seismic surveys, continuous sound and naval sonar are also presented though are not applicable to this Project.

Table 4.2: Criteria for onset of injury to fish due to impulsive piling (Popper *et al.*, 2014).

Type of animal	Parameter	Mortality and potential mortal injury	Recoverable injury
Fish: no swim bladder (particle motion detection)	SEL, dB re 1 μPa^2s	>219	>216
	Peak, dB re 1 µPa	>213	>213
Fish: where swim bladder is not involved in hearing (particle motion detection)	SEL, dB re 1 μPa^2s	210	203
	Peak, dB re 1 µPa	>207	>207
Fish: where swim bladder is involved in hearing (primarily pressure detection)	SEL, dB re 1 μPa^2s	207	203
	Peak, dB re 1 µPa	>207	>207
Eggs and larvae	SEL, dB re 1 μPa^2s	>210	(*Near*) Moderate (*Intermediate*) Low (*Far*) Low
	Peak, dB re 1 µPa	>207	

4.18 Behavioural reaction of fish to sound has been found to vary between species based on their hearing sensitivity. Typically, fish sense sound via particle motion in the inner ear which is detected from sound-induced motions in the fish's body. The detection of sound pressure is restricted to those fish which have air filled swim bladders; however, particle motion (induced by sound) can be detected by fish without swim bladders[4].

4.19 Highly sensitive species such as herring have elaborate specialisations of their auditory apparatus, known as an otic bulla - a gas-filled sphere, connected to the swim bladder, which enhances hearing ability. The gas filled swim bladder in species such as cod and salmon may be involved in their hearing capabilities, so although there is no direct link to the inner ear, these species are able to detect lower sound frequencies and as such are considered to be of medium sensitivity to noise. Flat fish and elasmobranchs have no swim bladders and as such are considered to be relatively less sensitive to sound pressure.

4.20 The most recent criteria for disturbance are considered to be those contained in Popper et al. (2014) which set out criteria for disturbance due to different sources of noise. The risk of behavioural effects is categorised in relative terms as "high", "moderate" or "low" at three distances from the source: "near" (i.e. in the tens of metres), "intermediate" (i.e. in the hundreds of metres) or "far" (i.e. in the thousands of metres), as shown in Table 4.3.

[4] It should be noted that the presence of a swim bladder does not necessarily mean that the fish can detect pressure. Some fish have swim bladders that are not involved in the hearing mechanism and can only detect particle motion.

Table 4.3: Criteria for onset of behavioural effects in fish for impulsive piling (Popper *et al.*, 2014).

Type of animal	Relative risk of behavioural effects
Fish: no swim bladder (particle motion detection)	(*Near*) High (*Intermediate*) Moderate (*Far*) Low
Fish: where swim bladder is not involved in hearing (particle motion detection)	(*Near*) High (*Intermediate*) Moderate (*Far*) Low
Fish: where swim bladder is involved in hearing (primarily pressure detection)	(*Near*) High (*Intermediate*) High (*Far*) Moderate
Eggs and larvae	(*Near*) Moderate (*Intermediate*) Low (*Far*) Low

4.21 It is important to note that the Popper *et al*. (2014) criteria for disturbance due to sound are qualitative rather than quantitative. Consequently, a source of noise of a particular type (e.g. piling) would result in the same predicted impact, no matter the level of noise produced or the propagation characteristics.

4.22 Therefore, the criteria presented in the Washington State Department of Transport Biological Assessment Preparation for Transport Projects Advanced Training Manual (WSDOT 2011) are also used in this assessment for predicting the extent of behavioural effects. The manual suggests an un-weighted sound pressure level of 150 dB re 1 µPa (rms) as the criterion for onset of behavioural effects, based on work by Hastings (2002). Sound pressure levels in excess of 150 dB re 1 µPa (rms) are expected to cause temporary behavioural changes, such as elicitation of a startle response, disruption of feeding, or avoidance of an area. The document notes that levels exceeding this threshold are not expected to cause direct permanent injury but may indirectly affect the individual fish (such as by impairing predator detection). It is important to note that this threshold is for onset of potential effects, and not necessarily an 'adverse effect' threshold.

Source Noise Levels

4.23 Noise sources are usually described in dB re 1 µPa as if measured at 1 m from the source. In practice, it is not usually possible to measure at 1 m from a source, but this method allows different source levels to be compared and reported on a like-for-like basis. This method of specification involves assuming that the source is infinitesimally small so that at 1 m from this imagined point the sound pressure levels can be defined. In reality, for a large sound source such as a pile this

imagined point at 1 m from the acoustic centre does not exist. Furthermore, the energy is distributed across the source and does not all emanate from this imagined acoustic centre point. Therefore, the stated sound pressure level at 1 m does not actually occur for large sources, such as piles. In the acoustic near-field, the sound pressure level will be significantly lower than would be predicted using this method.

4.24 The sound generated and radiated by a pile as it is driven into the ground is complex, due to the many components which make up the generation and radiation mechanisms. However, a wealth of experimental data are available which allow us to predict with a good degree of accuracy the sound generated by a pile at discrete frequencies. Third-octave band noise spectra have been presented in literature for various piling activities (e.g. Matuschek and Betke 2009; De Jong and Ainslie 2008; Wyatt 2008; J. R. Nedwell *et al*. 2007; J. Nedwell and Howell 2004; Jeremy Nedwell *et al.,* 2003; CDoT 2001; Nehls *et al.*, 2007; Thomsen *et al.*, 2006).

4.25 For this project, the assessment has been carried out for a worst case scenario of installation of 1.219 m diameter steel tubular piles installed using an impact pile hammer with a maximum hammer energy of 240 kJ.

4.26 Changing the hammer energy used to install a pile will result in a change in emitted noise. The assumption used for the modelling is that approximately 0.5% of the hammer energy is converted into sound in order to derive the SEL (based on a review of literature from Robinson *et al*., 2009, Robinson *et al*., 2013, Lepper, 2007, Lepper *et al.*, 2012 and Bailey *et al*., 2010).

4.27 Wyatt (2008) provides a method for estimating the peak-to-peak sound pressure level of a pile of known diameter, D, using the equation P = 230.25 x D0.0774. Root mean square (rms) sound pressure levels were calculated assuming a typical T90 pulse duration (*i.e*. the period that contains 90% of the total cumulative sound energy) of 100 ms.

Table 4.4 Piling noise source levels used in assessment (un-weighted).

Parameter	Source level at 1 m
SEL per blow @ 1 m, dB re 1 μPa^2s	195
Peak sound pressure level @ 1 m, dB re 1 μPa	228
rms_{T90} sound pressure level @ 1 m, dB re 1 μPa	205

4.28 The SEL exposure resulting from piling noise assumes that each hammer blow will contribute to the overall exposure of the marine mammal or fish, and that the piling operation has a fixed duration (4 hours) over which the number of blows per minute remains constant (assumed maximum speed 40 strikes per minute). Subsequently, the SEL exposure is calculated by

considering the total number of blows likely to be experienced by a mammal moving away from the piling operation at a constant speed. It also assumes that there is no hearing recovery between hammer blows and therefore represents a worst case conservative assessment.

4.29 Root mean square (rms) sound pressure levels were calculated assuming a typical T90 pulse duration (i.e. the period that contains 90% of the total cumulative sound energy) of 0.1 s.

4.30 Peak and rms sound pressure levels are not cumulative in the same way as SEL exposure, and assessments are made against levels for individual hammer blows.

4.31 Noise source data for construction and operational vessels have been estimated using proxy data from publicly available data, as set out in Table 4.5.

Table 4.5: Source noise data for vessels.

Item	Description/assumptions	Data source	Source sound pressure level at 1 m	
			Rms, dB re 1 µPa	SEL(24h), dB re 1 µPa^{2}s
Construction:				
Backhoe dredger	Manu Pekka used as proxy	Nedwell *et al*. (2008)	163	212
Work / safety boat	Tug used as proxy	Richardson (1995)	172	221
Tug	Tug used as proxy	Richardson (1995)	172	221
Operation:				
Cruise vessel	Cruise ship used as proxy	Malme et al. (1989)	168	217
Offshore support vessel	Tug used as proxy	Richardson (1995)	172	221

Noise Propagation Modelling Methodology

4.32 Sound propagation modelling for this assessment was based on an established, peer reviewed, range dependent sound propagation model which utilises the semi-empirical model developed by (Rogers 1981). The model provides a robust balance between complexity and technical rigour over a wide range of frequencies, has been validated by numerous field studies and has been benchmarked against a range of other models. The following inputs are required for the model:

- third-octave band source sound level data;
- range (distance from source to receiver);
- water column depth (input as bathymetry data grid);

- sediment and water sound speed profiles and densities;
- sediment attenuation coefficient; and
- source directivity characteristics.

4.33 It should be borne in mind that noise levels (and associated range of effects) will vary depending on actual conditions at the time (day-to-day and season-to-season) and that the model predicts a typical maximum scenario. Taking into account factors such as animal behaviour and habituation, any injury and disturbance ranges should be viewed as indicative and probabilistic ranges to assist in understanding potential impacts on marine life rather than lines either side of which an impact definitely will or will not occur (this is a similar approach to that adopted for airborne noise where a typical worst case is taken though it is known that day to day levels may vary to those calculated by 5 - 10 dB depending on wind direction etc.). Taking into account the relatively low risk associated with noise from the proposed development (no impulsive sound), it is considered that potential errors due to paucity of information on marine mammal and fish criteria thresholds and uncertainties in source data are likely to be greater that the uncertainties inherent in the high-level acoustic modelling.

4.34 As well as calculating the sound pressure levels at various distances from the source, it is also necessary to calculate the SEL for a mammal or fish using the relevant weightings described previously taking into account the amount of sound energy to which it is exposed over the course of a 24 hour period. In order to carry out this calculation, it has been assumed that a mammal will swim away from the noise source at an average speed of 1.5 ms^{-1} (or 0.5 ms^{-1} for fish). The calculation considers each pulse exposure separately resulting in a series of discrete SEL values of decreasing magnitude. As the mammal or fish swims away, the noise will become progressively quieter; the cumulative SEL is worked out by logarithmically adding the SEL to which the mammal is exposed as it travels away from the source. This calculation was used to estimate the approximate minimum start distance for a marine mammal or fish in order for it to be exposed to sufficient sound energy to result in the onset of potential injury. It should be noted that the sound exposure calculations are based on the simplistic assumption that the source is active continuously over a 24 hour period and that the animal will continue to swim away at a fairly constant relative speed. The real world situation is more complex and the noise source will

vary in space and time and the animal is likely to move in a more complex manner[5]. Baseline Noise

4.35 Background or “ambient” underwater noise is generated by a number of natural sources, such as rain, breaking waves, wind at the surface, seismic noise, biological noise and thermal noise. Biological sources include marine mammals (which use sound to communicate, build up an image of their environment and detect prey and predators) as well as certain fish and shrimp. Anthropogenic sources also add to the background noise, such as fishing boats, ships, industrial noise, seismic surveys and leisure activities. Generalised ambient noise spectra (Wenz, 1962) attributable to various noise sources including both natural and anthropogenic sources are shown in Figure 5.1.

4.36 The vast majority of research relating to both physiological effects and behavioural disturbance due to noise on marine species is based on determining the absolute noise level for the onset of that effect. As a result, criteria for assessing the effects of noise on marine mammals and fish tend to be based on the absolute noise criteria, as opposed to the difference between the baseline noise level and the specific noise being assessed (e.g. Southall *et al.*, 2007). Given the lack of evidence-based studies investigating the effects of noise relative to background on marine wildlife, the value of establishing the precise baseline noise level is somewhat diminished. It is important to understand that baseline noise levels will vary significantly depending on, amongst other factors, seasonal variations and different sea states, meaning that the usefulness of establishing such a value would be very limited. Nevertheless, it can be useful (though not essential) when undertaking an assessment of underwater noise, to have an understanding of the range of noise levels likely to be prevailing in the area, so that any noise predictions can be placed in the context of the baseline. It is important to note however, that even if an accurate baseline noise level could be determined, there is a paucity of scientific understanding regarding how various species distinguish anthropogenic sound relative to masking noise.

[5] Swim speeds of marine mammals have been shown to be up to 5 ms^{-1} (e.g. cruising minke whale 3.25 ms^{-1} (Cooper et al. 2008) and, harbour porpoise up to 4.3 ms^{-1} (Otani et al. 2000)). The more conservative swim speed of 1.5 ms^{-1} used in this assessment allows some headroom to account for the potential that the marine mammal might not swim directly away from the source, could change direction or does not maintain a fast swim speed over a prolonged period.

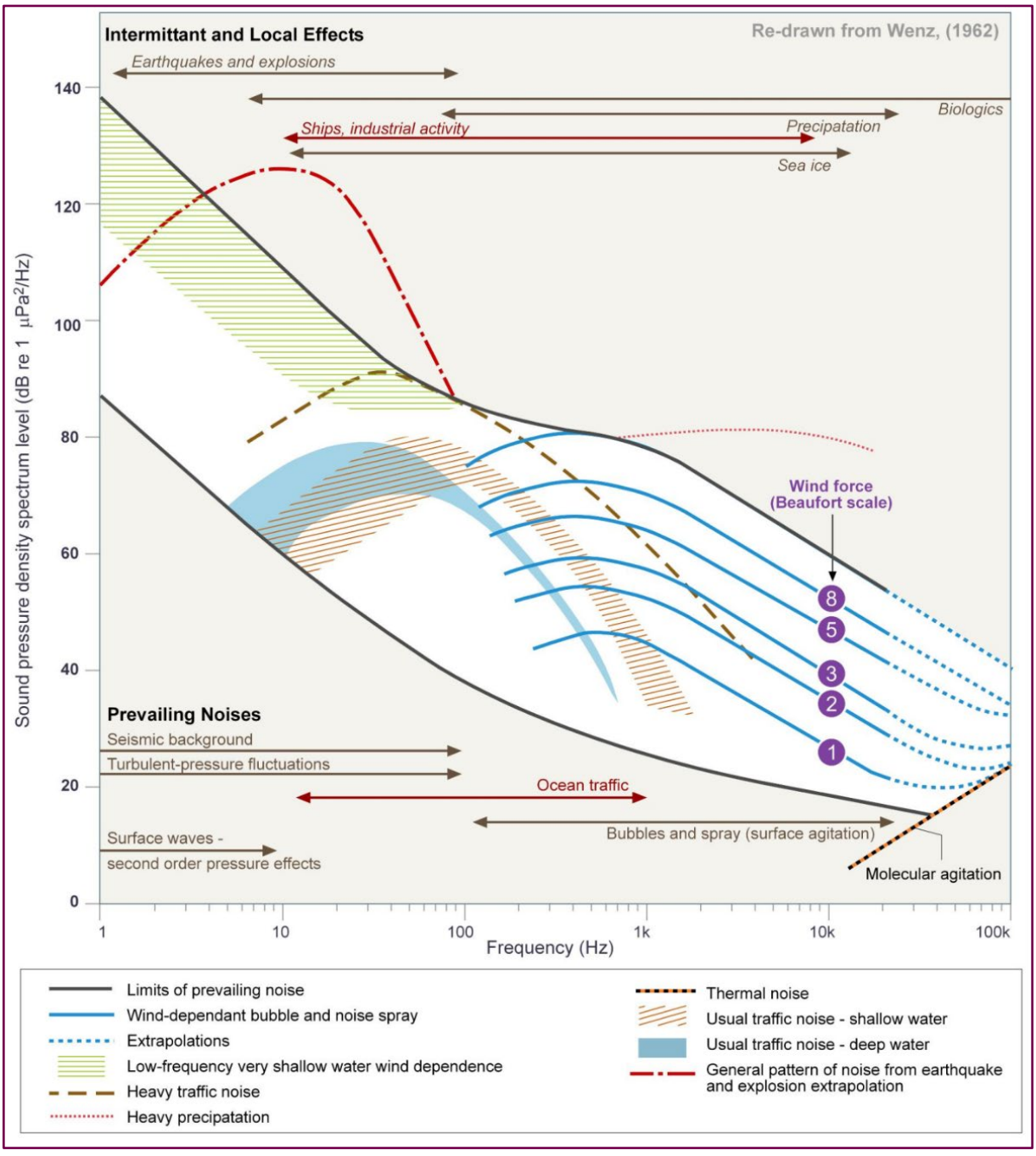

Figure 5.2: Generalised ambient noise spectra attributable to various noise sources (Wenz, 1962).

4.37 An animal's perception of sound is likely to depend on numerous factors including the hearing integration time, the character of the sound, and hearing sensitivity. It is not known for example,

to what extent marine mammals and fish can detect tones of lower magnitude than the background masking noise, or how they distinguish time varying sound. Therefore, it is necessary to exercise considerable caution if attempting any comparison between noise from the proposed development and the baseline noise level. For example, it does not follow that because the broadband sound pressure level due to the source being considered is below the numeric value of the baseline level, that this means that marine mammals or fish cannot detect that sound. This is particularly true where the background noise is dominated by low frequency sound which is outside the animal's range of best hearing acuity. Until such a time as further research is conducted to determine a dose response relationship between the "signal-to-noise" level and behavioural response, a precautionary approach should be adopted.

4.38 For the reasons given above, it was considered that it would be disproportionate and unnecessary to undertake baseline noise measurements as part of this study. Alternatively, as detailed below, RPS has reviewed baseline noise studies carried out in UK waters for other projects in order to determine the likely magnitude of noise encountered in such waters.

4.39 A review of noise data relating to other sites in UK waters was undertaken for the Beatrice Wind Farm including a review of baseline underwater noise measurements in UK coastal waters (Brooker *et al.,* 2012). These noise data are summarised in Table 5.1 and power spectral density levels are shown graphically in Figure 5.2 (Sea State 1) and Figure 5.3 (Sea State 3).

Table 5.6: Summary of average background levels of noise around the UK coast (Brooker *et al*., 2012).

	Overall (Un-Weighted) Average Background Noise Levels, dB re 1 µPa (rms)	
	Sea State 1	Sea State 3
Minimum	92	94
Maximum	126	132
Mean	111	112

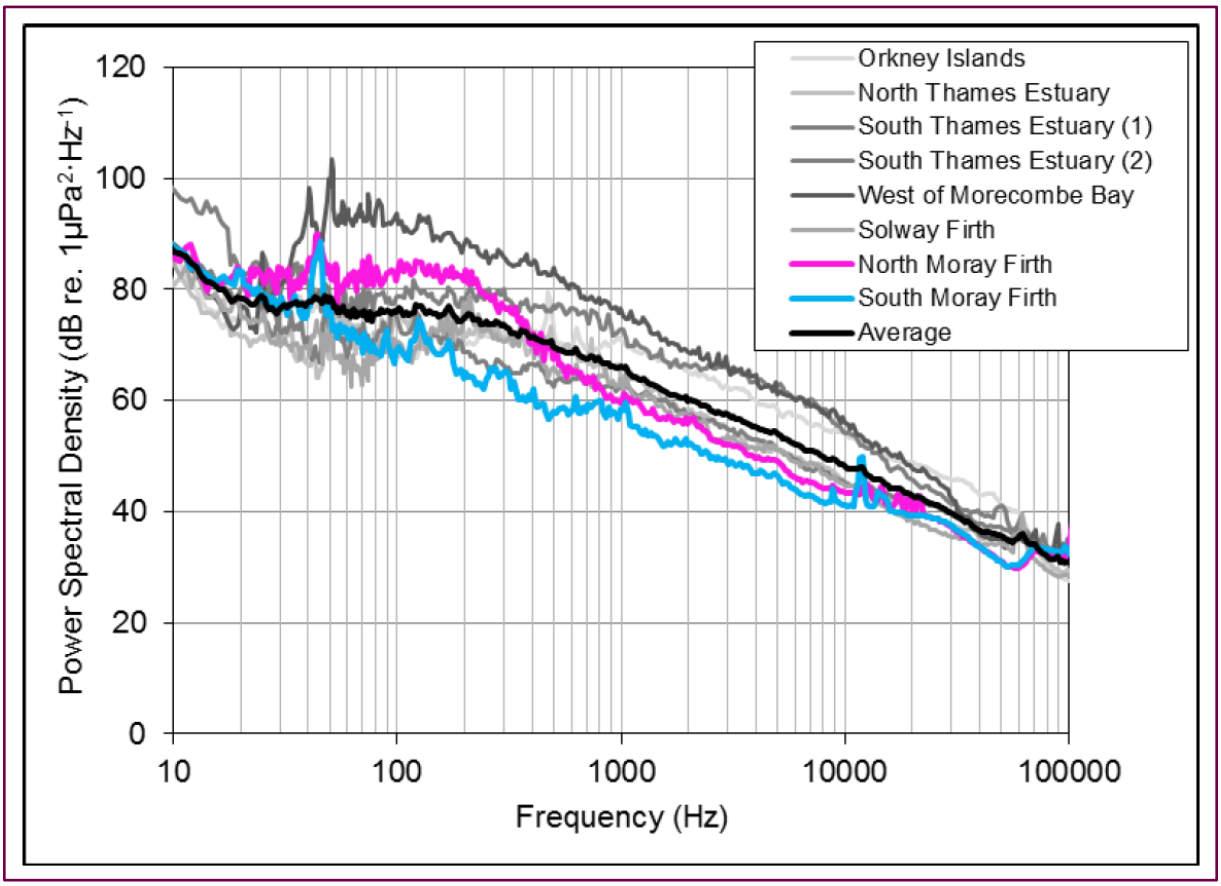

Figure 5.3: Summary of Power Spectral Density levels of background underwater noise at Sea State 1 at sites around the UK coast (Brooker, Barham, and Mason 2012).

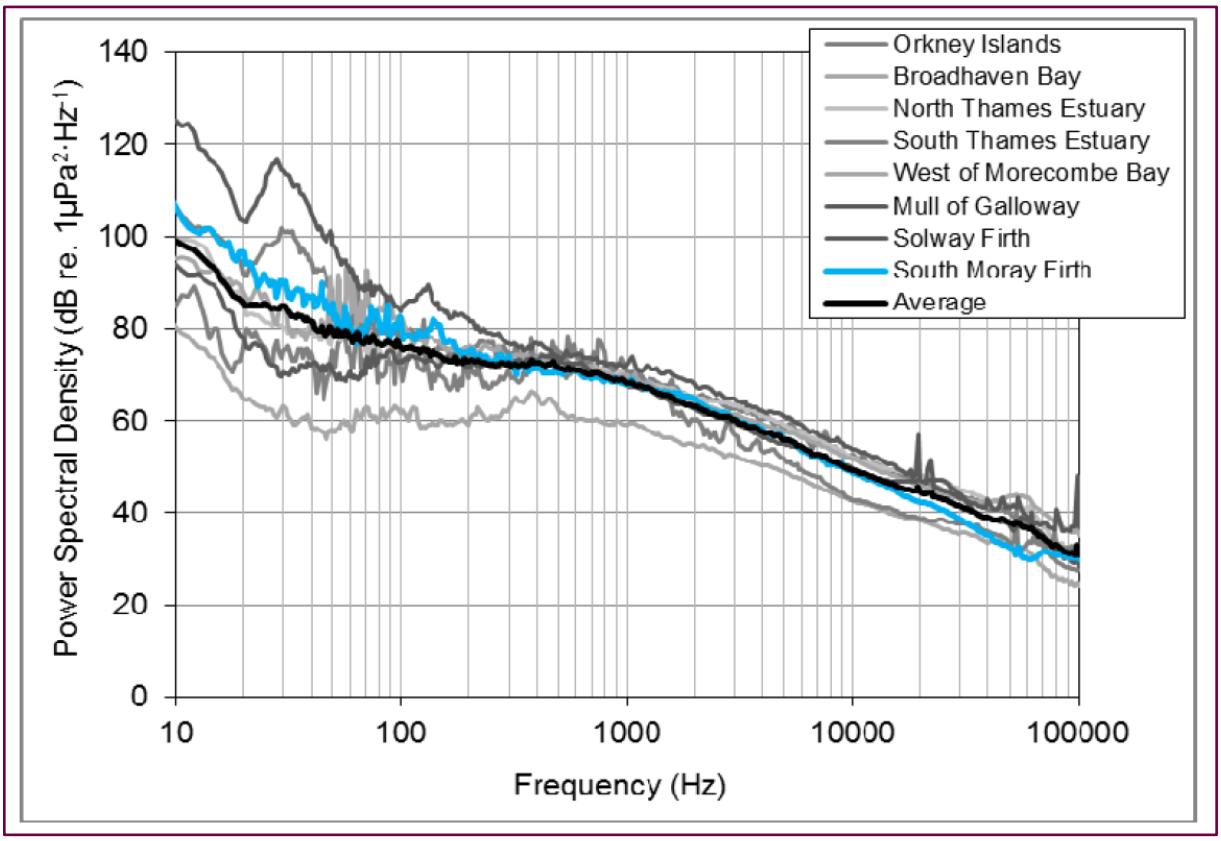

Figure 5.4: Summary of Power Spectral Density levels of background underwater noise at Sea State 3 at sites around the UK coast (Brooker *et al.*, 2012).

4.40 The measured power spectral density levels (maximum values in red, mean values in black and minimum values in green, in dB re 1 μPa^2Hz^{-1}) and third octave band sound pressure levels (light blue, in dB re 1 µPa) are shown in Figure 5.4 taken from Kongsberg (2012).

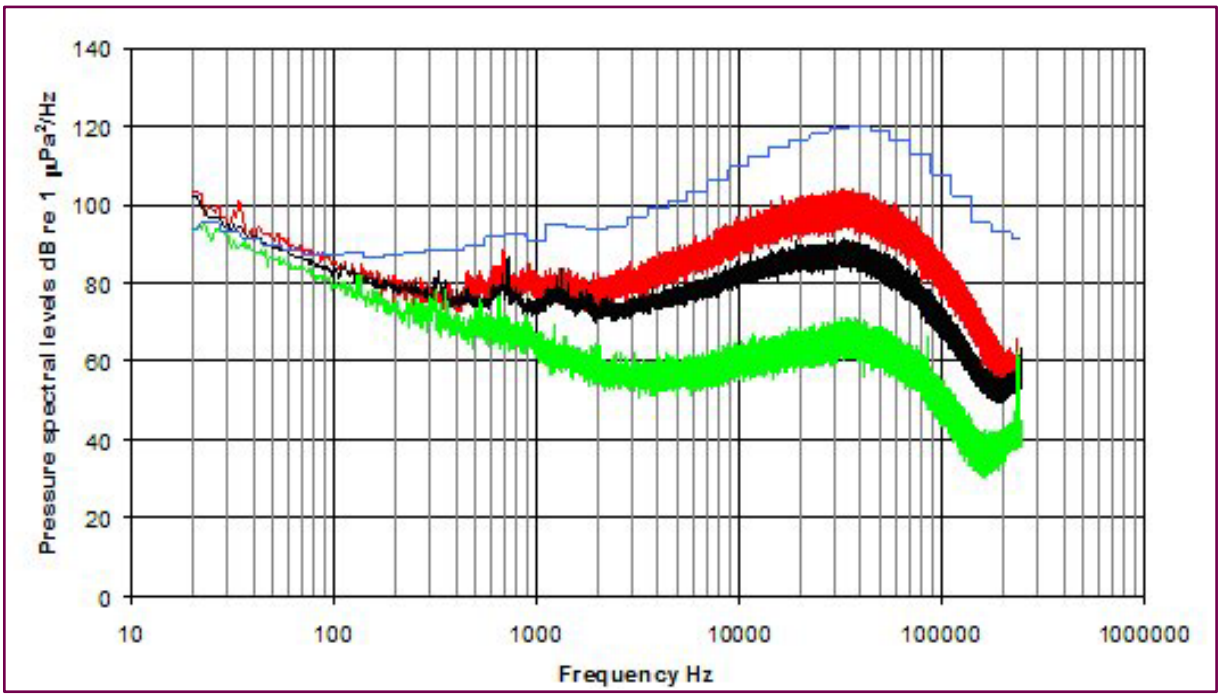

Figure 5.5: Summary of power spectral density levels and third octave band sound pressure levels of background underwater noise measured in the Inner Sound (Meygen), August 2011 (Kongsberg, 2012).

4.41 A “drifting-buoy” style assessment of background noise was undertaken by the Low Carbon Research Institute (LCRI) marine division in July 2014. Over an eleven-hour period, noise levels at the Inner Sound site were seen to vary from 91 dB re 1µPa during periods of low tidal flow speed to 121 dB re 1µPa at high tidal flow speeds.

4.42 Based on the review, it is concluded that baseline underwater noise levels in high-tidal, coastal areas are likely to be in the range 91 to 121 dB re 1 µPa (rms).

5 Results and Assessment

Impact Piling Noise Modelling Results

5.1 Based on the modelling, the resultant PTS injury ranges for the proposed impact piling activities are summarised in Table 6.1.

Table 6.1 Summary of injury ranges for marine mammals due to impact piling (N/E = threshold not exceeded).

Species / Group	Threshold (SEL)	Range	Threshold (Peak SPL)	Range
Low frequency cetacean	183 dB re 1 μPa^{2}s	77 m	219 dB re 1 μPa (pk)	*N/E*
Mid frequency cetacean	185 dB re 1 μPa^{2}s	*N/E*	230 dB re 1 μPa (pk)	*N/E*
High frequency cetacean	155 dB re 1 μPa^{2}s	80 m	202 dB re 1 μPa (pk)	58 m
Phocid pinniped	185 dB re 1 μPa^{2}s	*N/E*	218 dB re 1 μPa (pk)	*N/E*
Otariid pinniped	203 dB re 1μ Pa^{2}s	*N/E*	232 dB re 1 μPa (pk)	*N/E*

5.2 The single pulse unweighted SEL noise contours are shown in Figure 6.1, in steps of 5 dB.

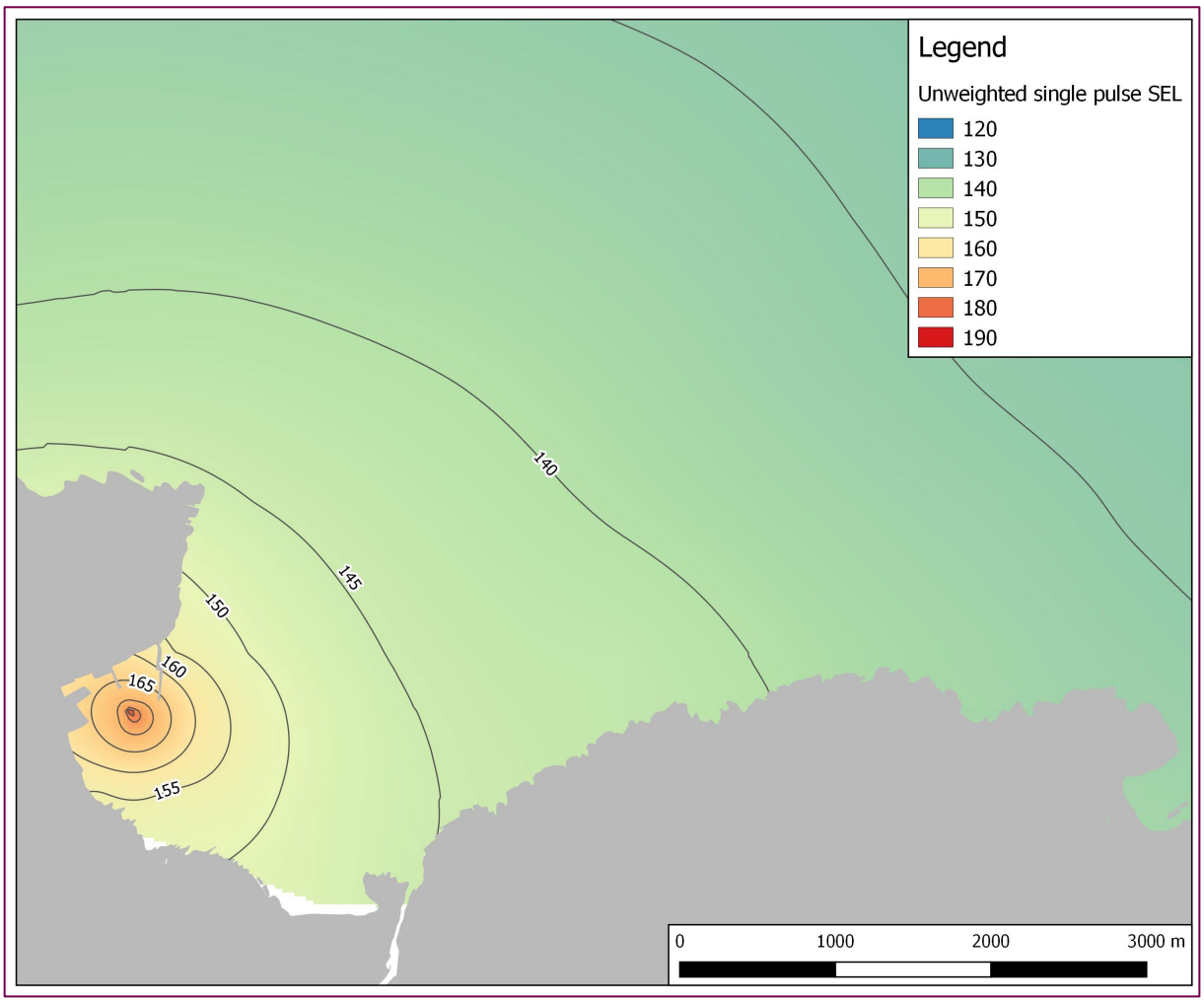

Figure 6.1: Unweighted single pulse SEL contours due to impact piling.

5.3 Based on the SEL noise contours, the probability of disturbance has been calculated following the approach set out in Graham *et al.* (2017). The resulting probability of disturbance contours are shown in Figure 6.2.

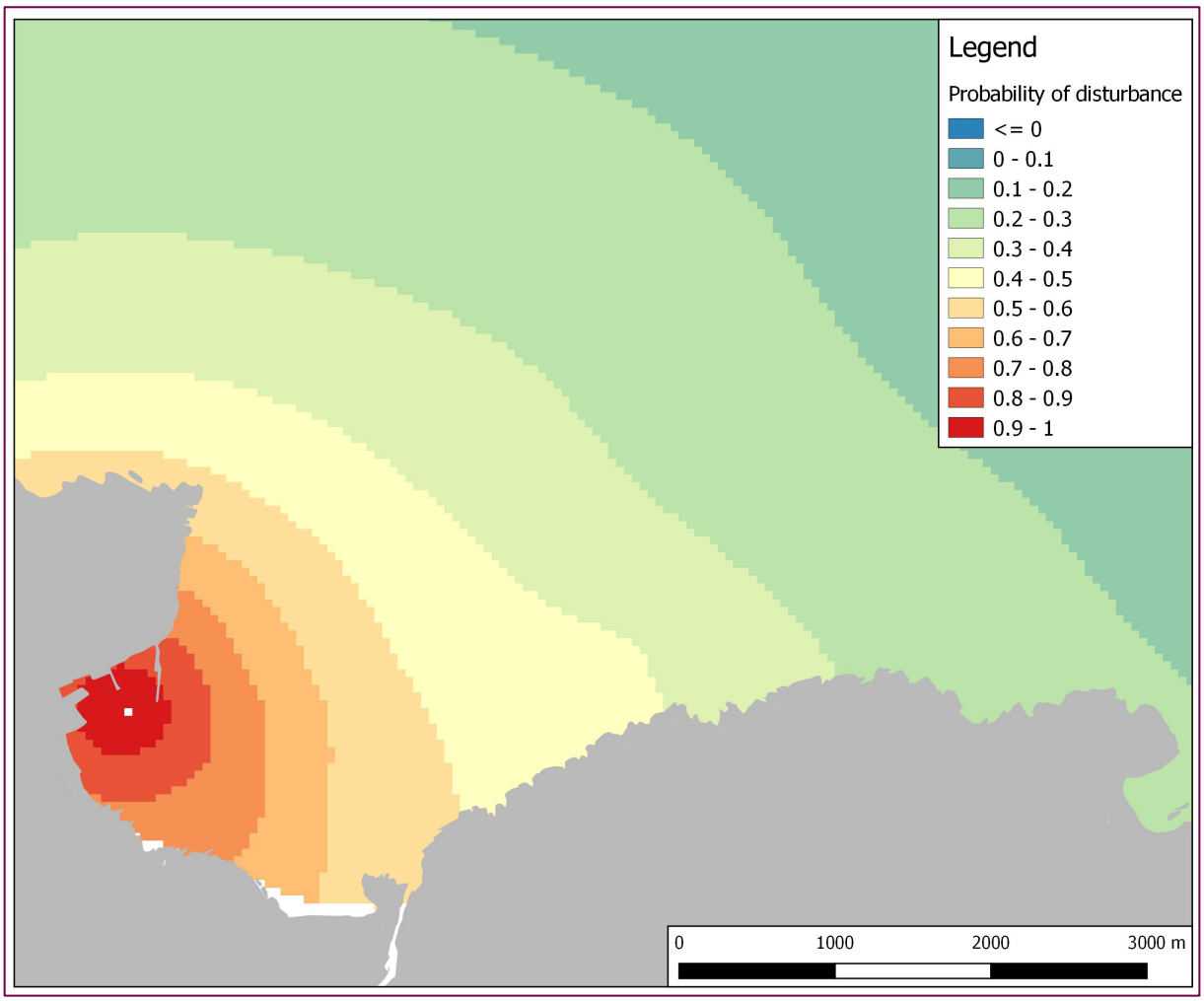

Figure 6.2: Probability of disturbance contours due to impact piling.

5.4 The results of the noise modelling for fish are shown in Table 6.2. None of the SEL injury thresholds were exceeded for fish and so are not included in the table.

Table 6.2 Summary of injury ranges for fish due to impact piling.

Class	Threshold	Range
Mortality No swim bladder (particle motion detection)	213 dB re 1 µPa (pk)	11 m
Impairment No swim bladder (particle motion detection)	213 dB re 1 µPa (pk)	11 m
Mortality Swim bladder not involved in hearing (particle motion detection)	207 dB re 1 µPa (pk)	28 m
Impairment Swim bladder not involved in hearing (particle motion detection)	207 dB re 1 µPa (pk)	28 m
Mortality Swim bladder involved in hearing (primarily pressure detection)	207 dB re 1 µPa (pk)	28 m
Impairment Swim bladder involved in hearing (primarily pressure detection)	207 dB re 1 µPa (pk)	28 m
Mortality Fish eggs and larvae	207 dB re 1 µPa (pk)	28 m
Behaviour	150 dB re 1 µPa (rms)	1.8 km

Construction and Operational Vessel Noise Modelling Results

5.5 The results of the noise modelling for vessels on marine mammals are shown in Table 6.3. It should be noted that the SEL injury ranges are based on a marine mammal being within that range of the vessel continuously over a 24 h period. Consequently, it is considered that these ranges are over estimates and over precautionary.

Table 6.3 Summary of injury and disturbance ranges for marine mammals due to vessels (N/E = threshold not exceeded).

Activity / vessel	Radius of potential injury zone (assuming continuous exposure within that radius over 24 hour period)					Radius of potential disturbance – all marine mammals
	LF	MF	HF	PW	OW	
Backhoe dredger	3 m	*N/E*	3 m	*N/E*	N/E	600 m
Work / safety boat	20 m	2 m	46 m	7 m	*N/E*	2.1 km
Tug	20 m	2 m	46 m	7 m	*N/E*	2.1 km
Cruise vessel	10 m	*N/E*	7 m	3 m	*N/E*	1.2 km
Offshore support vessel	20 m	2 m	46 m	7 m	*N/E*	2.1 km

5.6 The modelling results for the effect of vessels on fish is shown in Table 6.4. It should be noted that there are no numerical criteria for fish with no swim bladders contained in the ASA guidance and consequently on injury ranges for fish with swim bladders involved in hearing are included in the table.

Table 6.4 Summary of injury and disturbance ranges for fish due to vessels (N/E = threshold not exceeded).

Activity / vessel	Recoverable injury	Disturbance
	Fish: swim bladder involved in hearing	All fish
Backhoe dredger	*N/E*	6 m
Work / safety boat	*N/E*	23 m
Tug	*N/E*	23 m
Cruise vessel	*N/E*	13 m
Offshore support vessel	*N/E*	23 m

6 Conclusions

6.1 Noise modelling has been undertaken to determine the range of potential effects on marine mammals and fish due to noise from the proposed impact piling activities and operational and construction vessels at Scrabster Harbour.

6.2 Based on the assessment it is concluded that injury to high frequency cetaceans (harbour porpoise) could occur within 80 m of piling operations, for low frequency cetaceans within 77 m. The modelling shows that injury is unlikely to occur for mid frequency cetaceans and pinnipeds.

6.3 Results of the modelling show that there is a 50% probability of disturbing marine mammals within a radius of up to 2.2 km from piling activities.

6.4 Impairment or injury could occur to some fish within a range of 28 m from the piling. Disturbance to fish could occur within 1.8 km from piling activities.

6.5 Injury could occur to marine mammals within a radius of up to 47 m from vessels, but only if they stay within that radius for a continuous period of 24 hours or more, which is considered a highly unlikely scenario. Disturbance to marine mammals could occur within 2.1 km, although it should be noted that operational noise levels will not be dissimilar to those already experienced at the harbour.

6.6 The modelling shows that construction and operational vessels are unlikely to result in injury to fish. Disturbance to fish could occur up to 23 m from vessels.

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Appendix 11.2 Benthic Technical Report

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ST. OLA PIER REDEVELOPMENT

Benthic Technical Report

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Contents

1 INTRODUCTION 1
1.2 Project Background 1
1.3 Aims and Objectives 1

2 METHODOLOGY 2
2.1 Study area 2
2.2 Desktop review 2
2.3 Site-specific surveys 2
2.3.2 Physico-chemical survey 2
2.3.3 Benthic grab survey 2
2.3.4 Sample analysis 3
2.3.5 Data analysis 4

3 RESULTS 8
3.1 Desktop review 8
3.1.1 Subtidal 8
3.1.2 Intertidal 8
3.2 Site-specific subtidal survey 9
3.2.1 Physico-chemical characterisation 9
3.2.2 Infaunal characterisation 13

4 DISCUSSION 23
4.2 Summary of Valued ecological receptors 24
4.2.1 Ecological Value of Subtidal Habitats 24
4.2.2 Ecological Value of Intertidal habitats 24

REFERENCES 25

Tables

Table 3.2: Univariate statistics output for each faunal group 20
Table 3.3: Benthic infauna groups identified in Thurso Bay, including summary of SIMPA results and geographic locations. 22

Figures

Figure 2.1: Proposed benthic grab sample locations for benthic analysis and sediment chemistry samples for chemical and PSA analysis (inset). 6
Figure 2.2: Actual benthic sample locations for benthic and PSA analysis. 7
Figure 3.1: PSA sediment classifications for the samples from the diver survey. 10
Figure 3.2: PSA sediment classifications for the samples from the benthic grab survey. 11
Figure 3.3: Cluster analysis for benthic faunal samples within Thurso Bay. 14
Figure 3.4: 2-D MDS plot for benthic faunal samples within Thurso Bay. 15
Figure 3.5: 2-D MDS plot for benthic infaunal samples within Thurso Bay and associated distribution of mud. 16
Figure 3.6: Mean number of species (per 0.1m^2) per Faunal Group identified for each major faunal group in Thurso Bay. 18
Figure 3.7: Mean abundance (individuals per 0.1m^2) per Faunal Group identified for each major faunal group in Thurso Bay. 19
Figure 3.8: Mean biomass (ash free dry weight per 0.1m^2) per faunal group identified for each major faunal group in Thurso Bay. 19

Appendices

Appendix A Sediment Chemistry Analysis 26
Table 5.1: Metals recorded for all samples taken from Scrabster Harbour. 27
Table 5.2: Organics and organotins recorded for all samples taken from Scrabster Harbour. 28
Table 5.3: PCBs recorded for all samples taken from Scrabster Harbour. 29
Table 5.4: PAHs recorded for all samples taken from Scrabster Harbour. 30
Appendix B Particle Size Analysis 32
Appendix C Faunal Data 34

1 INTRODUCTION

1.1 This benthic technical report, supporting the Environmental Impact Assessment (EIA) has been prepared by RPS Energy Consultants Ltd on behalf of Scrabster Harbour Trust (SHT) in respect of the proposed redevelopment at St. Ola Pier, Scrabster Harbour, Thurso, Caithness. An EIA scoping opinion on the proposed redevelopment issued from Marine Scotland Licencing Operations Team (MSLOT) in September 2018 determined the scope of this benthic technical report as part of the EIA.

1.2 The EIA will be produced in order to assist the Scottish Ministers in making a decision on whether consent for this redevelopment should be granted. In line with The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA regulations), the following has been provided within this report:

- A description of the location of the works, including a plan sufficient to identify the area in which the works are proposed to be sited.
- Description of the methods of site-specific data collection and analyses and approach employed for the desk-top study.
- Results and interpretation of the data collected along with information collected via the desk top study.

1.2 Project Background

1.3 Scrabster is located on the north coast of Caithness and has a grid reference centre point of ND10437 70310. Scrabster is situated 1.5 miles northwest of Thurso, the largest town in Caithness, provides a ferry link to Orkney and is ideally located for access to the North Sea and Atlantic Ocean.

1.4 The St. Ola Pier is located at the centre of a busy operational harbour. It was constructed in 1972 and incorporates a 100m long berth face to the southwest, a linkspan and a further 115 m berth which was used by the Orkney Ferry prior to the Queen Elizabeth Pier being constructed in 2003. Due to the age of pier it is in need of an upgrade. The proposed redevelopment aims to ensure the ongoing structural integrity of the pier while also providing additional berthage for use, particularly by oil and gas supply vessels and cruise ships.

1.5 The redevelopment will provide an enhanced straight berthing face on the inner side for service and cargo vessels with a new berth on the outside face; particularly for cruise vessels of up to 250 m long. The pier will be widened locally to accommodate the straight berthing faces with resulting parallel berthing faces at approximately 32 m apart. The renovated pier will be circa. 280 m long and be fully enclosed by newly driven steel piles around the perimeter. There will be a concrete deck with drainage captured through bypass interceptors as well as lighting masts at circa 50 m spacing. The outer side will have a new berth depth of -9 m CD to accommodate cruise vessels and the inner side will be dredged to provide a consistent berth depth of -7.5 m CD.

1.3 Aims and Objectives

1.6 The aim of this study was to provide a characterisation of benthic subtidal and intertidal resources within the immediate vicinity of Scrabster harbour and within the wider Thurso Bay, to inform the environmental risk and impact assessments.

1.7 The objective was to use the results of the benthic subtidal survey and diver survey (and any available historic data) to identify communities within the study area that could be used to provide the basis for evaluating the importance of habitats, species, or groups as ‘valued ecological receptors’ for consideration in the impact assessment.

2 METHODOLOGY

2.1 Study area

2.1 For the purpose of the benthic ecology characterisation two study areas were defined:

1. Scrabster Harbour and Thurso Bay is the area in the immediate vicinity of the proposed redevelopment in which the site-specific surveys were carried out (Figure 2.1).
2. The North Coast Marine Region and North Coast is the regional study area that provides a wider context for the site-specific data and it is the area covered by the desk-top review.

2.2 Desktop review

2.2 There are very few historical benthic ecology studies within Thurso Bay and the wider north coast study area and there are no public site-specific research papers available. Therefore, the desktop review focused on the European Marine Observation and Data Network (EMODnet) seabed habitat maps and surveys of benthic species and the surveys carried out for the MeyGen Project to characterise the area.

2.3 Site-specific surveys

2.3 In order to provide site-specific information sufficient for the purposes of conducting an EIA, there was a requirement to undertake specific ecological and physico-chemical sampling to characterise the benthic habitats and species occurring within the James Bay study area, as well as to assess the levels of existing contamination in the benthic sediments. Two surveys were commissioned to characterise the environment of the Thurso Bay study area:

- Diver collected sediment samples within the harbour only (sediment chemistry and PSA)
- Benthic grab sediment survey within the harbour and Thurso Bay (infauna and PSA)

2.3.2 Physico-chemical survey

2.4 Nine sediment samples were collected from within Scrabster harbour in 2018 for sediment chemistry analysis and particle size analysis (PSA). Three samples were taken from the west of St Ola's Pier and six sample taken to the east of the Pier, all within the proposed dredging area. All samples were collected by divers in acid washed sample jars, labelled and frozen before being sent off to RPS laboratories for testing. Samples were then tested for organotins, metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and underwent particle sediment analysis (PSA). These samples were then compared against the CEFAS Action Levels (AL) 1 & 2, Canadian threshold effect levels (TEL) and probable effect levels (PEL), with sediments described following the Folk and Ward method (Long, 2006

2.3.3 Benthic grab survey

2.5 The second survey, the benthic subtidal characterisation, was undertaken in February 2019 by Ocean Ecology Ltd. with sampling successful at seven of the ten proposed sampling locations using a 0.1 m^2 day grab. At sample stations 7,9 and 10 they were unable to collect benthic samples due to the presence of rocky reef. Therefore, these samples stations were moved to alternative locations and the ten sampled sites are illustrated in Figure 2.2.

2.6 At each of the ten subtidal sampling locations, grab samples were collected for benthic infaunal analysis and particle size analysis (PSA). At each sampling location the grab was lowered by hand and set down on the seabed and then recovered to deck by hand hauling. The exact position of the sample was logged from the onboard Differential Global Positioning System (DGPS) together with the time and water depth.

2.7 Upon recovery, the grab was placed in a receiving hopper (a fish box) and the sample inspected through the inspection hatches to ensure adequacy of sample. Where a grab of inadequate volume was obtained (i.e., less than half the grab) the sample was initially retained, and further attempts were made to achieve a grab of acceptable volume. The initial grab was only fully processed if sufficient volume could not be obtained in the further grabs.

2.8 Acceptable samples were briefly described and photographed for future reference. A total of two grabs were made at each sampling location. From one of the grabs a sample for PSA was taken and placed into a sample bag. All PSA and benthic samples were clearly labelled with the date, job number and sampling site name (i.e. G01, G02, G03 etc.). No pooling of grab samples was undertaken as standardisation was by surface area.

2.9 The sample was gently washed out of the grab using a seawater deck hose into the receiving hopper ensuring no sediment was left in the grab. The sample was then washed through a 0.5 mm sieve on deck and the residue backwashed into pre-labelled sampling containers. Sieve time was kept to a minimum to limit enmeshment of small infauna in the sieve and all reasonable attempts were made to remove all infauna from the mesh. Each sample was fixed in 4-10% buffered saline formalin solution and may be stained with Rose Bengal, and the sampling container clearly marked with the date, job number and sample site. Any fauna of note from incomplete grab samples which would otherwise have been rejected were also kept for potential analysis.

2.3.4 Sample analysis

2.3.4.1 Particle Size Analysis

2.10 PSA was undertaken in accordance with the National Marine Biological Analytical Quality Control's Best Practice Guidance: Particle Size Analysis for Supporting Biological Analysis (Mason, 2011), by which method standardisation of the data was ensured with other routine monitoring projects. Samples were therefore wet separated at 2.0 mm. The >2.0 mm fraction, where present, was analysed using nested British Standard sieves at half-phi intervals. The sub-2.0 mm fraction was analysed via laser diffraction (size range 0.04 µm to 2.0 mm) where it constituted more than 5% of the sample; otherwise it was reported as % mud. The laser and sieve data were mathematically merged and calculations of particle size summary parameters (percentages of mud, sand, and gravel, silt/clay ratio, sand/mud ratio, median, mean, d10, d90, etc.) calculated using appropriate software.

2.3.4.2 Sediment Chemistry Analysis

2.11 The concentrations of contaminants in the Scrabster Harbour sediments were subject to an ecotoxicology assessment, with comparison against sediment environmental quality standards (EQS). The results of this are presented in Section 3.2.1.2 and Appendix A.

2.12 The samples were analysed for the following determinands:

- Metals;
- Organotins;
- Polychlorinated biphenyls; and
- Polyaromatic hydrocarbons (PAHs; EPA 16).

2.3.4.3 Benthic Infauna Analysis

2.13 Sediment samples for benthic infauna analysis were processed through a 0.5 mm sieve and the retained material transferred to an appropriate container and preserved immediately in 4% buffered saline formalin solution. The samples were analysed at Ocean Ecology for identification (to species level), enumeration and biomass determination of the major faunal groups (i.e.

polychaetes, molluscs, crustaceans, echinoderms and others). Biomass was recorded in grams (g) ash free dry weight.

2.3.5 Data analysis

2.3.5.1 Multivariate community analysis

2.14 The macroinvertebrate community structure and sediment distributions within Thurso Bay were investigated by employing a range of univariate and multivariate statistical measures using PRIMER 6 statistical package (Clarke and Warwick, 2001). The PSA data was categorised using the Folk sediment classification. This classification groups particles into mud, sand and gravel (mud <63 µm = mud; sand <2 mm; gravel >2 mm) and the relative proportion of each used to ascribe the sediment to one of 15 classes (e.g. slightly gravelly sand, muddy sand etc.).

2.15 The infaunal data were also imported into PRIMER and square root transformed in order to downweight the highest abundances (over 1000 individuals of certain species, e.g. the round worms *Nematoda*). Several of the encrusting and epifaunal taxa present in the grab samples had been recorded by the laboratory as 'Present' (P) rather than as discrete counts. To enable these taxa to be included within the multivariate analyses they were given nominal abundances of 0.1. Hierarchical agglomerative clustering was carried out in PRIMER to determine the relative similarities between sites. Similarity Percentages (SIMPER) analyses were undertaken on the infaunal dataset to identify which species best explained the similarity within groups and the dissimilarity between groups identified in the cluster analysis. The similarity matrix was also used to produce a MDS plot which showing the relatedness of the communities (at each site) to one another. The results of the cluster analyses and associated SIMPER were reviewed alongside the raw, untransformed data in order to assign preliminary Faunal Groups to the groups of sites.

2.3.5.2 Univariate community analysis

2.16 As well as assessing the raw species data, a number of indices were also calculated, including Margalef's Index of Richness (d), Pielou's Evenness Index (J'), the Shannon-Wiener Diversity Index (H') and Simpson's Index of dominance (λ) (Clarke and Warwick, 2001). Such indices are useful in reducing large faunal datasets to a single figure, which may be used in comparison to other sites in assessing community structure. These indices were calculated for each faunal group in order to allow for comparisons to be made between the groups identified. This was done by calculating the diversity indices for each site, then calculating the mean (± standard deviation) for each faunal group.

2.17 The Shannon-Wiener diversity index (H') is a common diversity measure. Margalef's index (d) incorporates the total number of individuals (N) and is a measure of the number of species (S) present for a given number of individuals. Pielou's evenness index (J') is a measure of how evenly distributed the individuals are among the different taxa. In general, the higher the equitability the more balanced the sample is, as it indicates that the individuals are evenly distributed between the species recorded. The Simpson Index (λ), is a dominance index and larger values of this index correspond to assemblages whose total abundance is dominated by one, or a very few, of the species present.

2.18 Comparisons were also made between numbers of species (S), total abundance (N) and biomass (g) for the main faunal groups. For the benthic infaunal dataset these were divided into polychaetes, molluscs, crustaceans, echinoderms and others (includes all other faunal groups e.g., tunicata, cnidaria, bryozoa). This univariate analysis provides further detail on the composition of the benthic infaunal communities present in the study area.

2.3.5.3 Biomass data analysis

2.19 The biomass data was compiled to take a mean across the samples within each faunal group identified in the multivariate community analysis for the main marine faunal groups (crustaceans, molluscs etc.).

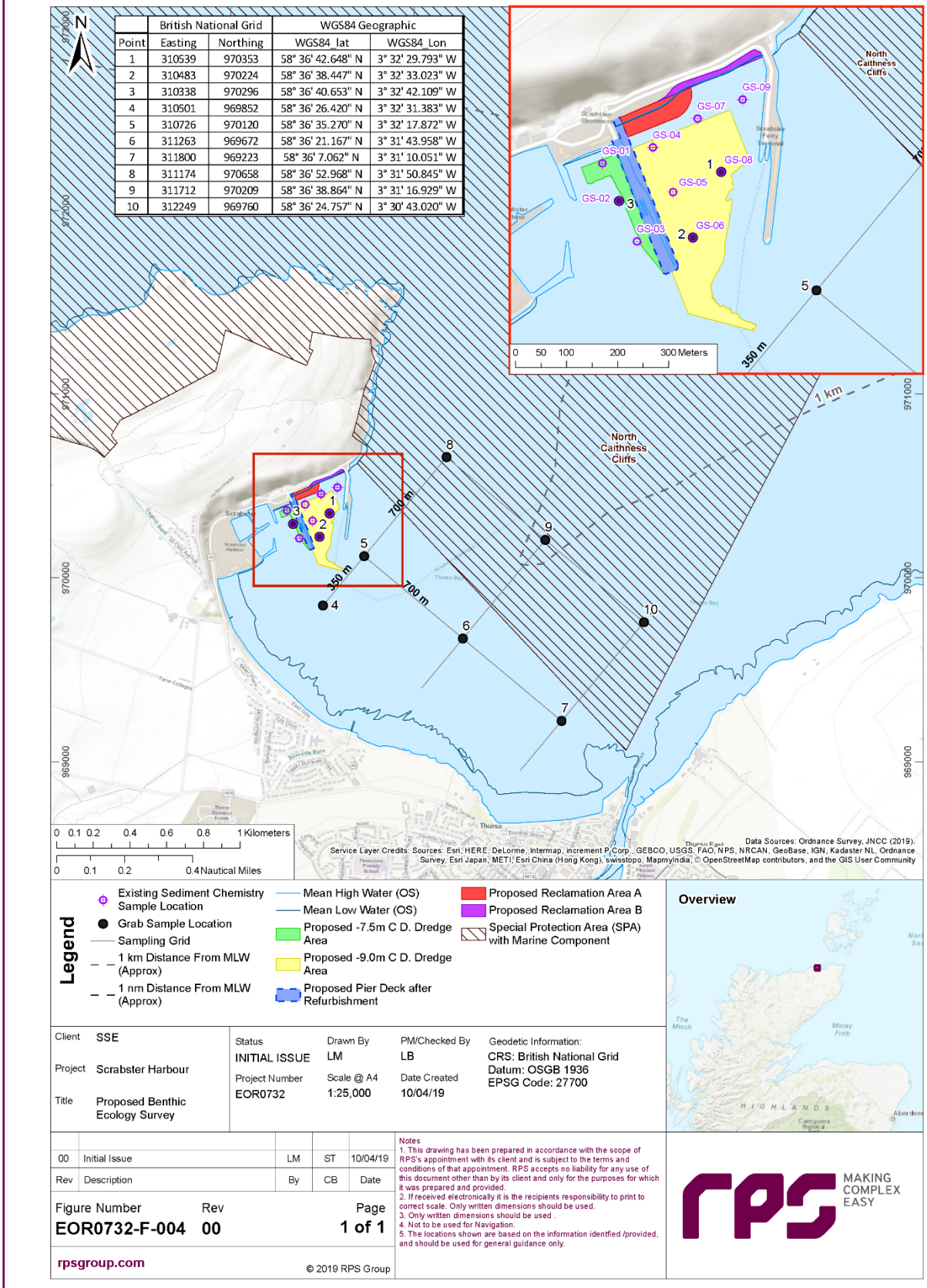

Figure 2.1: Proposed benthic grab sample locations for benthic analysis and sediment chemistry samples for chemical and PSA analysis (inset).

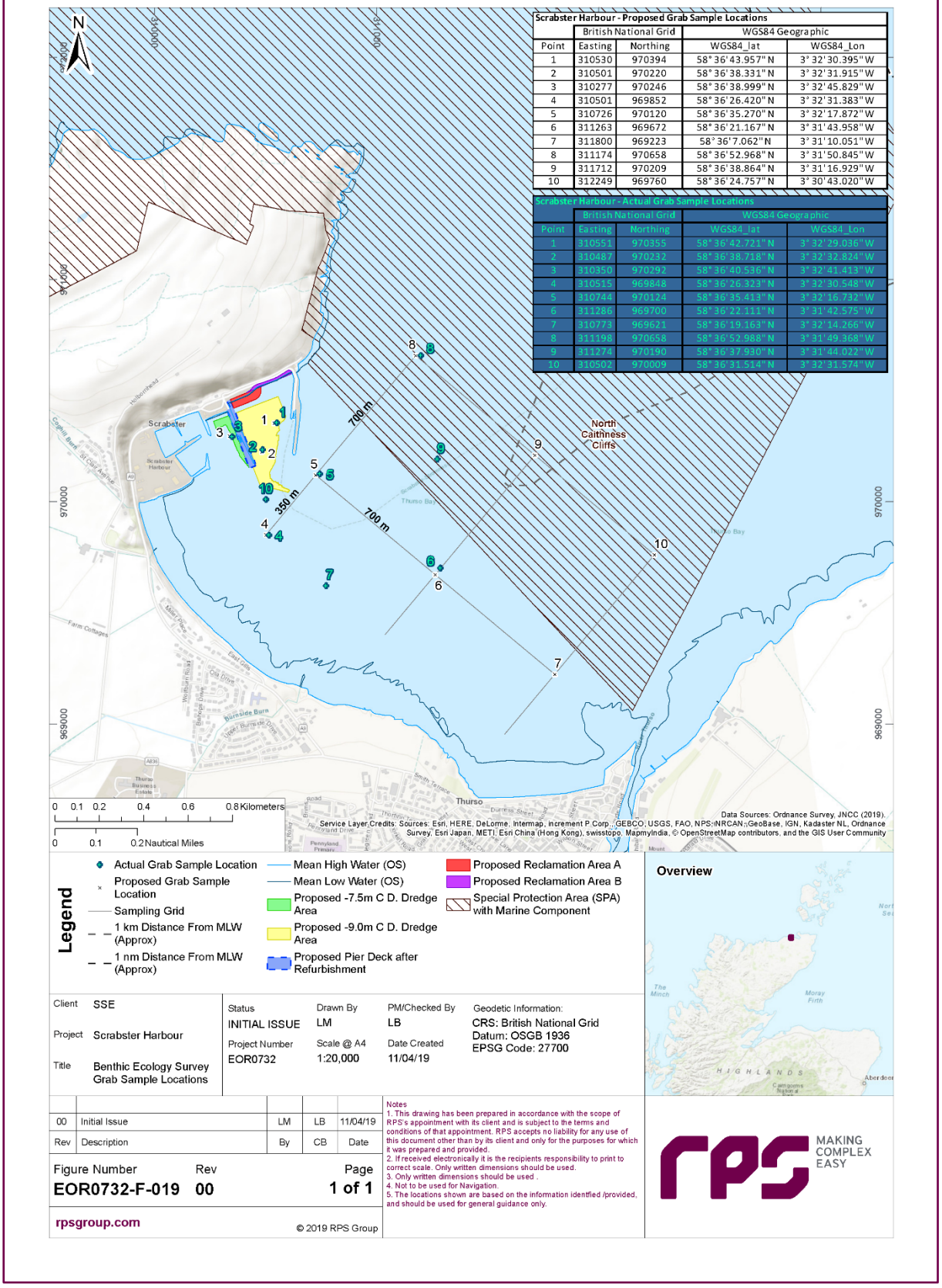

Figure 2.2: Actual benthic sample locations for benthic and PSA analysis.

3 RESULTS

3.1 Desktop review

3.1.1 Subtidal

3.1 The EMODnet indicated that the bathymetry of Thurso Bay has a depth range of between 0 m – -40 m CD. A review of the EMODnet seabed habitats maps, full-detail habitat classification (EUNIS), indicates that the majority of Thurso Bay is 'infralittoral fine sand or infralittoral muddy sand' (EUNIS habitat: A5.23 or A5.24). The subtidal fringe along the west side of the bay, above the redevelopment site, has been recorded as 'Atlantic and Mediterranean low energy infralittoral rock' (EUNIS habitat: A3.3). Along the eastern fringe, habitat has been recorded as 'Atlantic and Mediterranean moderate energy infralittoral rock' (EUNIS habitat: A3.2). Extending out from Thurso Bay towards the dredge disposal site, habitat have been recorded as 'circalittoral fine sand or circalittoral muddy sand' (EUNIS habitat: A5.25 or A5.26) and 'infralittoral coarse sediment' (EUNIS habitat: A5.13).

3.2 Surveys undertaken by ASML (2011) for the MeyGen project, in the nearshore waters of the Pentland Firth, circa 23 km from Scrabster Habrour, found the sediment was comprised of mainly very fine to very coarse sand, with areas of gravel. Species found to be associated with this area included: sponges *Esperiopsis fucorum* and *Hymedesmia paupertas*, patchy bryozoan crusts, dead man's fingers *Alcyonium digitatum*, hydroids with mobile species including brown crab *Cancer pagurus*, common sea urchin *Echinus esculentus* and starfish *Asteroidea spp*. and *henricia* spp (Moore & Roberts, 2011). Biotopes described included *Balanus crenatus* and *Tubularia indivisa* on extremely tide-swept circalittoral rock (CR.HCR.FaT.BalTub) although the characterising species *T. indivisa*, appeared to be only present at low density, *T. indivisa* and cushion sponges on tide-swept turbid circalittoral bedrock (CR.HCR.FaT.CTub) and circalittoral coarse sediment (SS.SCS.CCS) (ASML, 2011).

3.3 The subtidal benthic communities associated with the harbour has been found to differ from those found in the wider bay area due to the semi-enclosed and stable nature of the harbour compared to the dynamic more exposed environment of the bay. Fine sediments (mud) have been found to be more common within the harbour as they tend to fall out of suspension more readily in less exposed, sheltered environments such as the harbour resulting in potentially reduced (poorly oxygenated) sediment conditions. Subtidal benthic ecological communities generally associated with these sediments include annelids, *bivalvia*, *oligochaeta*, *polychaeta*, *gastropoda*, *crustacea* and algae (Seiderer and Newell, 1999).

3.1.2 Intertidal

3.4 Scrabster Harbour is nestled within the north western part of Thurso bay, where a beach, with intermittent rocky outcrops, extends in a south-easterly direction towards the River Thurso mouth. Beyond the river mouth, extends rocky outcrops in a north-easterly direction. The north of the harbour is backed steep cliffs that wraps in an easterly direction around the headland.

3.5 Throughout the intertidal zone, common fauna species found along the north eastern coast of Scotland include rough periwinkle *Littorina saxatilis*, barnacle *Semibalanus balanoides*, mussels *Mytilus edulis*, dog whelk *Nucella lapillus* and common limpets *Patella vulgata* while common flora species include the bladder wrack *Fucus vesiculosus* and brown algae *Laminaria spp*. (Bartrop et al., 1980; Boon, 1995; Bennet & Mcleod, 1998; Eleftheriou et al., 2004).

3.6 Within the immediate confines of Scrabster Harbour (inner and outer), the intertidal substrate is predominantly comprised of artificial hard substrate in the form of vertical concrete and stone harbour/breakwater walls as well as localised areas of boulders forming coastal protection, such as

on the seaward edges of the outer harbour breakwaters. These surfaces are likely to host encrusting benthic flora and fauna including taxa such as bryozoans, barnacles, mussels, sea squirts and sea anemones (Hawkins et al., 2002; Derweduwen et al., 2014) as well as seaweeds common to the area, such as fucoids and kelp.

3.7 In addition, studies of harbour and dock sediments have demonstrated very low densities of only a few macrobenthic species (Derweduwen et al., 2014) and those that have been recorded have generally been short lived species (Hawkins et al., 2002).

3.2 Site-specific subtidal survey

3.2.1 Physico-chemical characterisation

3.2.1.1 Physical

3.8 As described in Section 2.3.2 a detailed sediment survey was undertaken in the vicinity of the Scrabster Harbour in 2019. PSA was carried out on both the nine-sediment chemistry samples and the ten benthic grab samples (Figure 2.1). The PSA identified the sediment characteristics and sorted them into Folk and Ward Classifications (Long, 2006).

3.9 PSA of the nine sediment chemistry samples collected from within the harbour identified three Folk Sediment classifications: very fine sand, fine sand and coarse sand (using the Folk and Ward method). Poorly sorted very fine sand was found to occur at sites GS-01–3 and at site GS-09, poorly sorted fine sand was located at sites GS-04–7 except for site GS-06 which was moderately sorted fine sand. Very poorly sorted coarse sand was identified at site GS-08. Sites GS-01-3 and GS-09 are characterised by fine sand, very fine sand, very coarse silt and coarse silt. Site GS-04-7 is characterised by fine sand, very fine sand, medium sand and coarse sand. Site GS-08 is characterised by fine sand, very coarse gravel, very fine sand and medium sand (Figure 3.1). Across all sites there is a high percentage of sand (60-93%). Very fine to fine sand indicates a relatively low energy environment as fine material would be expected to be resuspended in a higher energy environment. The presence of coarse sand may indicate eddies forming within the centre of the harbour.

3.10 PSA carried out on benthic grab samples taken from within Thurso Bay identified fine sand or very fine sand environments. Site 1 and 2 found within the harbour were recorded to have poorly sorted fine sand with some small shells, this is similar to the results from the sediment chemistry survey sample GS-08 and GS-09 which were in the same locations respectively. Site 3 was recorded to have poorly sorted very fine sand with small shells and organics (dead organic material); this is consistent with the results from the sediment chemistry survey sample GS-02 which was in the same location. Sites 4-10 were recorded to have moderately well sorted fine sand with small stones and shell fragments. These results are expected and in line with the PSA from the diver-collected samples within the harbour. Across all sites there is a high percentage of sand (66-100%; Figure 3.2) with the rest comprising mud. It can therefore be assumed that areas within the grab samples are composed of sandy and muddy sediments.

3.11 The full PSA results and the sediment categories assigned to each site are presented in Appendix B.

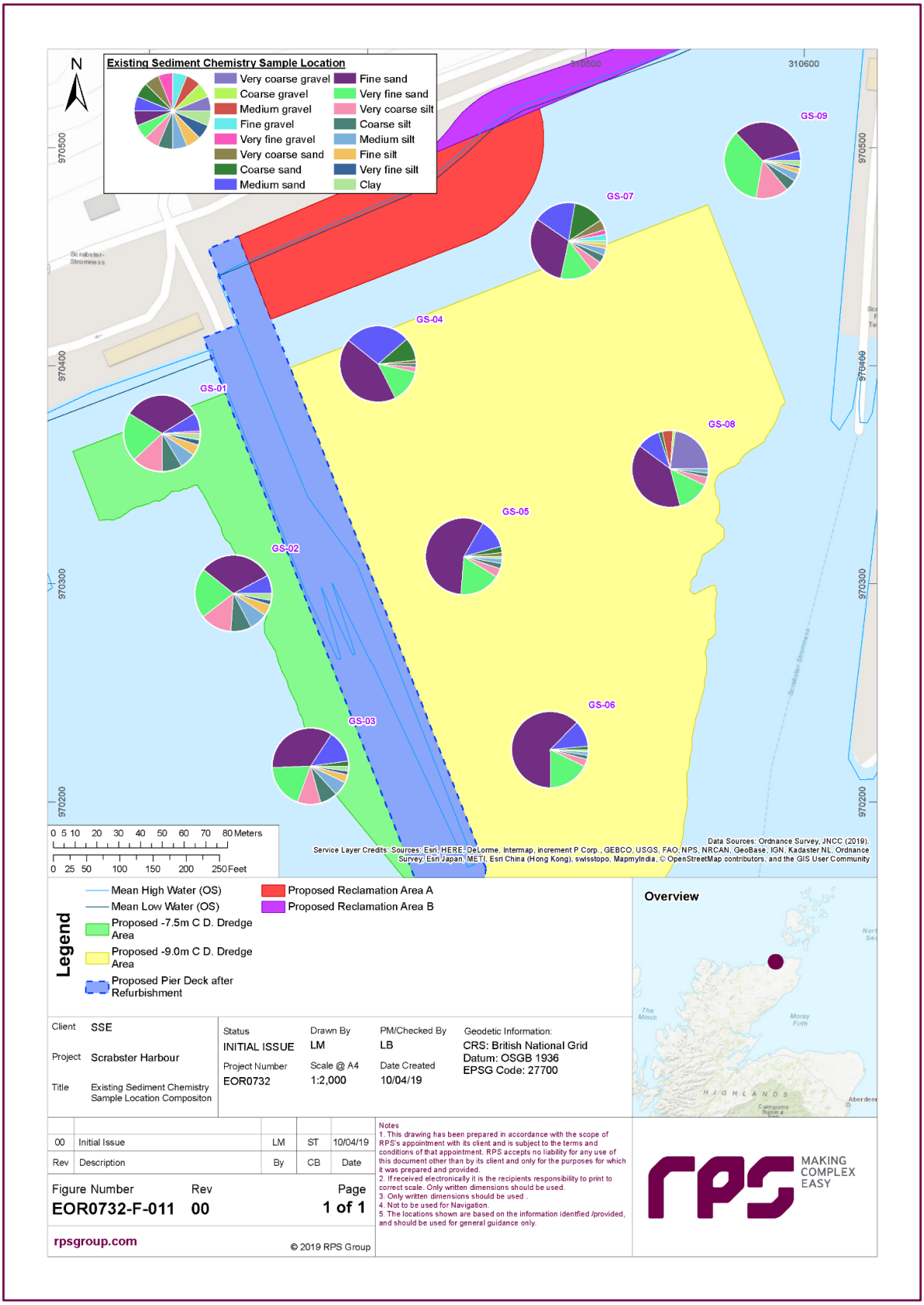

Figure 3.1: PSA sediment classifications for the samples from the diver survey.

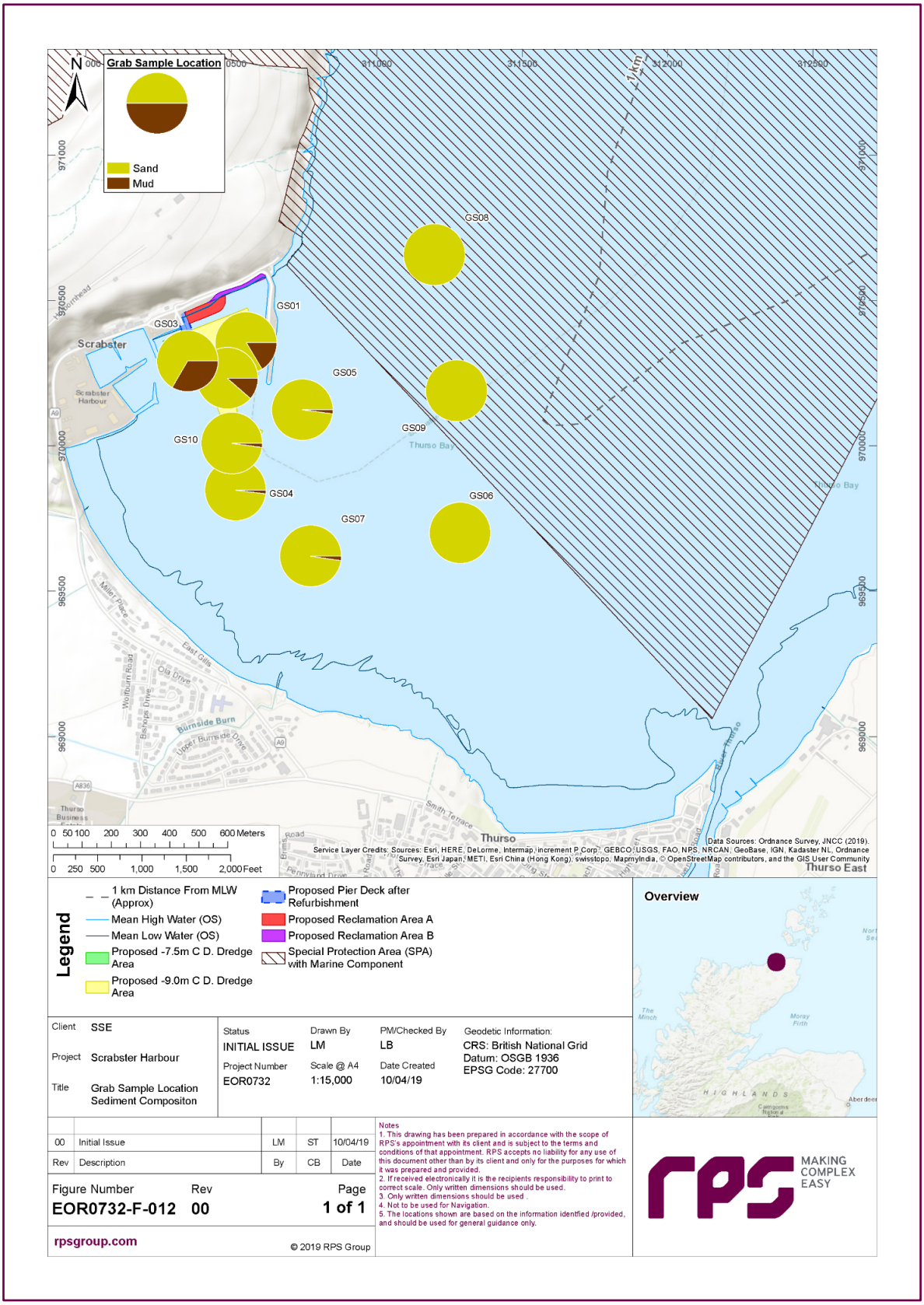

Figure 3.2: PSA sediment classifications for the samples from the benthic grab survey.

3.2.1.2 Chemical

3.12 As described in Section 2.3.2, an assessment of the physico-chemical quality of the sediment was undertaken on samples collected in the vicinity of the Pembroke Dock in 2018.

3.2.1.2.2 Metals

3.13 Heavy metals are readily adsorbed by sediments, this can lead to metals accumulating to concentrations far higher than the surrounding environment. These sediments can become re-suspended through bioturbation or through physical processes/disturbances. Metals will tend to accumulate in these fine-grained sediments and can become bioavailable to marine organisms through ingestion. The uptake of heavy metals by marine organism can lead to bioaccumulation through tropic levels leading to apex organisms accumulating metals to adverse and toxic levels. This could result in significant adverse effects including mortality, impaired reproduction, reduced growth, alterations in metabolism as a result of oxidative stress and disruption to the food chain.

3.14 The RPS 2018 sediment chemistry survey concluded that the contaminant levels in the study area exceeded the CEFAS AL1 and Canadian TEL. Metals observed at elevated levels included arsenic, copper and nickel. Site GS-01–3 was found to be contaminated (Appendix A -Table 5.1).

3.15 Site GS-01 was found to be marginally exceeding the Canadian TEL threshold for Arsenic and CEFAS Action Level 1 for Chromium. Site GS-02 was found to marginally exceed the Canadian TEL for Arsenic, Copper and Nickel. Site GS-03 was found to only exceed the Canadian TEL for Copper. All data can be found with comparisons against their chemical safety thresholds in Appendix A.

3.2.1.2.3 Organotins

3.16 Organotin compounds are based on tin with hydrocarbon substitutes, these include the historically used biocides dibutyltin (DBT) and tributyltin (TBT). Primarily used as antifungal and anti-fouling agents to improve the efficiency, performance and longevity of marine structures and vessels. Concerns over toxicity of these compounds to biological organisms led to the International Maritime Organisation introducing a worldwide ban. Adverse biological effects are comparable to hydrogen cyanide, whereby the compound halts cellular respiration within the mitochondria leading to cell and organism death. Legacy trace TBT and DBT can still be present within sediments in harbours and low energy environments.

3.17 Levels of DBT and tributyltin TBT for all samples in Scrabster Harbour were found to be under the guideline levels for sediments (see Appendix A).

3.2.1.2.4 Polychlorinated biphenyls (PBSs)

3.18 PCBs are toxic to fish and other aquatic organisms. Reproductive and developmental problems have been observed in fish at low PCB concentrations, with the early life stages being most susceptible. There is growing evidence linking PCBs and similar compounds with reproductive and immuno-toxic effects in wildlife, including effects on seals and other marine mammals. The WHO (1993) also reported that, for marine mammals, there was evidence that PCBs reduce their reproductive capacity. Due to their persistence and lipophilic nature, PCBs have the potential to bioaccumulate, particularly in lipid rich tissue such as fish liver. Bioaccumulation of PCBs is recorded in fish, birds and marine mammals with known sublethal toxicological effects. Accumulation of PCBs in sediments poses a potential hazard to sediment-dwelling organisms.

3.19 The RPS 2018 PCB concentrations returned for the all sites were found to be below the CEFAS AL1 of 0.01 mg/kg (Sum of ICES 7). This value is below the Canadian TEL and PEL benchmarks (see Appendix A).

3.2.1.2.5 Polyaromatic hydrocarbons (PAHs)

3.20 PAHs enter the environment through a number of sources, these include road run-off, sewage, atmospheric circulation and from historical industrial discharge. Once in the environment, PAHs exert a strong affinity for organic carbon and as such organic sediment in rivers can act as a substantial sink. Due to the high affinity for organic carbon, once ingested by fauna the PAHs cause oxidative stress and lead to adverse effects in the organism. Most species have a limited ability to metabolize PAHs and as a result can bioaccumulate to toxic levels.

3.21 PAH concentrations returned for surface sediment samples were found to exceed the Canadian TEL and CEFAS AL1. See Appendix A for a comprehensive breakdown of all PAH by site.

3.2.1.3 Summary of physico-chemical characteristics

3.22 Habitats across the area typically had low concentrations of heavy metals, however sites GS-01-3 taken from the eastern landward site of the pier have higher levels of contamination. There was only one record above the Cefas AL1 threshold which was for chromium at site GS-01, but there were several records for metals exceeding the Canadian TEL threshold, all at sites GS-01-3. Sites GS-04-9 had no record for any metals exceeding toxicity thresholds. The area showed higher levels of hydrocarbon contamination with PAHs found to exceed the Canadian TEL and Cefas AL1 thresholds across all sites. Cefas AL2 and Canadian TEL thresholds were not reached and broadly the area has low levels of contamination.

3.2.2 Infaunal characterisation

3.2.2.1 Multivariate community analysis

3.23 A total of 125 taxa of benthic fauna were recorded form the 10 faunal samples taken across Thurso Bay, comprising: Annelids, Crustaceans, Echinoderms and molluscs. The full faunal dataset is presented in Appendix C.

3.24 The results of the hierarchical cluster analysis of the faunal data set identified two groups that were statistically significant from each other and one individual sample (G03) that was statistically significant from the two groups (Figure 3.3). Faunal group *a* (G04-G10) showed a range of similarities between the seven group members, from 22% between G06 and the rest of the group, up to 40% between G04 and G10 (average 28%). Faunal group *a* had a lower degree of similarity between group members than group *c* (GO1 & G02) which has a 47% similarity. Site G03 only shows 20% similarity to faunal group *c* and 10% similarity to faunal group *a*.

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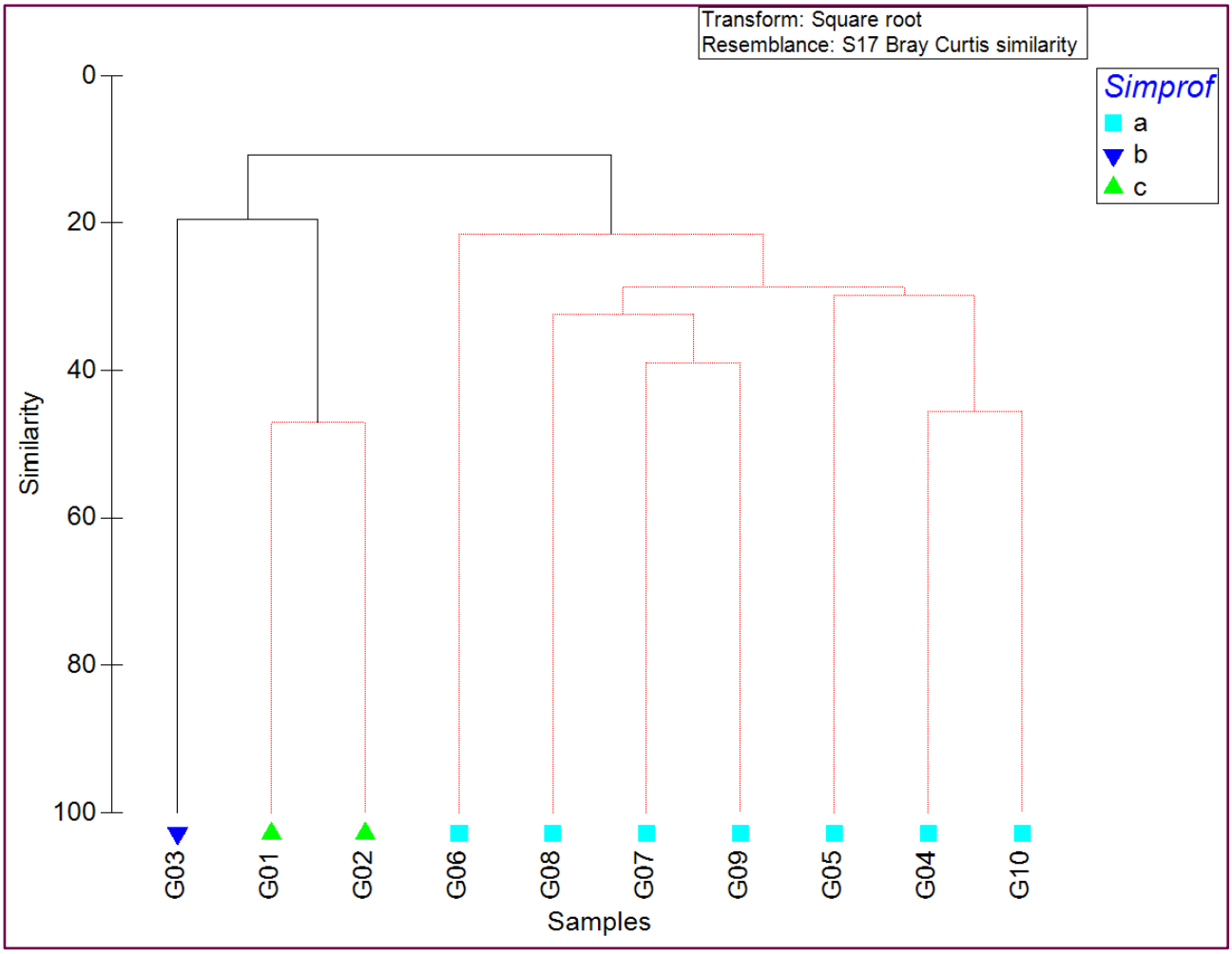

Figure 3.3: Cluster analysis for benthic faunal samples within Thurso Bay.

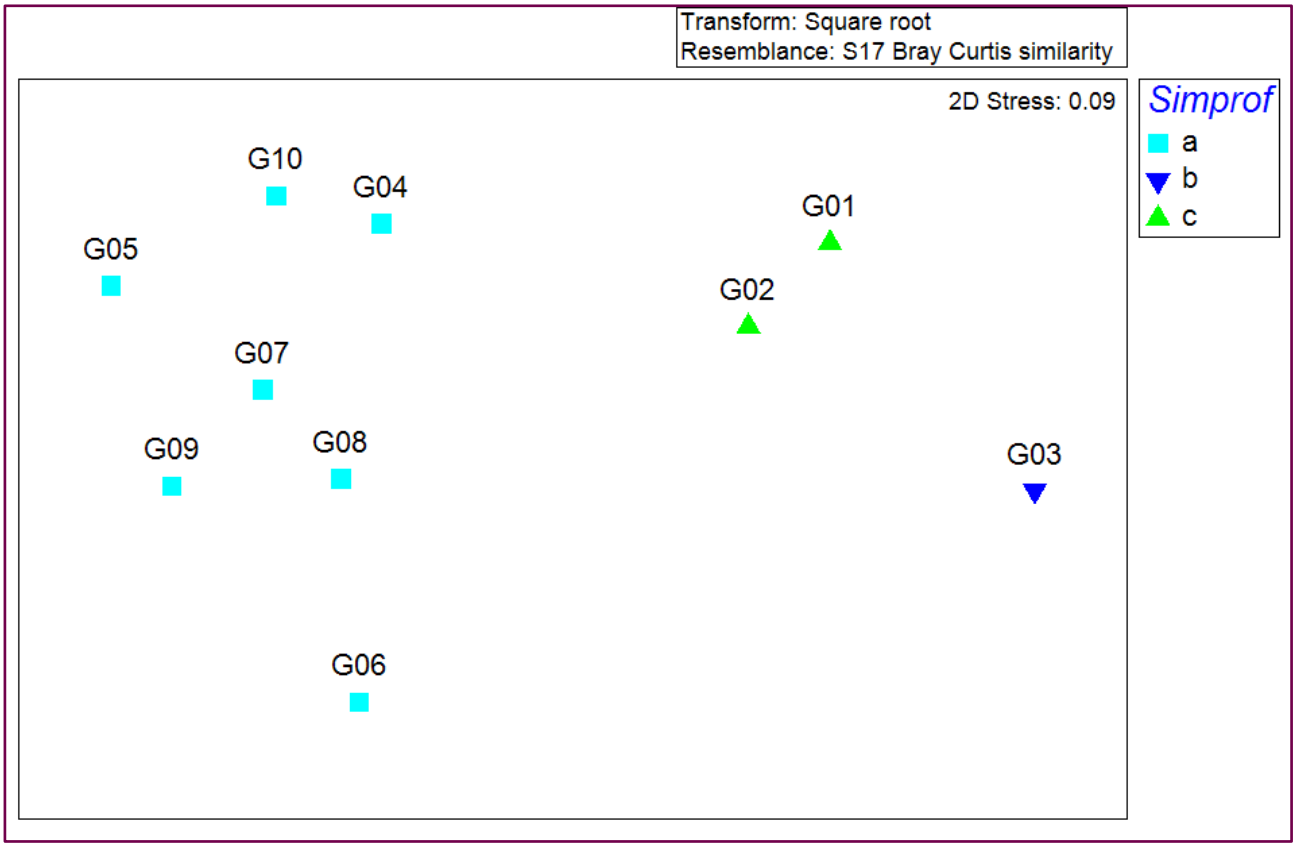

Figure 3.4: 2-D MDS plot for benthic faunal samples within Thurso Bay.

3.25 The 2D MDS plot of the square root transformed infaunal data for all sites is presented in Figure 3.4 and the low stress value of 0.09 indicates that this is a good representation of the data. It shows two faunal groups that are statistically significant from each other and one individual sample (G03) that was statistically significant from the two faunal groups. The sites within faunal group *a* are loosely clustered but are distinct from other sites, sites within faunal group *c* are well clustered. There is no overlap between groups, indicating that the sites from within these groups are distinct from sites within other groups. The single site G03 was distinct from all other sites and so has been given its own group, faunal group *b*.

3.26 A review of the results of the SIMPER analysis shows that differences between faunal group *a*, faunal group *b* (G03) and faunal group *c* could be explained by the presence/absence of key species. Despite similarities between some samples within a group being low (28% in group *a*), the dissimilarities between faunal groups was high (94% for groups *b*&*c*.)

3.27 Sites that fell within faunal group *c* occurred within Scrabster Harbour where sediments were comprised by poorly sorted fine sand with some small shells. This group was characterised by a high abundance of the polychaete *Scoloplos armiger* which contributed to 34% of the similarity within this group. Other important species within this group were a mix of polychaetes, ribbon worms, bivalves, crustaceans and sea anemones. With *Scoloplos armiger*, *Prionospio fallax*, *Nemertea*, *Galathowenia oculate*, *Parexogone hebes* and *Edwardsiidae* contributing to over 60% of the similarity between the two sites within this faunal group.

3.28 Faunal group *c* was 80% distinct from faunal group *b*. The distinction between faunal group *c* and *b* was the high abundance of *Nematoda* in faunal group *b* and low abundance in faunal group *c*; this contributed to 22% of the distinction. High abundances of *Scoloplos armiger, Iphinoe trispinosa* and *Prionospio fallax* in faunal group *c* compared to low abundance of *Scoloplos armiger* and no *Iphinoe trispinosa* and *Prionospio fallax* in faunal group *b* contributed to 35% of the distinction.

3.29 Faunal group *c* was 86% distinct from faunal group *a*. The distinction was the high abundance of *Scoloplos armiger, Prionospio fallax* and *Iphinoe trispinosa* in group *c* and low abundance in group *a*. As well as the high abundance of *Bathyporeia Elegans* in group *a* compared to group *c*. These species contributed to 25% of the distinction between the faunal groups. The rest was made up of differences in abundance of 64 different species, including: polychaetes, bivalves, ostracods, nemertea, amphipods and sea anemones.

3.30 Samples comprising faunal group *a* were taken from the wider Thurso Bay with sediment profiles of moderately well sorted fine sand with small stones and shell fragments. This group was characterised by a high abundance of the amphipod *Bathyporeia elegans*, which contributed to 44% of the similarity within this group. Other important species within this group were a mix of polychaetes, amphipods, bivalves and gastropods. Bathyporeia elegans, *Centraloecetes kroyeranus*, *Iphinoe trispinosa* and *Bathyporeia guilliamsoniana* contributed to over 60% of the similarity between the sites in this faunal group. Faunal group *a* was 94% distinct from faunal group *b*. The distinction was the high abundance of *Nematoda*, *Abra alba* and *Tubificoides benedii* in group *b* and low abundance in group *a*. There was also a higher abundance of *Bathyporeia Elegans* in group *a* compared to group *b*. These species contributed to 41% of the distinction between the faunal groups.

3.31 Faunal group *b* represented by sample G03, taken from just outside Scrabster Harbour had a sediment composition of poorly sorted very fine sand with small shells and organics. Faunal group *b* had statistically significantly different fauna from the other groups of samples. This sample was characterised by high abundance of Nematoda. Other important species within this sample were *Abra alba*, *Caulleriella alata*, *Scoloplos armiger*, *Tubificoides benedii* and *Chamelea striatula*.

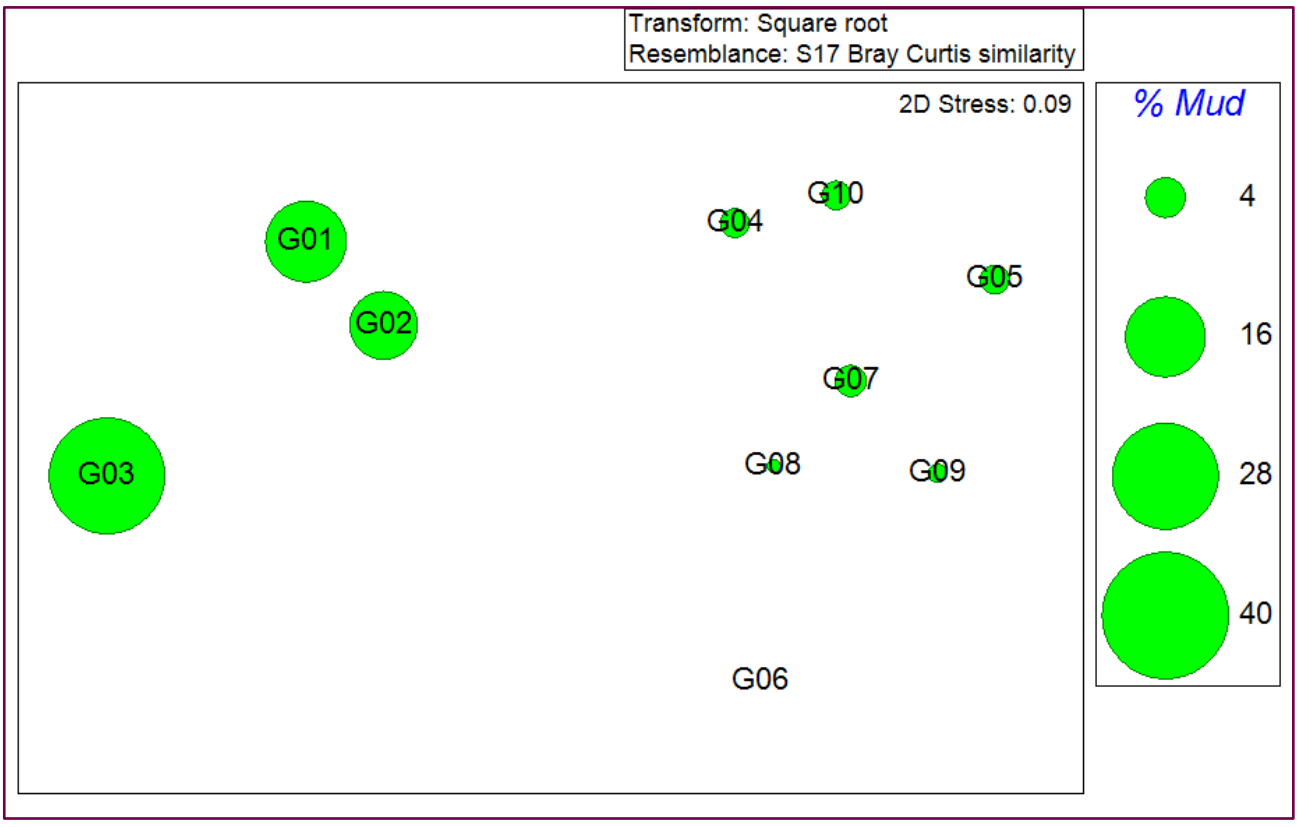

Figure 3.5: 2-D MDS plot for benthic infaunal samples within Thurso Bay and associated distribution of mud.

3.32 Sediment classification grouping of the benthic samples from PSA analysis outlined in paragraph 3.12 correspond with the samples in the three faunal groups. The percentage of mud in the sediment

at each sample has been superimposed onto the faunal 2-D MDS plot to highlight any association between faunal groups and sediment composition (Figure 3.5). Faunal group *c* was found on sediments of poorly sorted fine sand with some small shells, with mud content across all samples within this group at a maximum of 2.4% and an average of 1.4%. This contrasts with faunal group *a* which was found on sediment profiles of moderately well sorted fine sand with small stones and shell fragments. Faunal group *b* had poorly sorted very fine sand with small shells and organics. Faunal group *a* had a much higher percentage of mud, with a maximum mud percentage of 16.38% and an average of 14%. This is again a smaller percentage than for faunal group *b* with a mud percentage of 33.39%. This suggests that some of the difference between the distinct faunal groups can be explained by the different sediment profiles and mud content.

3.2.2.1.2 Faunal group characterisation

3.33 The mean number of species in each taxonomic group for each faunal group identified within Thurso Bay are presented in Figure 3.6. Faunal group *a* had the highest mean number of species (48) with a relatively even spread across polychaetes, crustacea and molluscs. Faunal group *b* had a lower mean number of species (38) but had similar numbers of polychaetes and mollusc species to faunal group *a*. However, it has no crustacea or Echinodermata. Faunal group *c* had the lowest mean number of species (17) and similar to faunal group *a*, it is predominantly made up of polychaetes, crustacea and molluscs with very small contributions from Echinodermata and other groups. Echinoderms in general were poorly represented across all of the faunal groups identified, with a total of three difference species recorded across all the samples, the majority of which were from grab sites within faunal group *a*. Approximately 30-40% of all the species present in each of the faunal groups were polychaetes, and Figure 3.6 shows that 'other' taxa were also an important component of the species assemblages across the Thurso Bay study area, due mainly to high numbers of different species nematodes, nemertea, cnidaria and epifaunal bryozoans.

3.34 The mean abundance within the major faunal groups for the faunal groups identified within Thurso Bay (Figure 3.7) show a large spread across the groups. Faunal group *b* has three times the mean number of individuals than the next most abundant, group *a*. Faunal group *a* has 75% of its numbers from polychaetes with the rest from molluscs, crustacea and 'other' taxa. Faunal group *b* is made up of 90% 'other' taxa, this is due to the abundance of Nematoda in this group (sample G03). Faunal group *c* is predominantly made up of crustacea with some contribution from polychaetes and molluscs. Although polychaetes made up a large proportion of the total number of species for each faunal group they are only a large proportion of the number of individuals within group *a*, this could be due to the high abundance of one species for faunal group *b* (Nematoda- other) and group *c* (*Bathyporeia elegans* – crustacea). Although, a high number of 'other' taxa were recorded for group *a* these were found to contribute little to the overall abundances. These species were generally present in lower numbers than polychaetes and as one of the species was epifaunal/encrusting species (bryozoans) discrete counts had not been made.

3.35 The major faunal group biomass data for the faunal groups identified within Thurso Bay (Figure 3.8) show a large spread across the groups. Faunal group *a* has a high percentage of its biomass accounted for by annelids and the rest mostly *Mollusca* with *Crustacea* and *Echinodermata* and 'other' taxa under represented. The 'other' taxa within group *a* included cnidaria, nemertea, nematoda and bryozoan. Faunal group *b* also has a large percentage of its biomass within the annelids taxon however the largest percentage was made up by Mollusca. Despite Nematoda dominating this group in abundance, they are exceptionally small therefore do not proportionally contribute to biomass although they are likely to be the largest contributor with 'other' taxa. Faunal group *b* does not have any biomass from *Crustacea* or *Echinodermata*. Faunal group *b* 'other' also included cnidaria, sipuncula and bryozoan. The higher total biomass in faunal groups *a* and *b* reflects the higher total number of individuals in these groups compared to faunal group *c*. Faunal group *c* has a very small biomass <0.1g which is mainly made up of polychaetes with presence of molluscs, Crustacea, Echinodermata and other taxa.

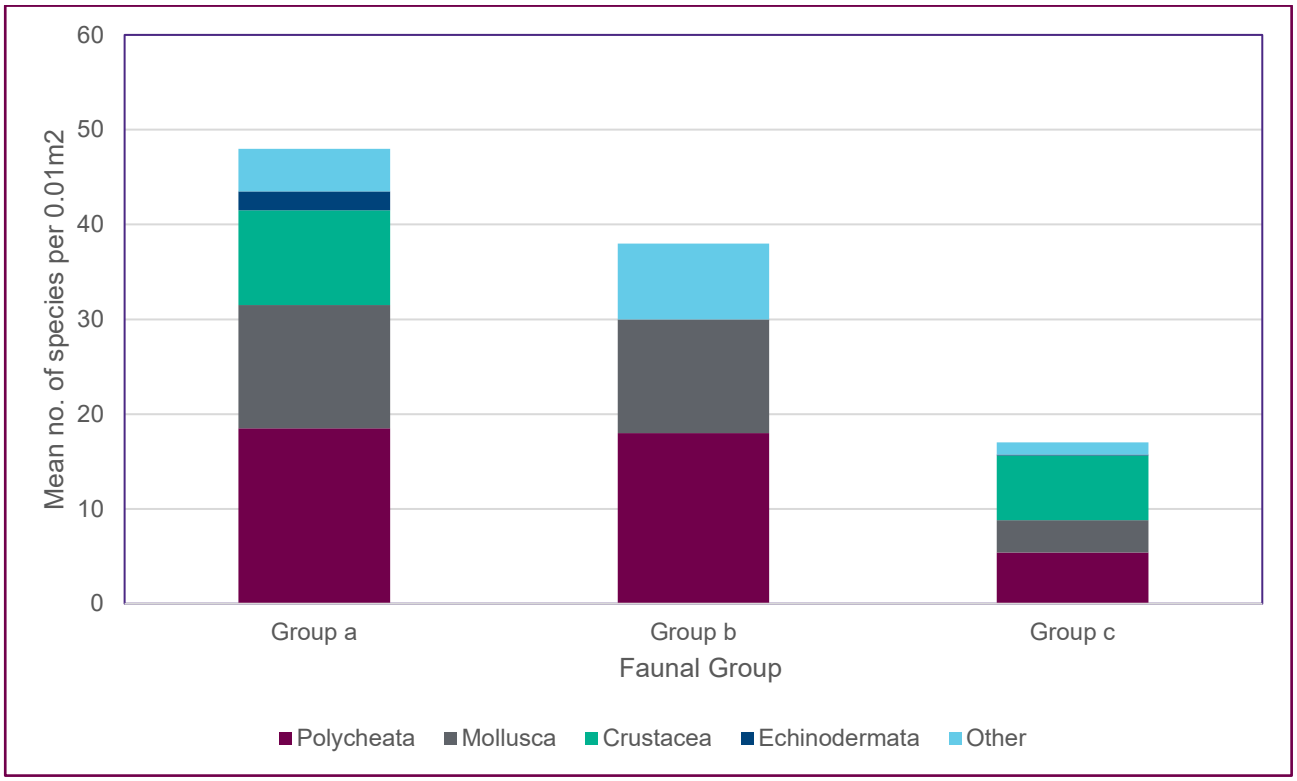

Figure 3.6: Mean number of species (per 0.1m^2) per Faunal Group identified for each major faunal group in Thurso Bay.

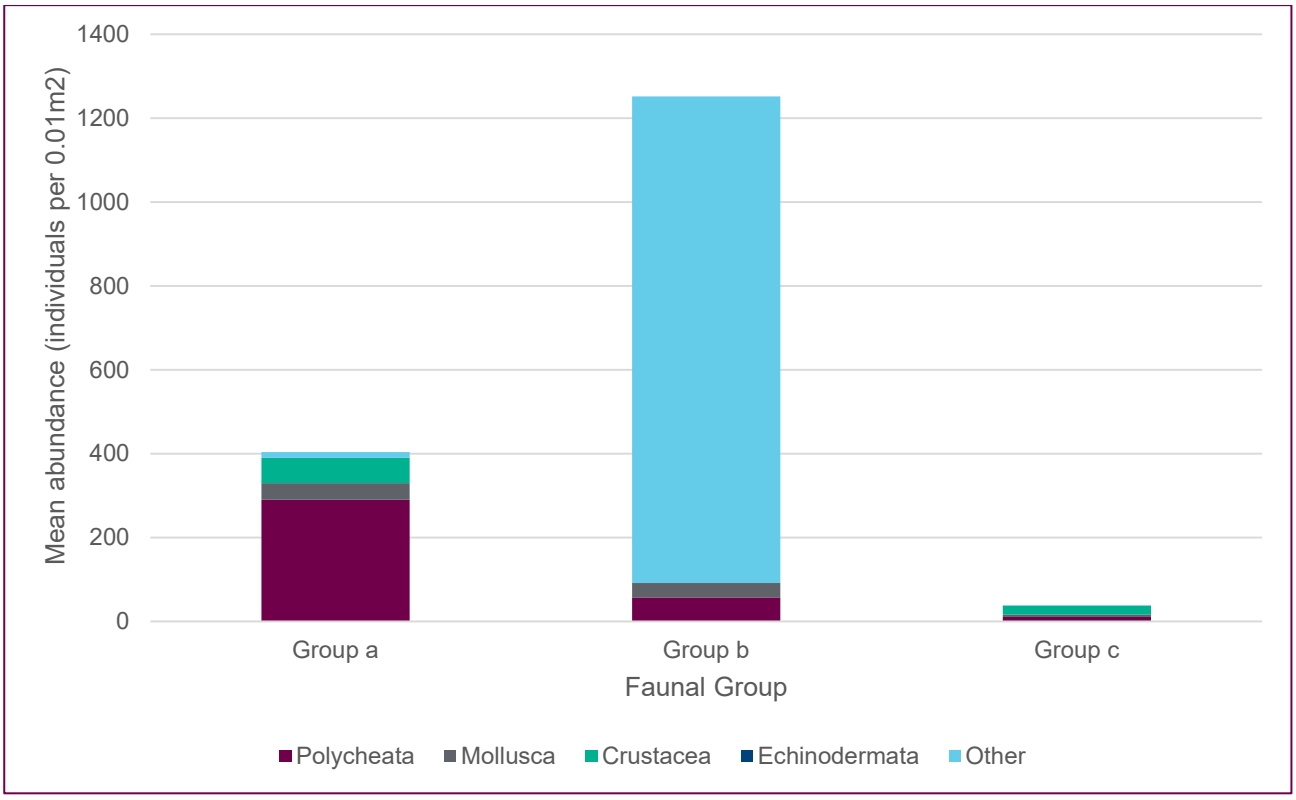

Figure 3.7: Mean abundance (individuals per 0.1m^2) per Faunal Group identified for each major faunal group in Thurso Bay.

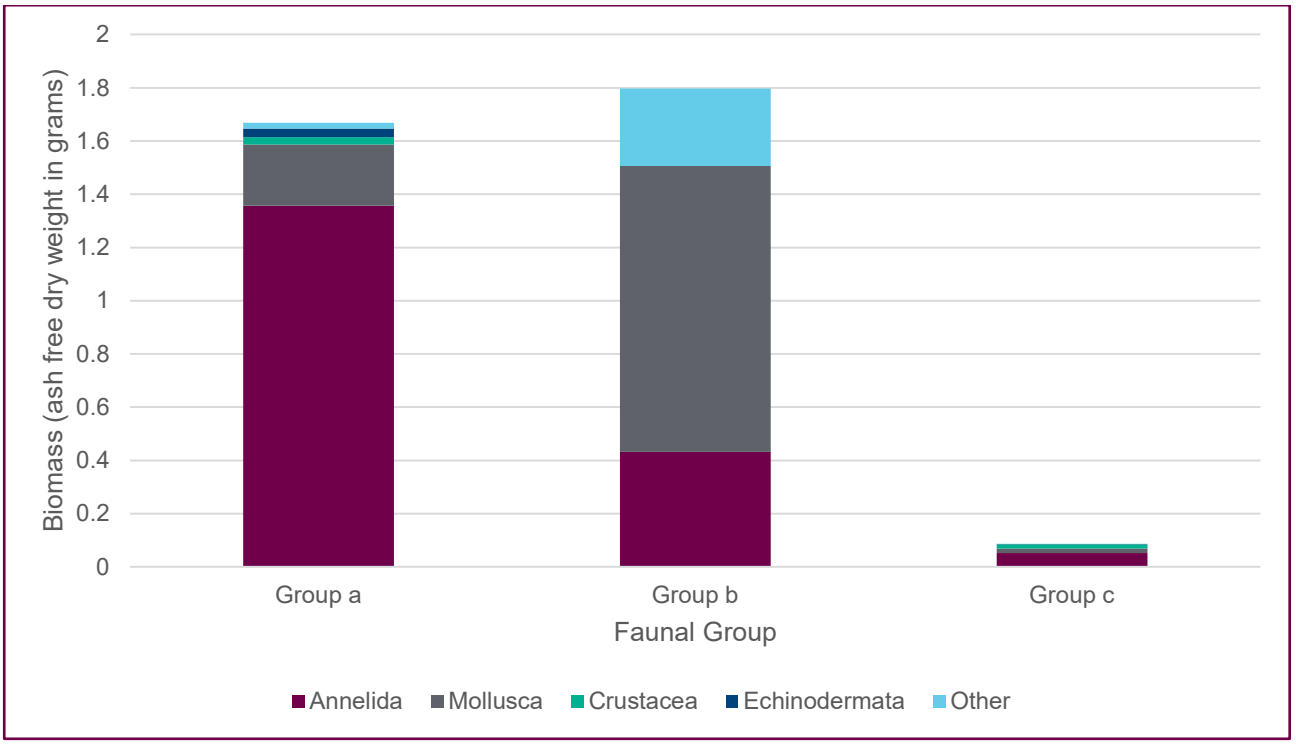

Figure 3.8: Mean biomass (ash free dry weight per 0.1m^2) per faunal group identified for each major faunal group in Thurso Bay.

3.2.2.2 Univariate community analysis

3.36 The following univariate statistics were calculated for each benthic grab site: number of species (S), abundance (N), ash free dry weight (AFDW) biomass in grams (g), Margalef's index of Richness (d), Pielou's Eveness index (J'), Shannon-Wiener Diversity index (H') and Simpson's index of Dominance (λ). The mean of each of these indices was then calculated for each of the faunal groups identified in the study area and these are summarised in Table 3.2.

Table 3.1: Univariate statistics output for each faunal group.

Univariate Statistics output for each faunal group							
Faunal group	**S**	**N**	**g**	**d**	**J'**	**H**	**λ**
A	47.5	406.55	1.67	7.75	0.51	1.99	0.36
B	38	1252.4	1.79	5.18	0.15	0.57	0.82
C	17.14	64.21	0.08	4.11	0.74	2.10	0.22

3.37 The univariate statistics indicated that faunal group *a*, the moderately well sorted fine sand community, had the highest mean numbers of species (47.5 ± 4.5). Faunal group *b* (sample G03) has the second highest number of species (38 ± 0) with faunal group *c*, the poorly sorted fine sand communities having considerably fewer numbers of species (17.14 ± 5.14). Faunal group *c* also had the lowest mean number of individuals (64.21 ± 94.79) although there was a large range across the samples within this group. This is characteristic of communities on fine sand which provides low habitat complexity so supports lower biodiversity and abundance. The highest mean number of individuals was in faunal group *b* (sample G03; 1252.4 ± 0) with over half the number of individuals belonging to *Nematoda*.

3.38 Faunal group *a* has the highest number of species (species richness) and the second highest number of individuals (species diversity). A number of diversity indices were calculated to further describe the faunal groups. The Margalef's diversity index for faunal group *a* was relatively high (7.75 ± 0.46) suggesting a high species richness and evenness across the community. The Shannon-Wiener diversity index was, however, relatively low for group *a* (1.99 ± 0.37), potentially due to the high abundances of a small number of species.

3.39 Faunal group *c* had the lowest Margalef's diversity index (4.11), most likely due to the low number of taxa and individuals within this group. It also may be due to the higher number of samples within this group compared to the other groups which are represented by only have one or two samples. The Shannon-Weiner diversity index for group *c* was similar to the index for group *a* albeit slightly higher (2.10 ± 0.78).

3.40 Pielou's eveness scores (J') and the Simpson's index of Dominance (λ) scores varied across the faunal groups. Faunal group *c* mean J' was the highest (0.74 ± 0.17) and λ the lowest (0.22 ± 0.09) indicating an even distribution of abundances among species and that this community was not dominated by a small number of species. Faunal group *b* (sample G03) had the lowest mean J' (0.15 ± 0) and the highest mean λ (0.82 ± 0) indicating that the high abundance of *Nematoda* is dominating this community.

3.2.2.3 Biotope allocation

3.41 The results from the SIMPER analysis have been used to allocate a biotope classification to each faunal group. These are detailed below in Table 3.3. Level 3 biotopes have been assigned to each faunal group as they did not sufficiently align with any level 4 biotopes. Faunal group *b* had some

similarities to SS.SMu.ISaMu.MysAbr due to its high number of molluscs, however it was not similar enough to be classified as this biotope.

Table 3.2: Benthic infauna groups identified in Thurso Bay, including summary of SIMPER results and geographic locations.

Faunal Group	Sample no.	Benthic grab survey sediment classification	Biotope classification	Biotope Description	Characterising species accounting for up to 75% of cumulative similarity (SIMPER)	Geographic location
A	4-10	Moderately well sorted fine sand	SS.SSa.IFiSa Infralittoral fine sand	Predominantly sheltered medium to very fine sand at depths of 20m. Characterised by *Pagurus bernhardus, Nephtys cirrosa, Lanice conchilega, Bahtyporeia elegans, Scoloplos armiger* and *Hydrallmania.*	Bathyporeia elegans, Centraloecetes kroyeranus, Iphinoe trispinosa, Bathyporeia guilliamsoniana, Nephtys (juv), Synchelidium maculatum, Scoloplos armiger, Chaetozone christiei.	This faunal community was found across the study area in Thurso Bay.
B	3	Poorly sorted very fine sand	SS.SMu.ISaMu Infralittoral sandy mud	Predominantly very sheltered muddy sediments with a fine sand fraction to depths of 20m. Characterised by polychaetes including *Melina plamate*, *Nephtys hombergii*, bivalves such as *Mysella bidnetata* and *Nuculosa nitidosa*.	Less than 2 samples in group, although the top ten species by abundance were: *Nematoda, Soloplos armiger, Abra Alba, Tubificoides benedii, Caulleriella alata, Chamelea striatula, Capitella, Lumbrineris cingulate, Aphelochaeta marioni* and *Galathowenia oculate*.	This faunal community was found to the north west of the study area, on the landward side of the St Ola's Pier within Scrabster harbour.
C	1 & 2	Poorly sorted fine sand with some small shells.	SS.SMu.ISaMu Infralittoral sandy mud	Predominantly very sheltered muddy sediments with a fine sand fraction to depths of 20m. Characterised by polychaetes including *Melina plamate*, *Nephtys hombergii*, bivalves such as *Mysella bidnetata* and *Nuculosa nitidosa*.	Scoloplos armiger, Prionospio fallax, Nemertea, Galathowenia oculate, Parexogone hebes, Edwardsiidae, Harpinia antennaria, Thracia (juv), Philinidae (juv, Phyllodoce mucosa, Iphinoe trispinosa.	This faunal community was found to the north west of the study area, within Scrabster harbour.

4 DISCUSSION

4.1 The sediments present within Thurso Bay were found to be predominantly sand and mud sediments with higher percentages of mud found within Scrabster Harbour, although one sample from the diver PSA survey found coarse sand within the centre of Scrabster Harbour. This is indicative of Thurso Bay which is described on the EMODnet as 'infralittoral fine sand or infralittoral muddy sand' and the wider area which is described on the EMODnet as 'circalittoral fine sand or circalittoral muddy sand'. Differences in sediment classifications between Scrabster Harbour and the wider Thurso Bay may be due to the high level of anthropogenic disturbance and dredging.

4.2 With respect to sediment contamination, only sites 1-3 had elevated levels of heavy metals which crossed Cefas AL1 and Canadian TEL lower thresholds. Samples across the survey area showed high levels of polyaromatic hydrocarbons that exceeded the lower Canadian TEL and Cefas AL1 thresholds. Sites 1-3 are on the west, landward side of St. Ola Pier and the rest are on the east side within the main harbour. This extra shelter may cause high levels of build-up of contaminants and higher levels of shipping traffic causing the elevated levels of heavy metals. Cefas AL2 and Canadian TEL thresholds were not reached and broadly the area has low levels of contamination.

4.3 Multivariate analysis of the infaunal grab data revealed distinct benthic communities that fit into two biotope classifications within Thurso Bay that were generally associated with the sediment types.

- Faunal group *a* - The samples that made up this faunal group all have poorly sorted fine sand with some small shells and were found across the study area in Thurso Bay. This group was given the biotope Infralittoral fine sand (SS.SSa.IFiSa) due to its characterising species of the amphipods *Bathyporeia elegans, Centraloecetes kroyeranus*, polychaetes *Scoloplos armiger* and *Nephtys* (juv).
- Faunal group *b* – Sample G03 made up this faunal group and had a sediment classification of poorly sorted very fine sand with small shells and organics and was found to the north west of the study area, on the landward side of the St Ola's Pier within Scrabster Harbour. This group has been given the biotope Infralittoral sandy mud (SS.SMu.ISaMu) due to its diverse range characterising species including the polychaetes *Scoloplos armiger*, high abundance of the round worm *Nematoda*, and the bivalve *Abra Alba*.
- Faunal group *c* – All samples within faunal group a had moderately well sorted fine sand with small stones and shell fragments and was found to the north west of the study area, within Scrabster Harbour. This group has been given the biotope of Infralittoral sandy mud (SS.SMu.ISaMu) due to its characterising species including the polychaetes *Scoloplos armiger*, *Prionospio fallax*, Nemertea and bivalves e.g. *Abra Alba*.

4.4 Both the sediment types and communities show a gradient from group a towards group *c* with group *c* being an intermediate. Group *a* is predominantly sandy, with samples in group *c* being slightly muddier and group *b* having the highest percentage of mud. The faunal group characterises of group *c* are between group *a* and *b* but leaning towards group *b*. This is driven by the greater mud fractions which is characteristic of their more sheltered situation compared to the relatively more exposed sites that make up group *a*. The distinctness of this faunal group *b* may also be due to the higher levels of contamination and anthropogenic disturbance compared to the samples within the wider Thurso Bay.

4.5 These results are in keeping with the limited desk top data found. The review of the EMODnet found that the majority of Thurso Bay is 'infralittoral fine sand or infralittoral muddy sand', similar to what was found in this study. Areas of 'Atlantic and Mediterranean low energy infralittoral rock' and 'Atlantic and Mediterranean moderate energy infralittoral rock' were also reported and there were areas of rocky substrate found within the study area at three of the proposed grab locations for this study. Surveys undertaken by ASML (2011) for the MeyGen project, in the nearshore waters of the Pentland Firth, found the sediment was comprised of mainly very fine to very coarse sand, with

areas of gravel, similar to the results of this study, although the biotypes described in the MeyGen study are different from the ones described here.

4.2 Summary of Valued ecological receptors

4.2.1 Ecological Value of Subtidal Habitats

4.6 No offshore nature conservation designations exist for Thurso Bay (only the North Caithness Cliffs SPA designated for seabird nesting sites and so outside the scope of this report) and none of the habitats identified are protected and none of the species present are of conservation interest. Offshore subtidal sands and gravels are Scottish Marine Priority Features however the component biotopes are not the ones that have been identified within this study. No species found within this study are Scottish Marine Priority Features (JNCC, 2012). The sand and mud communities are typical of large parts of Thurso Bay and the North Coast of Scotland.

4.2.2 Ecological Value of Intertidal habitats

4.7 The species identified from previous studies as part of the desk top review were typical of rocky shores assemblages and demonstrated typical zonation patterns. The intertidal substrate within Scrabster Harbour is predominantly comprised of artificial hard substrate in the form of vertical concrete and stone harbour/breakwater walls as well as localised areas of boulders forming coastal protection, such as on the seaward edges of the outer harbour breakwaters. These surfaces are likely to host encrusting benthic flora and fauna including taxa such as bryozoans, barnacles, mussels, sea squirts and sea anemones which are of no particular conservation or commercial interest.

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Appendix A

Sediment Chemistry Analysis

Table 5.1: Metals recorded for all samples taken from Scrabster Harbour.

Description (Metals)		Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Detection Limit		0.5	0.1	0.5	0.5	0.5	0.01	0.5	3
Cefas AL1 (mg/kg)		20	0.4	40	40	50	0.3	20	130
Cefas AL2(mg/kg)		100	5	400	400	500	3	200	800
Canadian TEL(mg/kg)		7.2	0.70	52.3	18.7	30.2	0.13	15.9	124
Canadian PEL(mg/kg)		41.6	4.2	160	108	112	0.7		271
Sample No.	Sample Type								
Site 1	Grab sample	7.75	0.20	41.7	13.9	29.1	0.03	15.8	52.5
Site 2	Grab sample	8.79	0.19	39.2	20.8	29.4	0.05	19.0	67.7
Site 3	Grab sample	7.18	0.15	32.8	20.0	17.2	0.03	15.3	48.6
Site 4	Grab sample	5.43	< 0.10	24.2	4.21	13.0	< 0.01	11.7	28.7
Site 5	Grab sample	5.04	< 0.10	29.6	4.42	12.5	< 0.01	11.2	30.6
Site 6	Grab sample	5.12	< 0.10	26.9	4.18	11.4	< 0.01	11.0	24.9
Site 7	Grab sample	5.75	< 0.10	29.2	5.00	13.6	< 0.01	11.1	28.0
Site 8	Grab sample	4.29	< 0.10	26.1	4.55	11.7	< 0.01	11.9	24.5
Site 9	Grab sample	6.54	0.11	38.0	8.05	13.9	< 0.01	14.7	36.1

Table 5.2: Organics and organotins recorded for all samples taken from Scrabster Harbour.

Description (DW, DBT, TBT)		dry solids (at 105°C)	total organic carbon	total hydrocarbon content by fluorescence	dibutyltin (DBT)	tributyltin (TBT)
Units		%	%	mg/kg	mg/kg DW	mg/kg DW
Cefas AL1 (mg/kg)					0.1	0.1
Cefas AL2(mg/kg)					1	1
Sample No.	Sample Type					
Site 1	Grab sample	62.7	1.0	62200	0.00823	0.02860
Site 2	Grab sample	58.0	1.4	66600	0.00907	0.04400
Site 3	Grab sample	62.9	1.3	36400	0.005	0.0133
Site 4	Grab sample	70.4	1.2	13100	0.005	0.002
Site 5	Grab sample	72.0	0.9	15600	0.005	0.002
Site 6	Grab sample	72.2	0.8	21200	0.005	0.002
Site 7	Grab sample	64.8	0.8	3340	0.005	0.002
Site 8	Grab sample	66.4	1.2	7670	0.005	0.002
Site 9	Grab sample	61.9	0.7	18300	0.005	0.002

Table 5.3: PCBs recorded for all samples taken from Scrabster Harbour.

description (PCB congener)		28	52	101	118	138	153	180	Sum of ICES 7
Units		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Cefas AL1 (mg/kg)									0.01
Cefas AL2(mg/kg)									none
Canadian TEL(mg/kg)									
Canadian PEL(mg/kg)									
Site 1	**Grab sample**	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001300000000000000
Site 2	**Grab sample**	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001300000000000000
Site 3	**Grab sample**	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001300000000000000
Site 4	**Grab sample**	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001300000000000000
Site 5	**Grab sample**	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001300000000000000
Site 6	**Grab sample**	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001300000000000000
Site 7	**Grab sample**	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001300000000000000
Site 8	**Grab sample**	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001300000000000000
Site 9	**Grab sample**	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001300000000000000

Table 5.4: PAHs recorded for all samples taken from Scrabster Harbour.

Description (PAH)	Units	Station : Mass	Cefas AL1 (µg/kg)	Canadian TEL (µg/kg)	Sample No. / Depth (m)	Site 1 Grab sample	Site 2 Grab sample	Site 3 Grab sample	Site 4 Grab sample	Site 5 Grab sample	Site 6 Grab sample	Site 7 Grab sample	Site 8 Grab sample	Site 9 Grab sample
naphthalene	ug/kg	128	100	20.2		21.2	28.6	36.7	31.5	10.8	4.71	15.5	6.12	14.3
acenaphthylene	ug/kg	152	100	5.87		15.3	7.78	12.9	3.08	3.51	9.54	3.67	< 2.0	5.48
acenaphthene	ug/kg	154	100	6.71		19.1	23.2	12.2	8.10	18.5	6.31	12.5	19.8	25.9
fluorene	ug/kg	166	100	21.2		27.2	26.9	29.4	10.0	19.3	16.9	14.3	20.7	26.0
phenanthrene	ug/kg	178	100	86.7		110	93.4	77.2	58.2	37.1	70.0	32.2	22.4	58.6
anthracene	ug/kg	184	100	46.9		38.1	37.7	32.4	9.86	17.2	49.8	19.3	10.2	25.1
fluoranthene	ug/kg	178	100	113		234	132	120	69.2	88.0	148	62.6	45.9	105
pyrene	ug/kg	202	100	153		255	175	140	57.5	88.3	145	63.7	41.9	92.4
benzo(a)anthracene	ug/kg	202	100	74		185	119	61.6	36.6	60.9	117	49.6	31.3	66.9
chrysene	ug/kg	228	100	108		104	73.6	28.5	19.1	34.8	74.0	25.3	16.0	38.4
benzo(b+j)fluoranthene	ug/kg	228	100	n/a		274	212	77.9	47.1	83.1	139	71.6	42.3	88.8
benzo(k)fluoranthene	ug/kg	252	100	n/a		70.6	50.8	20.2	13.1	27.8	41.2	19.2	11.6	29.2
benzo(a)pyrene	ug/kg	252	100	88.8		185	126	49.2	17.6	54.5	109	39.8	22.2	55.6
indeno(1,2,3-c,d)pyrene	ug/kg	252	100	n/a		86.2	63.7	23.0	13.1	27.3	43.0	20.5	10.5	27.7
dibenzo(a,h)anthracene	ug/kg	276	100	6.22		41.5	34.3	11.9	6.02	14.0	18.8	10.3	5.95	13.2

Description (PAH)	Units	Station:	Cefas AL1 (µg/kg)	Canadian TEL (µg/kg)	Sample No.	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9
		Mass			Depth (m)	Grab sample	Grab sample	Grab sample	Grab sample	Grab sample	Grab sample	Grab sample	Grab sample	Grab sample
benzo(g,h,i)perylene	ug/kg	278	100	n/a		102	81.9	27.5	15.7	30.5	52.5	28.2	12.8	31.3
Perylene	ug/kg	276	100	n/a										

Appendix B

Particle Size Analysis

Table 5.5: Particle size analysis of the benthic grab samples from the survey in 2019.

Station	Treatment	Textural Group Classification	Folk and Ward Description	Folk and Ward Sorting	Mean µm	Mean phi	Sorting Coefficient	Skewness	Kurtosis	Major Sediment Fractions		
										% Gravel	% Sand	% Mud
GS01	Sediment	Muddy Sand	Fine Sand	Poorly Sorted	136.087	2.877	1.377	0.379	1.869	0.00%	83.62%	16.38%
GS02	Sediment	Muddy Sand	Fine Sand	Poorly Sorted	141.413	2.822	1.063	0.320	1.774	0.00%	88.47%	11.53%
GS03	Sediment	Muddy Sand	Very Fine Sand	Poorly Sorted	76.857	3.702	1.908	0.503	1.085	0.00%	66.61%	33.39%
GS04	Sediment	Sand	Fine Sand	Moderately Well Sorted	181.057	2.465	0.564	0.005	1.070	0.00%	97.92%	2.08%
GS05	Sediment	Sand	Fine Sand	Moderately Well Sorted	176.008	2.506	0.533	-0.017	1.081	0.00%	97.90%	2.10%
GS06	Sediment	Sand	Fine Sand	Moderately Well Sorted	232.576	2.104	0.520	-0.070	1.047	0.00%	100.00%	0.00%
GS07	Sediment	Sand	Fine Sand	Moderately Well Sorted	174.827	2.516	0.689	-0.069	1.165	0.00%	97.57%	2.43%
GS08	Sediment	Sand	Fine Sand	Moderately Well Sorted	230.600	2.117	0.644	-0.187	1.312	0.00%	99.55%	0.45%
GS09	Sediment	Sand	Fine Sand	Moderately Well Sorted	227.075	2.139	0.534	-0.067	1.058	0.00%	99.17%	0.83%
GS10	Sediment	Sand	Fine Sand	Moderately Well Sorted	199.159	2.328	0.632	-0.041	1.291	0.00%	97.92%	2.08%

Table 5.6: Particle size analysis of the sediment survey 2018.

Station	Treatment	Textural Group Classification	Folk and Ward Description	Folk and Ward Sorting	Mean phi	Sorting Coefficient	Skewness	Kurtosis	Major Sediment Fractions		
									% Gravel	% Sand	% Mud
1	Sediment	Slightly gravelly Muddy Sand	Very Fine Sand	Poorly Sorted	3.84	1.95	0.416	1.08	2.09	60.7	37.2
2	Sediment	Slightly gravelly Muddy Sand	Very Fine Sand	Poorly Sorted	3.93	1.94	0.400	1.02	1.05	60.1	38.9
3	Sediment	Muddy Sand	Very Fine Sand	Poorly Sorted	3.53	1.85	0.457	1.15	0.00	69.4	30.6
4	Sediment	Slightly Gravelly Sand	Fine Sand	Poorly Sorted	2.22	1.11	0.005	1.31	0.75	93.1	6.13
5	Sediment	Muddy Sand	Fine Sand	Poorly Sorted	2.68	1.05	0.250	1.97	0.00	89.8	10.2
6	Sediment	Sand	Fine Sand	Moderately Sorted	2.68	0.877	0.275	1.81	0.00	91.7	8.29
7	Sediment	Gravelly Mud	Fine Sand	Poorly Sorted	2.28	1.98	0.049	1.53	4.87	80.0	15.1
8	Sediment	Gravelly Muddy Sand	Coarse Sand	Very Poorly Sorted	0.163	3.77	-0.577	0.664	28.2	62.6	9.28
9	Sediment	Muddy Sand	Very Fine Sand	Poorly Sorted	3.53	1.36	0.392	1.47	0.00	72.3	27.7

Appendix C

Faunal Data

Table 5.7: Macro fauna counts from the benthic grab samples (2019).

	Abundance									
Taxon Name	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Sample 6**	**Sample 7**	**Sample 8**	**Sample 9**	**Sample 10**
Pholoe baltica	-	1	2	-	-	-	-	-	-	-
Dipolydora	-	-	1	-	-	-	-	-	-	-
Tanaopsis graciloides	2	-	-	-	-	-	-	-	-	-
Onoba semicostata	1	-	-	-	1	-	-	-	1	-
Praxillella affinis	-	1	-	-	-	-	-	-	-	-
Centraloecetes kroyeranus	-	-	-	12	-	1	3	3	-	1
Eusyllis blomstrandi	-	-	-	1	-	1	-	-	-	-
Eumida sanguinea	-	3	-	-	-	-	-	-	-	-
Iphinoe trispinosa	1	68	-	58	1	-	3	-	-	21
Sphaerodoridium minutum	-	-	-	-	-	-	-	-	1	-
Galathowenia oculata	8	5	3	-	-	-	-	-	-	-
Aphelochaeta marioni	-	-	4	-	-	-	-	-	-	-
Cerianthus lloydii	-	1	3	-	-	-	-	-	-	-
Myodocopida	1	4	-	-	-	1	-	-	-	-
Edwardsiidae	3	3	2	-	-	-	-	-	-	-
Kurtiella bidentata	-	1	2	2	-	-	-	1	-	-
Heterobranchia	10	1	-	-	-	-	-	-	-	-
Gastropoda	-	P	-	-	-	-	-	-	-	-
Nemertea	6	7	-	-	-	3	1	-	-	-
Pariambus typicus	-	2	-	-	-	-	-	-	-	-
Megaluropus agilis	-	5	-	1	-	1	-	-	-	1
Fabulina fabula	1	10	1	3	1	-	-	1	-	-
Magelona johnstoni	-	-	-	2	3	-	2	-	-	-

	Abundance									
Tellimya ferruginosa	-	-	1	-	-	-	-	-	-	-
Mysia undata	1	-	-	-	-	-	-	-	-	-
Pholoe inornata	1	2	1	-	-	-	-	-	-	-
Retusa obtusa	-	-	-	-	-	-	-	-	-	2
Goniada maculata	1	1	-	-	-	-	-	-	-	-
Animalia	P	-	-	P	-	-	-	-	-	-
Travisia forbesii	-	-	-	-	-	-	-	5	-	-
Bathyporeia elegans	-	1	-	46	7	1	36	24	25	26
Echinocyamus pusillus	1	-	-	-	-	-	-	1	-	-
Nephtys caeca	1	-	-	-	-	1	-	-	1	-
Parexogone hebes	5	10	-	-	-	-	-	-	-	-
Pusillina sarsii	-	-	-	-	-	1	-	-	-	-
Euclymene oerstedii	1	-	-	-	-	-	-	-	-	-
Leptosynapta inhaerens	1	-	-	-	-	-	-	-	-	-
Ampelisca	1	-	-	-	-	-	-	-	-	-
Nephtys hombergii	-	-	-	2	-	-	-	-	-	-
Harpinia antennaria	2	5	-	-	-	-	-	-	-	-
Chamelea striatula	-	-	7	-	-	3	-	1	-	-
Thyasira flexuosa	-	-	2	-	-	-	-	-	-	-
Thyasiridae	1	-	-	-	-	-	-	-	-	-
Scrupocellaria scruposa	-	-	P	-	-	-	-	-	-	-
Tubificoides benedii	-	-	12	-	-	-	-	-	-	-
Ophryotrocha	-	-	1	-	-	-	-	-	-	-
Lumbrineris cingulata	2	-	5	-	-	-	-	-	-	-
Sthenelais limicola	1	-	-	-	-	-	1	1	1	-
Cylichna cylindracea	2	1	-	-	-	-	-	-	-	-
Asbjornsenia pygmaea	1	-	-	-	-	-	-	-	-	-
Macomangulus tenuis	-	2	-	-	-	-	-	-	-	-
Leucothoe incisa	-	2	-	-	-	-	-	-	-	-

	Abundance									
Hermania	-	1	-	-	-	-	-	-	-	-
Diastylis bradyi	-	-	-	-	-	1	-	3	-	-
Nematoda	1	6	1139	1	-	-	2	-	2	-
Glycera tridactyla	-	-	1	-	-	-	-	-	-	-
Abra nitida	1	-	2	-	-	-	-	-	-	-
Spio arndti	8	-	-	6	-	-	-	-	-	-
Syllidia armata	-	1	-	-	-	-	-	-	-	-
Chaetozone setosa	3	-	-	2	-	-	1	-	-	-
Corophiidae	-	2	-	-	-	-	-	-	-	-
Eunereis longissima	-	-	1	-	-	-	-	-	-	-
Timoclea ovata	-	-	1	-	-	-	-	5	-	-
Mysta picta	1	-	-	-	-	-	-	-	-	-
Pontocrates arenarius	-	-	-	3	-	1	-	-	-	-
Thracia	2	25	-	-	-	1	1	-	-	-
Nephtys	-	1	-	-	-	2	1	2	2	-
Celleporella hyalina	-	-	-	-	-	P	-	-	-	-
Capitella	-	2	6	-	-	-	-	-	-	-
Philinidae	2	3	-	-	-	-	-	-	-	1
Spisula	-	-	-	-	-	-	-	1	-	-
Oxydromus flexuosus	-	1	-	-	-	-	-	-	-	-
Nucula nucleus	-	-	1	-	-	-	-	-	-	-
Phaxas pellucidus	-	-	P	-	-	-	-	-	-	-
Copepoda	-	1	-	-	-	1	1	-	-	-
Sabellaria spinulosa	-	1	-	-	-	-	-	-	-	-
Prionospio fallax	9	30	-	2	-	-	-	-	-	-
Phaxas pellucidus	-	1	-	-	-	-	-	-	1	-
Scoloplos armiger	221	224	17	-	1	-	-	3	-	7
Nucula nitidosa	-	1	1	-	-	-	-	-	-	-
Cerastoderma	-	1	-	-	-	-	-	-	-	-

	Abundance									
Euspira nitida	-	4	-	-	-	-	-	1	2	-
Chaetozone christiei	-	6	1	-	1	1	-	-	2	-
Bathyporeia	-	-	-	-	-	4	5	-	-	-
Hippomedon denticulatus	-	-	-	-	-	1	-	-	1	-
Electra pilosa	-	P	-	-	-	P	P	-	-	-
Spirobranchus triqueter	-	-	1	-	-	-	-	-	-	-
Abra prismatica	-	2	-	-	-	-	-	-	-	-
Nototropis guttatus	-	3	-	-	1	-	-	-	-	-
Spio	-	-	-	-	1	-	-	-	-	-
Retusa umbilicata	1	-	-	-	-	-	-	-	-	-
Dosinia	-	2	1	1	-	1	-	-	-	-
Abra	-	-	-	-	-	-	-	1	-	-
Phascolion (Phascolion) strombus strombus	-	-	1	-	-	-	-	-	-	-
Pseudocuma (Pseudocuma) longicorne	-	2	-	2	-	-	-	-	1	-
Spiophanes kroyeri	-	-	1	-	-	-	-	-	-	-
Mactra	-	-	-	-	1	-	-	-	-	-
Perioculodes longimanus	1	13	-	6	-	-	-	-	-	1
Tubificoides galiciensis	-	-	3	-	-	-	-	-	-	-
Caulleriella alata	-	-	8	-	-	-	-	-	-	-
Bathyporeia guilliamsoniana	-	-	-	-	3	3	1	-	1	-
Exogone naidina	1	-	1	-	-	-	-	-	-	-
Phyllodoce mucosa	2	6	3	-	-	-	-	-	-	-
Magelona filiformis	-	-	-	6	1	-	-	-	-	2
Crisia	-	-	-	-	-	P	-	-	-	-
Thracia phaseolina	1	-	-	-	-	-	-	-	-	-
Corbula gibba	1	-	-	-	-	-	-	-	-	-
Amphictene auricoma	1	-	-	-	-	-	1	-	-	-
Microprotopus maculatus	-	-	-	-	-	-	1	-	-	-

	Abundance									
Synchelidium maculatum	-	-	-	3	1	-	2	-	-	1
Ampelisca brevicornis	-	6	-	-	-	2	-	-	-	-
Nototropis falcatus	-	-	-	-	-	-	-	3	-	-
Owenia	3	1	-	-	-	-	-	-	-	-
Nephtys cirrosa	-	-	-	-	-	-	-	1	-	1
Monopseudocuma gilsoni	-	-	-	-	-	-	3	-	-	-
Sigalion mathildae	-	-	-	-	1	-	-	-	-	-
Flustra foliacea	-	-	P	-	-	-	-	-	-	-
Spisula elliptica	-	-	-	-	-	-	-	1	-	-
Owenia	-	-	-	-	-	-	P	-	-	-
Spio decorata	-	13	-	-	-	-	1	-	-	-
Cellepora pumicosa	-	-	P	-	-	-	-	-	-	-
Amphiuridae	1	-	-	-	-	-	-	1	-	-
Abra alba	-	-	16	-	-	-	-	-	-	-
Spio symphyta	-	-	-	-	-	-	-	-	-	5
Spiophanes bombyx	-	1	-	-	-	-	-	-	-	-
Ophiuridae	1	1	-	-	-	-	-	-	-	-

Appendix 11.3 European Protected Species Supporting Information Report

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REDEVELOPMENT OF ST. OLA PIER

European Protected Species Supporting Information Report

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EPS Supporting Information Report
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Contents

1 INTRODUCTION 1
1.1 Background 1
1.2 Project Overview 2
1.3 The Licensable Construction Operations 2
1.4 Test 1 – Overriding Public Interest 3
1.5 Test 2 – No Satisfactory Alternatives 4
1.6 Test 3 – Favourable Conservation Status 5
1.7 Mitigation Measures 13
REFERENCES 14

Tables

Table 1.1: Worst case scenario for marine mammals for the Redevelopment. 3
Table 1.2: Estimated disturbance impacts to marine mammals due to piling noise. 6

1 INTRODUCTION

1.1 Background

1.1 Scrabster Harbour Trust (SHT) has applied for the necessary project consents (the **Project Consents**) under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 to redevelop and operate the St Ola Pier within Scrabster harbour (the **Redevelopment**), in Thurso Bay on the north Caithness Coastline.

1.2 In order to undertake piling operations to install foundations for the redevelopment of St Ola Pier (the **Licensable Construction Operations**), as described in chapter 2: Project Description of the Environmental Impact Assessment Report (EIAR) submitted in July 2019, which accompanied the applications for the Project Consents, SHT has been advised by Marine Scotland that a European Protected Species licence (**EPS Licence**) under regulation 44 of the Conservation (Natural Habitats, &c.) Regulations 1994 (the **1994 Regulations**) may be required to ensure no offence is committed pursuant to Regulation 39 (1) and Regulation 39 (2) of the 1994 Regulations. This report (**Supporting Information Document**) is submitted in support of SHT's applications to the Scottish Ministers (acting through Marine Scotland) for the Project Consents and seeks to demonstrate, should the Project Consents be granted, the information required to show that there would be no effect on the Favourable Conservation Status (FCS) of European Protected Species (EPS) likely to occur in the Redevelopment area. This EPS Supporting Information Document is provided to support an **Application** for an EPS Licence authorising the Licensable Construction Operations for the duration of the construction of the Redevelopment if deemed necessary as a condition of the Project Consents.

1.3 An EPS Licence can only be granted for specific purposes set out in Regulation 44 of the 1994 Regulations. For the Application to be granted, the 1994 Regulations provide that the Scottish Ministers will need to be satisfied that (within the terms of Regulation 44) the Application passes each of the following three tests:

1. the Licensable Construction Operations are for a purpose which constitutes "*imperative reasons of overriding public interest including those of a social or economic nature*" (the **Overriding Public Interest Test; Regulation 44(2)**);
2. there is no satisfactory alternative to the Licensable Construction Operations (the **No Satisfactory Alternatives Test; Regulation 44(3)(a)**); and
3. the Licensable Construction Operations will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range (the **Favourable Conservation Status Test; Regulation 44(3)(b)**).

1.4 In preparing this supporting information, SHT has had regard to the following guidance documents:

- The protection of Marine European Species from injury and disturbance: Guidance for Scottish Inshore Waters (Marine Scotland, 2014);
- EPS Licensing; Test 1 – Licensable Purpose: Interpreting the legal purpose at Regulation 44(2)(e) of the Conservation (Natural Habitats, &c.) Regulations 1994[1];

[1] Available at https://www.nature.scot/professional-advice/safeguarding-protected-areas-and-species/licensing/european-protected-species-licensing

- EPS Licensing; Test 2 – No satisfactory alternative: Interpreting Regulation 44(3)(a) of the Conservation (Natural Habitats, &c.) Regulations 1994[1];
- Favourable Conservation Status: UK Statutory Nature Conservation Bodies Common Statement[2] and
- Application for a licence relating to European Protected Species: Guidance notes on providing supporting information[1].

1.5 This Supporting Information Document provides an overview of the proposed Redevelopment and the Licensable Construction Operations and further provides material to indicate how compliance with each of the three tests may be demonstrated in support of the Application.

1.2 Project Overview

1.6 The proposed Redevelopment is described in Chapter 2: Project Description of the EIAR. The Project Description provides parameters for the maximum likely scenario for the Redevelopment, a summary of which is set out below.

1.7 The proposed Redevelopment is a refurbishment of the existing St Ola Pier which has fallen into declining use due to ongoing corrosion of steel piling and lack of load bearing capacity for imposed deck loads. The proposal aims to provide an enhanced, widened, straight berthing face on the inner side for service and cargo vessels with a new berth on the outside face. The renovated pier will be circa. 280 m long and fully enclosed around the perimeter. Pier quay walls will likely comprise steel combi-wall piling, which will likely be impact driven with some expected pre-augering.

1.8 The proposed Redevelopment lies entirely within Scottish territorial waters (up to 12 nautical miles).

1.3 The Licensable Construction Operations

1.9 The Application will be made for the Licensable Construction Operations in respect of bottlenose dolphin (*Tursiops truncatus*); harbour porpoise (*Phocoena phocoena*); minke whale *(Balaenoptera acutorostrata*); white-beaked dolphin (*Lagenorhynchus albirostris*); Risso's dolphin (*Grampus griseus*); killer whales (*Orcinus orca*); and otter (*Lutra lutra).*

1.10 The parameters presented in Chapter 2: Project Description is considered by SHT to represent the 'worst case scenario' within the Rochdale Envelope parameters in terms of effects (principally due to noise) on key species of cetacean (as listed above). It is therefore considered that this 'worst case scenario' for the Licensable Construction Options also represents an appropriate basis for this supporting information and is set out in the table below.

1.11 Increased vessel noise produced as part of the Redevelopment, in terms of noise effects on marine mammals was not taken forward for Environmental Impact Assessment, as vessel movements during construction would likely produce underwater noise at similar levels to those vessel movements associated with the operating harbour. In addition, impact piling is likely to produce noise at substantially higher levels than those levels produced by vessel movements. It is therefore considered that vessel activity will not require an EPS Licence.

[2] http://jncc.defra.gov.uk/pdf/FCS18_InterAgencyStatement.pdf

Table 1.1: Worst case scenario for marine mammals for the Redevelopment.

Potential Effect	Worst Case Scenario Assessed
Construction	
Physical injury and disturbance resulting from pile driving	• Short-term typically up to 6 hours of actual pile driving for each pile • 1.219 m diameter steel tubular piles • Approximately 230 tubular piles • Impact pile hammer • Maximum hammer energy of 240 kJ with soft start procedures • Piling may take place from land or from a Jack up barge • It is assumed that piling will take place over approximately 115 days, including weather downtime
Temporary habitat loss resulting from the extension of the foreshore to accommodate a storage area	• Short-term habitat loss during the life-span of the project works

1.4 Test 1 – Overriding Public Interest

Guidance

1.12 Scottish Natural Heritage Guidance states that only public interests will be relevant for the Public Interest Test and generally, only where it is a long-term interest. Examples of objectives that the Scottish Government consider to be relevant to meet the Public Interest Test are provided in the Guidance and include:

- Where there is clear and demonstrable direct environmental benefit on a national or international scale;
- Where failure to proceed would have unacceptable social and/or economic consequences; and
- Where the project is of national importance, or, possibly, regional importance.

Policy and Legislation

1.13 SNH Guidance states that, when determining an EPS Licence application, SNH will take into account whether an activity or development is required to meet, or contribute to meeting, a specific need such as maintaining the environment of Scotland's people (including sustainable development and renewable or green energy) and supporting economic or social development (including nationally important infrastructure development projects and employment).

1.14 The following paragraphs set out some key policy support for economic development projects in general, and the Redevelopment in particular:

- The UK Marine Policy Statement 2011 (**UKMPS**) is currently the only marine policy document in effect for the area in which the Redevelopment is situated. It includes a high-level objective of ensuring a strong, healthy and just society, ensuring there is equitable access for those who want to use and enjoy the coast, seas and their wide range of resources and assets. It also recognises that properly planned developments in the marine area can provide environmental and social benefits as well as drive economic development, provide opportunities for investment and generate export and tax revenues. A proposal reinstating St. Ola Pier to a condition in which the pier can be fully utilised, and in enhancing the existing facilities to create a multi-purpose redeveloped quay will undoubtedly contribute to ensuring equitable access, as well as driving economic

development, and providing opportunities for investment. These benefits, however, have to be weighed against the environmental impacts including the extent to which development will impact on the ecosystem and other activities taking place within the marine environment.

- Scotland's National Marine Plan provides that key priorities under the heading of Shipping, Ports, Harbours and Ferries include: *Sustainable growth and development of ports and harbours as a competitive sector, maximising their potential to facilitate cargo movement, passenger movement and support other sectors*; and *Safeguarded essential maritime transport links to island and remote mainland communities* (Marine Scotland, 2015). A key priority under the heading of Recreation and Tourism is *Continued and improved access to marine and coastal resources for tourism activities and recreational use*. This draft Plan gives clear support in principle to the Redevelopment and states that evidence suggests that environmental issues could be addressed through appropriate mitigation measures at project level.

Conclusions

1.15 The Licensable Construction Operations are a solution to a fundamental and essential step required for the Redevelopment: providing a base for the Pier. Applying the relevant guidance, it is clear that developments which contribute to economic and social development are specifically recognised by SNH as the types of development which can fulfil the requirements of the Overriding Public Interest Test.

1.5 Test 2 – No Satisfactory Alternatives

1.16 Regulation 44(3) would require the Scottish Ministers to be satisfied that there is no satisfactory alternative before they could issue an EPS Licence for the Licensable Construction Operations. The Rochdale Envelope includes potential alternatives to the Licensable Construction Operations which are discussed in full in Chapter 3: Alternatives of the EIAR.

Alternative sites

1.17 As the redevelopment of St. Ola Pier relates specifically to the refurbishment and redevelopment of the St. Ola Pier there are no feasible alternative sites considered for the redevelopment project.

Alternative construction methods

1.18 The following were considered for the pier redevelopment:

- A closed face pier solution
- An open piled pier solution
- A partially open pile/closed faced pier solution.

1.19 It was anticipated that an open pile structure would be excessively costly to construct in comparison to a closed face structure. Additionally, an open piles structure would not allow for beneficial reuse of dredge spoil/crushed concrete within the structure. On the basis of these considerations a closed face pier structure was selected as the preferred construction solution for the redeveloped pier.

1.20 A number of layouts were considered, including a scenario in which the existing pier was repaired. The options considered have been presented below.

Alternative layouts

1.21 Whilst the most critical outcome of the project is to reinstate St. Ola Pier to a condition in which the pier can be fully utilised, SHT also wishes to enhance the existing facilities creating a multi-purpose redeveloped quay. Four options were considered, and were assessed under the criteria of the following:

- Additional pier/storage area;
- Sufficient cruise vessel berthage;
- Future potential of inner and outer harbour;
- Discrete quayside working area/dual working berths;
- Navigational impact and marine safety;
- Potential constraints on dredging and disposal/reclamation;
- Impact of construction works;
- Environmental factors and sustainability; and
- Estimated cost.

1.22 On the basis of these criteria the preferred option was selected due to the level of functionality required for the proposed operations of the redeveloped pier, whilst offering a cost-effective solution which would allow for the repurposing of the dredge spoil within the structure. This also provided minimum impact on the existing harbour and it was anticipated that this layout would have little effect on the harbour wave climate.

1.6 Test 3 – Favourable Conservation Status

1.23 Under Regulation 44(3) SHT must demonstrate that the Licensable Construction Operations will not be detrimental to the maintenance of the population of bottlenose dolphin, harbour porpoise, minke whale, Risso's dolphin, white-beaked dolphin and killer whale at a "favourable conservation status" in their natural range.

1.24 The European Habitats Directive (which is given effect in the UK by, among others, the 1994 Regulations) includes the following definitions:

1.24.1 The "conservation status" of a species means, "the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations […]"

1.24.2 The conservation status will be taken as "favourable" when:

- "population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis."

Bottlenose dolphin

Summary of the EIAR assessment

1.25 Noise modelling was undertaken in line with the most recent acoustic guidance from NOAA (NMFS, 2018) and showed that acoustic injury in the form of a permanent threshold shift (PTS), is not predicted to occur for mid-frequency cetaceans[3] (includes bottlenose dolphin) as the threshold for injury is not expected to be exceeded (see section 4.9 *et seq.* of Appendix 11.1: Underwater Noise Assessment of EIAR). Injury, however, will be mitigated for under JNCC mitigation guidelines (JNCC, 2010a; JNCC, 2010b) and will involve pre-piling searches (using dedicated marine mammal observers (MMOs) and passive acoustic monitoring (PAM) operatives) and soft-starts where the initial hammer energy is low and gradually ramped up over time (see Section 1.7). The aim of this mitigation is to allow detection of animals within a 500 m mitigation zone prior to commencement of the piling, and to deter any animals prior to reaching full hammer energy, where maximum noise levels would be achieved.

1.26 The effect on all cetacean species which is most likely to occur, as identified in the Underwater Noise Assessment, is the potential piling related disturbance of animals up to 9.8 km (10 % probability at this distance) from the Redevelopment. The method for assessing the potential disturbance effect is given in section 4.13 *et seq.* of Appendix 11.1: Underwater Noise Assessment at Volume II of the EIAR). Densities for all marine mammal species in the area were obtained from the SCANS III Survey (Hammond, 2017). There are a number of caveats to take into account with respect to the identified density estimates (and therefore, subsequent predicted number of individuals likely to be disturbed). The primary caveat being that density is assessed across a large area and is therefore not necessarily representative of the habitat type within the vicinity of Thurso Bay. Table 1.2 shows the estimated number of bottlenose dolphins likely to be disturbed by piling at the Redevelopment, and an indication of the proportion of the SCANS III Block S abundance estimate (Hammond, 2017) likely to be affected.

1.27 The assessment for noise impacts from piling for all species (see section 11.272 *et seq.* of Chapter 11: Marine Biodiversity considered that temporary displacement during the construction phase is unlikely to have any biological significance on populations and the magnitude of effects was considered to be minor. Due to the sensitivity and international/national conservation status of cetaceans, the significance was assessed as minor, and not significant in terms of the EIA Regulations. Long-term effects were considered unlikely to occur and therefore would not be significant.

Table 1.2: Estimated disturbance impacts to marine mammals due to piling noise.

Hearing group	Species	Density (km^2)	Max. likely no. of animals disturbed	SCANS III Block S abundance estimate[4]	% of population affected
Mid frequency	Harbour porpoise	0.152	3.43	246,526[5]	< 0.001
High frequency	Bottlenose dolphin	0.004	0.09	162	0.06
Low frequency	Minke whale	0.01	0.23	383	0.06
Mid frequency	White-beaked dolphin	0.021	0.47	868	0.05

[3] The authors note that new published recommendations from Southall *et al.* (2019) now re-label 'mid-frequency cetaceans' as 'high-frequency cetaceans' (includes bottlenose dolphin, Risso's dolphin, and killer whale); 'high frequency cetaceans' have been re-labelled as 'very high frequency cetaceans' (includes harbour porpoise), The audiogram data for these hearing groups given in Southall *et al.* (2019) is the same as that applied under the NMFS (2018) guidance, and therefore, there is no change to the assessment.

[4] Data taken from Hammond, 2017 and SCOS, 2017

[5] Value based on lower limit of reference population (abundance = 345,373 (95% CI = 246,526 – 495,752))

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Favourable conservation status

1.28 Bottlenose dolphins which are found within the vicinity of Scrabster Harbour are likely to have connectivity with the Moray Firth population, and therefore the Moray Firth SAC, designated for bottlenose dolphin. The bottlenose dolphin population within the Moray Firth is currently considered to be a stable or increasing population, as reported in the latest Site Condition Monitoring Report for the Moray Firth SAC (Cheney *et al*., 2018), and the favourable conservation status of the bottlenose dolphin in UK waters is *Favourable* (JNCC, 2013a).

1.29 The assessment predicted that, based on the dose-response curve, no more than one individual would be displaced per year as a result of piling activity at the Redevelopment, which is predicted to represent 0.06 % of the SCANS III Block S abundance estimate (Hammond, 2017).

1.30 This population will therefore continue to be "maintaining itself on a long-term basis as a viable element of its natural habitats", as defined by the first favourable conservation status test.

1.31 Piling at the Redevelopment is not predicted to create a barrier to movement for any cetacean species, including in relation to bottlenose dolphin movement to the Moray Firth SAC. Piling at the site of proposed redevelopment will therefore not reduce the range of the population for any EPS species, with the "natural range of the species neither being reduced nor likely to be reduced for the foreseeable future", as defined by the second favourable conservation status test.

1.32 The most important areas for bottlenose dolphin in the Caithness coast area occur in the Moray Firth SAC, which forms part of the East Coast of Scotland population. These areas will not be affected by piling noise with piling related disturbance only predicted to occur up to 9.8 (10 % probability a this distance) from the Redevelopment, located approximately 51 km (as the crow flies) from the Moray Firth SAC. The majority of habitat used by this bottlenose dolphin population will therefore not be affected. As such, it is predicted that the third favourable conservation status test, namely "there is, and will probably continue to be, a sufficiently large habitat to maintain bottlenose dolphin populations on a long-term basis", will be satisfied.

1.33 Piling at the site of proposed redevelopment is therefore not predicted to affect the favourable conservation status of bottlenose dolphin.

Harbour porpoise

Summary of the EIAR assessment

1.34 The underwater noise assessment (Appendix 11.1 at Volume II of the EIAR) concluded that acoustic injury in the form of permanent threshold shift (PTS), is expected to occur out to a maximum of 80 m, based on the assumption of continuous exposure within this radius over a 24-hour period (see Table 6.1 in Appendix 11.1 of the EIAR). As stated in section 1.14 injury will be mitigated for with the implementation of pre-piling searches and soft starts under JNCC guidelines (JNCC, 2010) (see Section 1.7 below).

1.35 As stated in 1.15, caveats with respect to the identified density of harbour porpoise (and therefore predictions of likely number of animals to be disturbed) have been identified. Harbour porpoise are often associated with near-shore headlands and strong tidal currents, and are commonly observed within shallow bays, estuaries and narrow tidal channels (Pierpoint, 2008; Pierpoint, Baines and Earl, 1999). As such, the habitat in which disturbance extends to, includes likely habitat for harbour porpoise.

Favourable conservation status

1.36 The assessment predicted that, based on the dose-response curve, up to four individuals may be displaced per year as a result of piling activity at the Redevelopment (see Table 1.2), which

is predicted to represent < 0.001 % of the SCANS III Block S abundance estimate (Hammond, 2017).

1.37 The harbour porpoise population status within the Hebrides and Minches candidate SAC (cSAC), the nearest cSAC to the Redevelopment (119 km, as the crow flies) has not yet been assessed, however this cSAC supports approximately 31.4% of the harbour porpoise population present within the UK's part of the West Scotland management unit in depths of less than 200 m (Hall *et. al*., 2016). The harbour porpoise is an abundant, wide-ranging species which spends much of the time in offshore waters and is distributed throughout the waters of the British Isles. The favourable conservation status of the Harbour porpoise in UK waters is *Favourable* (JNCC, 2013b). Although harbour porpoises are frequently recorded in the vicinity of the Redevelopment, this area is not likely to represent a particularly important habitat for the life history of harbour porpoise in Scottish waters (i.e. there is no evidence that this area is particularly associated with breeding or nurturing of juveniles). In the event that harbour porpoise do enter the zone of impact for noise disturbance, this will constitute a very small proportion of the available habitat for this population. Therefore, due to the small proportion of the population temporarily affected and the availability of alternative habitats in the wider area, the harbour porpoise population around the north east coast of Scotland is likely to continue "maintaining itself on a long-term basis as a viable element of its natural habitats", as defined by the first favourable conservation status test.

1.38 As stated in section 1.18, piling at the site of proposed redevelopment is not predicted to create a barrier to movement for harbour porpoise and this activity will therefore not reduce the range of the harbour porpoise population, with the "natural range of the species neither being reduced nor likely to be reduced for the foreseeable future", as defined by the second favourable conservation status test.

1.39 The most important areas for harbour porpoise in the north eastern Scotland occur around the Orkney Islands and the Pentland Firth, north east of the Redevelopment area, where sightings are regular and year-round (Northridge *et al*., 1995 Hughes, 1998; Evans *et al.,* 2003). These areas will not be affected by piling noise with piling related disturbance only predicted to occur up to 9.8 km (10 % probability at this distance) of the Redevelopment, located approximately 28 km from the Orkney Islands and 20 km from the Pentland Firth. The nearest site designated for harbour porpoise is found 119 km west of the Redevelopment area, at the Inner Hebrides and Minches SAC. Harbour porpoise are found throughout north east Scotland and therefore, whilst they have the potential to be found within the zone of impact for disturbance, any habitat likely to be affected will constitute a very small proportion of the available habitat to this harbour porpoise population. As such, it is predicted that the third favourable conservation status test, namely "there is, and will probably continue to be, a sufficiently large habitat to maintain harbour porpoise populations on a long-term basis", will be satisfied.

1.40 Piling at the site of proposed redevelopment is therefore not predicted to affect the favourable conservation status of harbour porpoise.

Minke whale

Summary of the EIAR assessment

1.41 The assessment predicted that, based on the dose-response curve, less than one individual may be displaced per year as a result of piling activity at the Redevelopment (see Table 1.2), which is predicted to represent 0.06 % of the SCANS III Block S abundance estimate (Hammond, 2017)

1.42 Noise modelling showed that acoustic injury in the form of permanent threshold shift (PTS), is not predicted to occur for low-frequency cetaceans (including minke whale) as the threshold for injury is not expected to be exceeded. As stated in section 1.14, injury however will be mitigated for under JNCC mitigation guidelines (JNCC, 2010) (see Section 1.7).

1.43 As stated in 1.15, caveats with respect to the identified density of minke whale (and therefore predictions of likely number of animals to be disturbed) have been identified. Density estimates are based across a wide-ranging area (Hammond, 2017) and are therefore not necessarily a true representative of Thurso Bay.

Favourable conservation status

1.44 The assessment predicted that, based on the dose-response curve, less than one individual may be displaced per year as a result of piling activity at the Redevelopment, which is predicted to represent 0.06 % of the SCANS III Block S abundance estimate (Hammond, 2017).

1.45 The favourable conservation status of the minke whale in UK waters is *Favourable* (JNCC, 2013d). Minke whale have a widespread temporal distribution in Scottish waters, mainly sighted in summer months, with peak sightings between June and August (Weir *et al*., 2001, Evans *et al*., 2003); during winter months they are believed to move out of British water to offshore or more southerly waters (Anderwald and Evans, 2008). Minke whale are likely to be foraging on important prey (such as sandeels and clupeids) in areas of upwelling or strong currents around headlands and small islands (Evans *et al*., 2010). Based on likely foraging habitat, minke whale are not expected to be found regularly in the Redevelopment area, however, in the event that minke whale do enter the zone of impact for noise disturbance, this will constitute a very small proportion of the available habitat for this population. Therefore, due to the small proportion of the population temporarily affected and the availability of alternative habitats in the wider area, the minke whale population around the coast Scotland is likely to continue "maintaining itself on a long-term basis as a viable element of its natural habitats", as defined by the first favourable conservation status test.

1.46 As stated in section 1.18, piling at the site of proposed redevelopment is not predicted to create a barrier to movement for minke whale and this activity is therefore unlikely to reduce the range of those minke whale in the project area. This will result in the "natural range of the species neither being reduced nor likely to be reduced for the foreseeable future", as defined by the second favourable conservation status test.

1.47 Similarly, due to the small population of minke whale habitat temporarily affected, it is predicted that the third favourable conservation status test, namely "there is, and will probably continue to be, a sufficiently large habitat to maintain minke whale populations on a long-term basis", will be satisfied.

1.48 Piling at the site of proposed redevelopment is therefore not predicted to affect the favourable conservation status of minke whale.

White-beaked dolphin

Summary of the EIAR assessment

1.49 The assessment predicted that, based on the dose-response curve, less than one individual may be displaced per year as a result of piling activity at the Redevelopment (see Table 1.2), which is predicted to represent 0.05 % of the SCANS III Block S abundance estimate (Hammond, 2017).

1.50 As stated in 1.14, noise modelling showed that acoustic injury in the form of a permanent threshold shift (PTS), is not predicted to occur for mid-frequency cetaceans[3] (including white-beaked dolphin) as the threshold for injury is not expected to be exceeded. Injury however will be mitigated for under JNCC mitigation guidelines (JNCC, 2010) (see Section 1.7).

Favourable conservation status

1.51 The assessment predicted that, based on the dose-response curve, less than one individual may be displaced per year as a result of piling activity at the Redevelopment, which is predicted to represent 0.05 % of the SCANS III Block S abundance estimate (Hammond, 2017).

1.52 The white-beaked dolphin is the most abundant dolphin species in Scottish shelf waters, and consequently it is one of the most commonly sighted cetaceans in the Pentland Firth (Weir *et al*., 2001, Reid *et al*., 2003). The favourable conservation status of the white-beaked dolphin in UK waters is *Favourable* (JNCC, 2013c). Sightings are widely distributed around the Orkney Islands and Pentland Firth region, with no obvious areas of concentration. As such density estimates taken from the SCANS III survey (Hammond, 2017) are likely to be representative of the waters surrounding the Redevelopment area. In the event that white-beaked dolphin do enter the zone of impact for noise disturbance, this will constitute a very small proportion of the available habitat for this population. Therefore, due to the small proportion of the population temporarily affected and the availability of alternative habitats in the wider area, the white-beaked dolphin population around the coast Scotland is likely to continue "maintaining itself on a long-term basis as a viable element of its natural habitats", as defined by the first favourable conservation status test.

1.53 As stated in section 1.18, piling at the site of proposed redevelopment is not predicted to create a barrier to movement for white-beaked dolphin and this activity will therefore not reduce the range of the white-beaked dolphin population, with the "natural range of the species neither being reduced nor likely to be reduced for the foreseeable future", as defined by the second favourable conservation status test.

1.54 Similarly, due to the small population of white-beaked dolphin habitat temporarily affected, it is predicted that the third favourable conservation status test, namely "there is, and will probably continue to be, a sufficiently large habitat to maintain white-beaked dolphin populations on a long-term basis", will be satisfied.

1.55 Piling at the site of proposed redevelopment is therefore not predicted to affect the favourable conservation status of white-beaked dolphin.

Other cetaceans

Summary of the EIAR assessment

1.56 Other cetacean species likely to occur in lower densities within the site of proposed redevelopment include Risso's dolphin and killer whale. Whilst killer whales occur in all months of the year in northern and western Scotland and are recorded near-shore mostly between April and October, sightings reports are typically clustered in the extreme northeast, between the Caithness mainland and the Northern Isles, or along the opposing west coast, in the Minches and Sea of Hebrides (Robinson *et al.,* 2017). Movements of individual killer whales between Iceland and Scotland (Samarra & Foote, 2015) suggest seasonal, rather than permanent passages by individuals, with animals travelling to Scotland in the late spring and summer. Risso's dolphins are observed regularly in the Orkney Islands and Pentland Firth region, though not in high numbers (Weir *et al*., 2001, Evans *et al*., 2010), with sightings occurring particularly along the west coasts of Hoy and the Orkney mainland. During the SCANS III survey however, no Risso's dolphins were sighted in Block S (see Chapter 11: Marine Biodiversity of the EIAR) therefore no density estimate is available for the waters surrounding the Redevelopment area. Killer whales were not assessed within SCANS III, therefore density estimates are not available.

1.57 Noise modelling showed that acoustic injury in the form of permanent threshold shift (PTS), is not predicted to occur for mid-frequency cetaceans (including Risso's dolphin and killer whale) as the threshold for injury is not expected to be exceeded. As stated in section 1.14, however, mitigation for injury for all cetaceans will be implemented (see Section 1.7).

Favourable conservation status

1.58 As stated in 1.43, density estimates are not available for killer whale or Risso's dolphin, therefore an assessment of number of animals likely to be disturbed or displaced is not possible for either species. Furthermore, the Redevelopment area does not represent a particularly important habitat in the life history of the European populations of these dolphin species (i.e. there is no evidence that the Redevelopment area is particularly associated with breeding or nurturing of juveniles). Therefore, due to the small proportion of the population temporarily affected and the availability of alternative habitats in the wider area the populations of these two delphinid species are likely to continue "maintaining itself on a long term basis as a viable element of its natural habitats", as defined by the first favourable conservation status test.

1.59 As stated in section 1.18, piling at the site of proposed redevelopment is not predicted to create a barrier to movement for killer whales or Risso's dolphin and this activity will therefore not reduce the range of either population, particularly based on the likelihood of Risso's dolphin or killer whale being found so close to the zone of impact for disturbance, with the "natural range of the species neither being reduced nor likely to be reduced for the foreseeable future", as defined by the second favourable conservation status test.

1.60 As stated in 1.43, the zone of impact for noise disturbance from piling is not expected to represent important habitat for either one of these species, therefore it is predicted that the third favourable conservation status test, namely "there is, and will probably continue to be, a sufficiently large habitat to maintain both killer whale and Risso's dolphin populations on a long-term basis", will be satisfied.

1.61 Piling at the site of proposed redevelopment is therefore not predicted to affect the favourable conservation status of Risso's dolphin or killer whale.

Otter

Summary of the EIAR assessment

1.62 The assessment predicted that based on the limited suitable available habitat present within the harbour for otter, there would only be limited disturbance this species during the construction phase of the project. Otter surveys undertaken out to a 200m buffer from the site of proposed redevelopment, surveying all areas of suitable habitat, found only four signs of otter presence in the form of spraint in the later stages of decay.

1.63 The presence of otter signs found during the surveys highlighted that otter holts (i.e. covered resting sites amongst the rock armour) used for resting during foraging trips were present within Scrabster Harbour, but there was no potential to support natal dens. Furthermore, the site was deemed as only being used infrequently due to the age of spraint found, with no evidence of recent use recorded at the time of the survey.

Favourable conservation status

1.64 Within Scotland otters are abundant and are distributed across the whole of the country with an estimated population of 8,000 individuals in 2013 (Jefferies *et al.,* 2003). Otters can have extensive home ranges of between 35km for males and 20km for females incorporating a mixture of waterways, lochs and marine habitats. Within the home range there can be numerous holts that are used to varying degree depending on the food availability. Conroy and Kruuk (1995) found that holts can be at densities of up-to four per km in coastal situations, while Durbin (1998) found holt densities of 1.1 to 0.36 per km for male and female otter respectively. Holts account for only a 42% proportion of location with which otter spent time resting, the remainder being accounted for by couches (i.e. uncovered resting sites in reeds etc.). The area of rock armour between the St Ola and Queen Elizabeth Piers where otter spraint was found represents a tiny fraction of the available habitat for otter along the north Caithness coast. Furthermore, the habitat will only be temporary lost during the construction phase, after which point the rock armour will be reinstated along the foreshore with no net loss of habitat. Therefore, due to the small proportion of habitat that will be temporarily lost in the short-term and the availability of

alternative habitat in the wider area, the otter population is likely to “maintain itself on a long-term basis as a viable element of its natural habitat” as defined by the first favourable conservations status test.

1.65 As stated above the loss of possible resting holts for otter in Scrabster Harbour will reduce the natural range of this species by a small fraction, but this will be temporary over the short-term while construction is completed and will not reduce the range of the species over the long-term. Therefore, the proposed redevelopment will not reduce the range of otter, with the “natural range of the species neither being reduced nor likely to be reduced for the foreseeable future”, as defined by the second favourable conservation status.

1.66 The small extent of the area affected by the site of proposed redevelopment constitutes a small proportion of the possible home range occupied by otter and a fraction of the overall suitable habitat on the north Caithness coast, especially within Thurso Bay. Therefore, the third favourable conservation status test, namely “there is, and will probably continue to be, a sufficiently large habitat to maintain otter populations on a long-term basis”, will be satisfied.

1.7 Mitigation Measures

1.67 As detailed in the EIAR, mitigation measures have been proposed to reduce the likelihood of injury and disturbance to marine mammals, specifically EPS species during construction. Primarily, pile driving will incorporate a ‘soft-start’ procedure, whereby pile driving does not start at full power but builds up to full power, thereby allowing opportunity for animals to flee the area and minimising the risk of lethal effects or injury. These soft-start procedures will be for a period of no less than 20 minutes, as recommended by the JNCC pile driving protocol (JNCC, 2010), though a detailed protocol for soft start will be designed as part of the construction programme and provided with an EPS Licence Application, should this be required.

1.68 The mitigation proposed for reducing the impacts of piling noise on marine mammals remains the same as that described in the EIAR. In summary this involves the following measures, following the JNCC guidelines on reducing the risk of injury to marine mammals during piling:

- During all piling operations trained Marine Mammal Observers (MMOs) will use visual and where required, acoustic detection, to ensure that marine mammals are not within the direct injury zone (termed the "mitigation zone" - as agreed with relevant Statutory Advisors). The use of MMOs will subsequently reduce the potential for injurious effects for any marine mammal species present in the mitigation zone;
- Passive Acoustic Monitoring (PAM) will be particularly important for periods of poor visibility or night time conditions. PAM buoys will surround the piling location and detections will be sent back to the PAM operator on a dedicated vessel. The use of PAMs will subsequently reduce the potential for injurious effects for any marine mammal species present in the mitigation zone; and
- When piling commences a ‘soft-start’ procedure will be employed and the force of piling will gradually be increased to alert marine mammals in the vicinity to the commencement of the operations and thus reduce the potential for injury on all marine mammal species.

1.69 As detailed in the EIAR, the mitigation measure proposed to prevent injury to otter was the undertaking of a further survey of the site, with particular attention on the area of rock armour between the St Ola and Queen Elizabeth Pier. This would allow an assessment of changes to baseline conditions to be made and, although unlikely, check for the presence of otter prior to construction commencing.

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Appendix 12.1 Report to Inform Appropriate Assessment

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REDEVELOPMENT OF ST. OLA PIER

Habitat Regulation Screening and Report to Inform Appropriate Assessment

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Contents

1 INTRODUCTION 1
1.1 Purpose of this Report 1
1.2 Structure of the Report 1

2 PROJECT DESCRIPTION 2

- **NR EXPORT (BUNKERING) POINTS ARE PROPOSED ON EACH BERTH, WITH 1 NR FUEL IMPORT POINT ON EACH BERTH. 4**

2.1 Other plans and projects to assess in-combination effects 4

3 CONSULTATION 6

4 THE HABITAT REGULATION ASSESSMENT PROCESS 8

5 THE EVIDENCE BASE USED FOR THIS RIAA 9

6 ASSESSMENT METHOD 11
6.1 Stage 1 - Screening 11
6.2 Stage 2 - Appropriate Assessment 12

7 STAGE 1: SCREENING FOR LIKELY SIGNIFICANT EFFECTS 13
7.1 Identification of European sites and qualifying features 13
7.2 European site and qualifying feature description 16
7.2.1 Inner Hebrides and the Minches cSAC (Harbour porpoise) 16
7.2.2 Moray Firth SAC (Bottlenose dolphin) 17
7.2.3 Faray and Holm of Faray and North Rona SAC's (Grey seal) 18
7.2.4 Sanday SAC and Dornoch Firth and Morrich More SAC (Harbour seal) 19
7.2.5 River Thurso SAC 19
7.3 Screening of project activities on qualifying features ..... **Error! Bookmark not defined.**
7.3.1 North Caithness Cliffs SPA 20
7.4 Screening of project activities on qualifying features 21

8 STEP 3: APPROPRIATE ASSESSMENT 27
8.1 Embedded Mitigation 27
8.2 Inner Hebrides and Minches cSAC 28
8.3 Moray Firth SAC 29
8.4 Faray and Holm of Faray and North Rona SAC's 31
8.5 Sanday SAC and Dornoch Firth and Morrich More SAC 33
8.6 River Thurso SAC 35
8.7 North Caithness Cliffs SPA 37

REFERENCES 40

Tables

Table 7.3: LSE matrix on marine mammals and salmon qualifying features 22
Table 7.4: Likely significant effects matrix on ornithological features. 25
Table 8.1: Summary of HRA outcome for the Inner Hebrides and Minches cSAC 28
Table 8.2: Summary of HRA outcome for the Moray Firth SAC 30
Table 8.3: Summary of HRA outcome for the Faray and Holm of Faray SAC and North Rona SAC 31
Table 8.4: Summary of HRA outcome for the Sanday SAC and Dornoch Firth and Morrich More SAC 33
Table 8.5: Summary of HRA outcome for the North Caithness Cliffs SPA. 37

1 INTRODUCTION

1.1 Purpose of this Report

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora ("The Habitats Directive"), provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species through the establishment and conservation of an EU-wide network of sites ("Natura 2000"). Natura 2000 is a European ecological network of special areas of conservation, composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II. This network is designed to enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.

The UK has designated a number of sites of nature conservation importance which form part of a network of Natura 2000 Sites. Natura 2000 Sites comprise Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) designated under the EC Habitats Directive. In addition, it is Government policy (DEFRA, 2006) that Wetlands of International Importance designated under the Ramsar Convention (Ramsar Sites) are also treated as fully designated European/Natura 2000 Sites when considering development proposals.

The procedures that must be followed when considering developments affecting Natura 2000 Sites are set out in Article 6 of the Habitats Directive. Habitats Directive Articles 6(3) set out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of European sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment:

"Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."

Both EU and national guidance exists in relation to Member States fulfilling their requirements under the EU Habitats Directive, with particular reference to Article 6(3) and 6(4) of that Directive. The methodology followed in this report to inform the Article 6 assessments has had regard to the following guidance and legislation:

In light of the proximity of the proposed development to both SACs and a SPA, consideration needs to be given to potential effects on the SAC and SPA qualifying interests. This Report to Inform an Appropriate Assessment (RIAA) provides that detailed consideration to assist the competent authority in fulfilling its obligation under the Habitats Directive Regulations.

1.2 Structure of the Report

Section 1 of this Report provides a brief introduction to its purpose, with Section 2 providing a description of the proposed project and the in-combination plans and projects to be considered in the HRA process. Section 3 summarises the consultation feedback relevant to the RIAA and Section 4 summarises the legislative underpinning of the Appropriate Assessment procedure. Key evidence used for the assessment of the proposed development's effects on SAC and SPA qualifying features is described in Section 5, and Section 6 to 8 provide the appropriate assessment.

2 PROJECT DESCRIPTION

The existing St Ola Pier was constructed in 1972 and has fallen into declining use due to ongoing corrosion of steel piling and lack of load bearing capacity for imposed deck loads. The outer side of the pier currently has no berthing because of a 1.5 metre high sea protection wall. Therefore, redevelopment of the facilities is proposed, as described in detail in Chapter 2 of the EIAR. In summary, these proposals comprise:

- The opportunity afforded by redevelopment is being used to provide an enhanced straight berthing face on the inner side for service and cargo vessels with a new berth on the outside face; particularly for cruise vessels of up to 250m long.

- The pier will be widened locally to accommodate straight berthing faces with resulting parallel berthing faces at approximately 32m apart.

- Partial demolition of the existing pier will be required to allow for the construction of the new pier walls and decking. Pier quay walls will likely comprise steel tubular piles with interlocking steel sheet piles. It is proposed that any concrete broken out as part of the demolition works will be crushed to allow for reuse within the works, as engineering fill (subject to meeting performance criteria).

- The renovated pier will be circa. 280m long and fully enclosed around the perimeter. An enclosed structure will allow for beneficial reuse of both dredge spoil & crushed recycled concrete if suitable. There will be a concrete deck with drainage captured through full retention interceptors as well as a number of centrally positioned lighting masts capable of providing 50 lux.

- The outer face will be dredged to provide a depth of -9m CD to accommodate cruise vessels and the inner face will be dredged to provide a consistent berth depth of -7.5m CD.

- The works may also include for reclamation & revetment of 0.84ha (plan area of both) at the root of the pier. The reclamation area will provide storage space for cargo handling, and may house a number of fuel tank(s) in the future which will allow for the refuelling of vessels on St. Ola Pier. The reclaimed area would reuse the rock armour from the existing revetment on the newly reclaimed seaward face with a small additional requirement for extra rock armouring.

- The volume of dredge material generated by the works is approximately 172,000m^3 of sandy gravel & clay. It is proposed that dredge material will be re-used within the reclaimed area & within the redeveloped pier structure (if deemed suitable by the works contractor). Alternatively dredge spoil may be disposed at a sea disposal site indicated in Appendix 2.1; or disposed at a licenced waste facility on land and off-site; or a combination of these solutions (subject to Contractor's chosen methodology). For the purposes of environmental assessment of the marine environment, it is assumed that the total volume of dredged material generated by these works (172,000m^3) shall be disposed at sea in the Scrabster dump site. For the purposes of traffic assessment, an additional scenario has been assumed whereby all of the dredged material is transported off site by road during the construction period.

- Notwithstanding the above assumptions for the purposes of assessment, the Design & Build tender will include a requirement that the detailed design will accommodate as much reuse of dredged material into the reclamation areas and into the body of the pier as is economically feasible.

- A water and fuel supply will be provided on the St. Ola Pier. The fuel pipe will either be routed from the existing supply on the Jubilee Pier, or from new tank(s) proposed for the reclamation area.

- If the fuel supply is routed from Jubilee Pier, both water and fuel lines will be routed in a trench either along the seabed within the inner berth directly on to the St. Ola Pier, or on to the seabed to the root of the opposite Ice Pier and behind the existing ferry terminal building on to St. Ola Pier on land.

- If the fuel supply is proposed from the new tank(s), the fuel line will be routed across land onto St. Ola Pier. In the case that the fuel supply is coming from the new tank(s), the water supply will be taken from an existing supply on the Queen Elizabeth Pier. The water line will also be routed across land onto St. Ola Pier. For HRA purposes both of the fuel supply route options outlined have been assessed.

- In the case that the new fuel tank(s) option was pursued, the scope of SHT's works will be restricted to ensuring the reclamation area can accommodate the tank(s), and installing the necessary pipework and associated infrastructure to allow the import/export of fuel on the redeveloped quay. The actual tank(s) would be erected and operated by a third party at a later date. The tank(s) would be for the storage and supply of marine gas oil only. The fuel tank(s) will be 15m in diameter, 15m high with associated pipework. The tank(s) will be suitably bunded. The tank(s) will service vessels operating on the redeveloped St Ola Pier. A full retention oil separator will be installed to mitigate for potential impacts of fuel/ oil spillage or leakage and this will be maintained in accordance with the manufacturer's instructions by experienced personnel.

- All services will be buried within the pier and located within a covered trench which will allow for maintenance and access.

- **NR EXPORT (BUNKERING) POINTS ARE PROPOSED ON EACH BERTH, WITH 1 NR FUEL IMPORT POINT ON EACH BERTH.**

- The works will require service connections to allow for power & water to service the redeveloped key. A minimum 400V shore power supply will be provided from the existing transformer located behind St. Ola Pier on the shoreside. A number of high mast lights will be provided to ensure adequate working light for all activities.

2.1 Other plans and projects to assess in-combination effects

The HRA process requires consideration of potential cumulative impacts from other projects and plans. Those considered for the in-combination assessment have been identified through a desk study involving general internet searches and in particular, scrutiny of consenting authority websites. The projects were either registered on the Highland Council planning website or MS LOT's website or are other developments that SHT have proposed. Other projects for which a development consent application has been submitted or consent granted were included. Potential future projects which have not submitted an application for consent were not included.

Those other projects for which impacts could foreseeably overlap both spatially and / or temporally with the construction or operation of the proposed project or where construction impacts may be consecutive but act in combination, were also considered.

The cut-off date for sourcing information on the other projects considered was 12 April 2019. Table 2.1 shows those projects which were considered as part of the desk study.

From this process, five projects were identified for further consideration, and information on works to be undertaken and the location of works was obtained.

Table 2.1: List of other projects and plans to assess in-combination effects.

Project Title	Justification	Stage	Distance from project (km)	Temporal Overlap	Spatial Overlap	Potential for in combination impact (construction phase)	Potential for in combination impact (operation phase)
Dounreay Trì Floating Wind Demonstration Project	Work yet to be undertaken	Post - determination	25	Yes	No	Screened out due to lack of spatial overlap of zone of impacts	Screened out due to lack of spatial overlap of zone of impacts
Katanes Floating Energy Park	Work yet to be undertaken	Pre-application	>25	Yes	No	Screened out due to lack of spatial overlap of zone of impacts	Screened out due to lack of spatial overlap of zone of impacts
Ness of Duncansby Tidal Array	Work yet to be undertaken	Pre-application	>25	Yes	No	Screened out due to lack of spatial overlap of zone of impacts	Screened out due to lack of spatial overlap of zone of impacts
MeyGen Tidal Energy	Work yet to be undertaken	Post-determination	25	Yes	No	Screened out due to lack of spatial overlap of zone of impacts	Screened out due to lack of spatial overlap of zone of impacts
Orkney-Caithness Link	Work yet to be undertaken	Early development	12	Yes	No	Screened out due to lack of spatial overlap of zone of impacts	Screened out due to lack of spatial overlap of zone of impacts

3 CONSULTATION

A summary of consultation responses relating to European sites is provided in Table 3.1 below.

Table 3.1: Consultation responses relevant to marine biodiversity.

Date	Consultee and Issues Raised	How/ Where Addressed
17 August 2018	**The Highland Council** Support the need for an assessment of the impacts of underwater noise on migratory fish and marine mammals.	Impacts on migratory fish (salmon) and marine mammals as qualifying features of identified European sites have been assessed as part of a HRA Screening exercise in Section 7 and for Appropriate Assessment in 8.2 to 8.6.
21 September 2018	**Scottish Natural Heritage** Identify the need to consider mitigation measures to address potential impacts from noise and physical obstruction on migrating salmon.	An assessment on potential impacts from noise have been provided in Section 8.6.
21 September 2018	**Marine Scotland** Concur with the applicant and the views of the consultees that marine biodiversity including migratory fish, marine mammals and benthic ecology should be scoped in to the EIA report.	Impacts on migratory fish (salmon) and marine mammals as qualifying features of identified European sites have been assessed as part of a HRA Screening exercise in Section 7 and for Appropriate Assessment in 8.2 to 8.6.
17 August 2018	**Highland Council** Suggest the applicants consult the Caithness District Salmon Fishery Board (CDSFB) on likely impacts on wild salmonids.	Applicant consulted **Caithness District Salmon Fishery Board (**CDSFB) for likely impacts on wild salmonids and this has been provided in section 8.6.
13 August 2018	**Scottish Natural Heritage** Suggest that protected areas listed below should be scoped into the EIA: • Moray Firth SAC; • Sanday SAC; • Faray and Holm of Faray SAC; and • River Thurso SAC.	A full list of the qualifying features and European sites scoped into HRA Screening and RIAA including those listed is provided in Table 7.2.
25 March 2019	**CDSFB stated the following in relation to salmon and eels:** Section 5.10 of the EIA Scoping Report deals with migratory fish. It is mistaken in implying that eels are not expected to be frequent. In fact, the annual electric-fishing surveys carried out by CDSFB show that eels are ubiquitous in all the streams and rivers of Caithness, including the River Thurso. Thurso Bay including the vicinity of the harbour are heavily used by young salmon smolts moving out of Thurso River (in April and May) and also by returning adult fish (present in every month of the year but principally between April and September).	Information provided by CDSFB has been included and incorporated into screening and appropriate assessment sections 7.3 and 8.6 respectively.

Table 3.2: Consultation responses relevant to ornithology.

Date	Consultee and Issues Raised	How/ Where Addressed
24 July 2018	**Highland Council Coastal Planner** Proximity of work to North Caithness Cliffs SPA may require Appropriate Assessment, SNH to advise.	See below.
13 August 2018	**Scottish Natural Heritage** Further information to demonstrate no adverse effect on the North Caithness Cliffs SPA integrity due to noise, sedimentation and pollution impacts.	An assessment of the potential impacts from noise and pollution have been provided in Section 8.7. An assessment of the effect of sedimentation was screened out during the EIA, see EIAR Chapter 12: Ornithology and Terrestrial Ecology.

4 THE HABITAT REGULATION ASSESSMENT PROCESS

The HRA process is well established in the UK so details of the process are only summarised here, for the sake of brevity.

An HRA is a process to determine any Likely Significant Effects (LSE) through Stage 1 screening (where such likely effects are identified) and assess whether there are adverse impacts on the integrity of a Natura Site by means of an Appropriate Assessment (Stage 2).

The threshold for a LSE is treated in the screening exercise as being above a *de minimis* level. A *de minimis* effect is a level of risk that is too small to be concerned with when considering ecological requirements of an Annex I habitat or a population of Annex II species present on a European site necessary to ensure their favourable conservation status. If low level effects on habitats or individuals of species are judged to be in this order of magnitude and that judgment has been made in the absence of reasonable scientific doubt, then those effects are not considered to be likely significant effects.

Based on the outcome of the Appropriate Assessment, the Competent Authority shall agree to a plan or project only after having ascertained that it will not adversely affect the integrity of the Natura 2000 site concerned.

The EC guidance document on Article 6(4) of the Habitats Directive (EC, 2007) explains that:

"Biological integrity can be defined as all those factors that contribute to the maintenance of the ecosystem including structural and functional assets. In the framework of the Habitats Directive, the biological integrity of a site is linked to the conservation objectives for which the site was designated as part of the Natura 2000 network."

The EC guidance "Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitats' Directive 92/43/EEC" (EC, 2000) states that:

"The integrity of the site involves its ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the site's conservation objectives."

In carrying out an Appropriate Assessment, mitigation measures aimed at minimising or avoiding the negative impact of a plan or project during or after its completion, may be considered as an integral part of the plan or project (EC, 2000). The recent judgement of Case C-323/17 ("People Over Wind", May 2018) suggests the ecological mitigation measures cannot be considered during Stage 1.

Exceptionally, where an Appropriate Assessment concludes there will be adverse effects on the integrity of a Natura 2000 Site, the relevant Competent Authority may only agree to a plan or project if:

- It is evidenced that there are no alternative solutions (Stage 3); and,
- There are Imperative Reasons of Overriding Public Interest (IROPI) for the advancement of the project (Stage 4), and appropriate compensation measures have been identified.

5 THE EVIDENCE BASE USED FOR THIS RIAA

To assess the proposed development's effects on SAC and SPA qualifying interests, information on qualifying features identified was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 5.1 below.

Table 5.1: Summary of key desktop reports.

Title	Source	Year	Author
Salmon			
Review of migratory routes and behaviour of Atlantic Salmon, Sea Trout and European Eel in Scotland's coastal environment: implications for the development of marine renewables	Scottish Marine and Freshwater Science	2010	Malcom *et al.*
Atlantic Salmon	https://www.nature.scot/plants-animals-and-fungi/fish/freshwater-fish/atlantic-salmon	2017	SNH
Marine mammals			
Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys			
Scientific Advice on Matters Related to the Management of Seal Populations	Special Committee on Seals (SCOS)	2017	SCOS
Management Units for cetaceans in UK waters	JNCC Report No. 547	2015	IAMMWG
Cetacean abundance and distribution in European Atlantic shelf waters to inform conservation and management	SCANS II	2013	Hammond *et al.*
Distributions of Cetaceans, Seals, Turtles, Sharks and Ocean Sunfish recorded from Aerial Surveys 2001-2008	Wildfowl and Wetland Trust aerial surveys	2009	WWT Consulting Ltd.
UK Cetacean Status Review	Sea Watch Foundation	*2003*	Evans *et al.*
Atlas of cetacean distribution in north-west European waters	JNCC	2003	Reid *et al.*
Abundance of Harbour Porpoise and other Cetaceans in the North Sea and Adjacent Waters	SCANS I	2002	Hammond *et al.*
Ornithology			
Waterbird Disturbance Mitigation Toolkit: Informing Estuarine Planning & Construction Projects	Institute of Estuarine & Coastal Studies	2013	Cutts *et al.*
Habitats Regulations Appraisal of Draft Plan for Offshore Wind Energy in Scottish Territorial Waters: Appropriate Assessment Information	Scottish Government Report R.1722c	2011	ABP Marine Environmental Research

Title	Source	Year	Author
A Review of the Potential Impacts of Marine Aggregate Extraction on Seabirds	Marine Environment Protection Fund (MEPF). Project 09/P130.	2010	Cooks and Burton

6 ASSESSMENT METHOD

In accordance to the Planning Inspectorate Guidance Note Ten there are several stages to the Habitat Regulation Assessment process:

- Stage 1 – Screening
  - Determine the European (Natura 2000 and Ramsar) sites and features that have the potential for likely significant effect (LSE) from the project alone or in-combination with other plans and projects and provide information on identified European sites and their conservation objectives; and
  - Determine project activities that have the potential for LSE on identified European sites and their features.
- Stage 2 - Appropriate Assessment
  - Where LSE has been identified on a European site have been identified in Stage 1, consider whether those effects will adversely affect the integrity of the European site in light of its conservation objectives (COs); and
  - For identified adverse effects on the integrity of the site provide suitable mitigation that will ensure that no adverse effect to site integrity can be concluded.

If Stage 2 concludes that the project will have an adverse effect on the integrity of the European site(s), or is inconclusive, then Stage 3 and 4 of the HRA process are triggered; that is consideration of alternatives, compensatory measures and whether the project is justified by Imperative Reasons of Overriding Public Interest (IROPI) is required.

6.1 Stage 1 - Screening

European sites to be carried forward for screening were identified by determining whether there would be a potential LSE from the project on the European sites qualifying features based on the following criteria:

1. Project boundaries overlap with European site;
2. Qualifying features recorded during surveys conducted for the project;
3. European sites and/or qualifying features located within the potential zone of influence of impacts associated with the project;
4. European site which supports mobile populations of qualifying features that may interact with potential effects from the project;
5. European site with qualifying features/species whose maximum foraging or migratory range overlaps with the project; and

Once European sites were identified, the qualifying interest features for each site and their COs were described through review of the citations for each of the identified European sites and advice provided under Regulation 33(2) of the HRA regulations.

Additional information including current condition on each of the European sites' features have been provided through review of information and data sources including appropriate surveys that were undertaken to identify the extent of qualifying features within the study area.

The screening assessment then identified project activities that could cause LSE to the features and/or COs of each identified European site.

Activities from the project were identified that could impact on European site features and COs by assessing the potential for an impact pathway on the features of the designated site. Direct disturbance, discharges, and emissions from the project were considered.

Through the assessment of each impact pathway, project activities or features of each site were screened out according to whether an LSE from the activity would occur or whether the feature would be subject to an LSE from the activity.

The screening assessment was based on sound reasoning and within the context of best available knowledge on the various ways in which the proposed project could impact on the interest features of the relevant European sites. If it cannot be concluded with confidence that LSE will not occur, then under the precautionary principle, it is assumed that the issue requires more detailed consideration and is progressed to Stage 2.

6.2 Stage 2 - Appropriate Assessment

For site qualifying features and impact pathways that were not screened out as part of the Stage 1 Screening, further assessment was undertaken. The information provided for this stage of the HRA included review of specialist studies and information to determine whether a conclusion of no adverse effect to the identified European sites as a result of the project could be determined.

This Report to Inform the Appropriate Assessment (RIAA) constitutes one of the Appendices to the Environmental Impact Assessment Report (EIAR) and should therefore be read in conjunction with the following chapters of the EIAR:

- Chapter 2 – Project Description;
- Chapter 10 – Water Quality and Figure 10.1 thereof;
- Chapter 11 – Marine Biodiversity and Figure 11.9 thereof;
- Appendix 11.1 – Underwater Noise Modelling Report; and
- Chapter 12 – Terrestrial Biodiversity and Ornithology.

This report does not aim to repeat information provided elsewhere within the EIAR. Therefore, where information is discussed in more robust detail elsewhere, a summary of the relevant information has been provided along with the reference to the appropriate sections of the relevant EIAR chapters and/or Technical Appendices.

To support the assessment, underwater noise modelling was undertaken to predict the magnitude of underwater noise emissions from piling activities, on European site features. Scientific published information has been used to assess the tolerance of site features to the identified impact, and a recommendation to the overall potential for adverse effect is provided.

An assessment of in-combination effects was then undertaken to determine if there were any other plans and projects that could impact the site features in-combination with the proposed project.

Following assessment of each impact a judgement was undertaken to determine whether the conservation objectives for each qualifying feature will be maintained in a favourable condition.

If it was identified that effects from the project following completion of Stage 2 could not be assessed as having no adverse effect, then mitigation has been proposed to minimise the identified effect to a suitable level.

7 STAGE 1: SCREENING FOR LIKELY SIGNIFICANT EFFECTS

The proposed project is clearly a plan or project. Furthermore, it is a project not directly connected with, or necessary to, the management of any European site. The competent authority is therefore required to determine whether the project will have a likely significant effect (LSE) on the features of relevant European sites ensuring that conservation objectives for each site are achieved. Evidence to assist the competent authority in reaching a conclusion on LSE is detailed within the description below and the matrices that follow.

7.1 Identification of European sites and qualifying features

An overview of the European sites and features relevant to the project is provided in Table 7.1. European sites and features were identified for screening based on potential for connectivity with the project. Within the table, qualifying features are listed with a justification provided as to whether the qualifying feature have, been included for further screening based on the screening criteria described in Section 6.1.

Table 7.1: List of identified European sites and features to be screened in for further assessment.

European Site	Closest distance to redevelopment (km)	Features	Screened In?	Justification
River Thurso SAC	2	Atlantic salmon *Salmo salar*	Yes	Project within migratory route of species[1]
River Naver SAC	41	Freshwater pearl mussel *Margaritifera margaritifera*	No	Project zone of influence does not overlap with feature
		Atlantic salmon *Salmo salar*	No	Project is not located within migratory route of species[2]
River Borgie SAC	41	Freshwater pearl mussel *Margaritifera margaritifera*	No	Project zone of influence does not overlap with feature
		Atlantic salmon *Salmo salar*	No	Project is not located within migratory route of species[2]
		Otter *Lutra lutra*	No	Project not within foraging distance of species

[1] The project is located within Thurso Bay in which Salmon enter from the River Thurso and offshore waters on their return migration.

[2] Salmon migrating from River Naver and River Borgie on the Caithness coast migrate towards offshore feeding grounds of Faroe Islands, Iceland and Greenland (Youngson 2017)

European Site	Closest distance to redevelopment (km)	Features	Screened In?	Justification
Moray Firth SAC	56	Bottlenose Dolphin *Tursiops truncates*	Yes	Project within maximum foraging distance of species[3]
		Sandbanks which are slightly covered by sea water all the time	No	Project zone of influence does not overlap with feature
Faray and Holm of Faray SAC	77	Grey seal *Halichoerus grypus*	Yes	Project within maximum foraging distance of species
Sanday SAC	86	Reefs	No	Project zone of influence does not overlap with feature
		Sandbanks which are slightly covered by sea water all the time	No	Project zone of influence does not overlap with feature
		Mudflats and sandflats not covered by seawater at low tide	No	Project zone of influence does not overlap with feature
		Harbour seal *Phoca vitulina*	Yes	Project within maximum foraging distance of species[4]
Dornoch Firth and Morrich More SAC	89	Estuaries	No	Project zone of influence does not overlap with feature
		Mudflats and sandflats not covered by seawater at low tide	No	Project zone of influence does not overlap with feature
		Salicornia and other annuals colonizing mud and sand	No	Project zone of influence does not overlap with feature
		Atlantic salt meadows *Glauco-Puccinellietalia maritimae*	No	Project zone of influence does not overlap with feature
		Embryonic shifting dunes	No	Project zone of influence does not overlap with feature
		Shifting dunes along the shoreline with *Ammophila arenaria*	No	Project zone of influence does not overlap with feature
		"Fixed coastal dunes with herbaceous vegetation (""grey dunes"")"	No	Project zone of influence does not overlap with feature
		Decalcified fixed dunes with *Empetrum nigrum*	No	Project zone of influence does not overlap with feature

[3] Sightings in the Pentland Firth and Thurso Bay have been recorded, the species does not occur regularly along the Caithness Coast. Sightings within Thurso Bay are potentially connected to the Moray Firth SAC (EIAR paragraph 11.108)

[4] Based on observed transit distances, and tracking data of harbour seal in Thurso Bay, it is possible that individuals sighted within the vicinity of the development are connected to SAC (Jones *et al.,* 2017; Russell *et al.,* 2017).

European Site	Closest distance to redevelopment (km)	Features	Screened In?	Justification
		Atlantic decalcified fixed dunes *Calluno-Ulicetea*	No	Project zone of influence does not overlap with feature
		Humid dune slacks	No	Project zone of influence does not overlap with feature
		Coastal dunes with *Juniperus spp*.	No	Project zone of influence does not overlap with feature
		Sandbanks which are slightly covered by sea water all the time	No	Project zone of influence does not overlap with feature
		Reefs	No	Project zone of influence does not overlap with feature
		Otter *Lutra lutra*	No	Project not within foraging distance of species
		Harbour seal *Phoca vitulina*	Yes	Project within maximum foraging distance of species[4]
Inner Hebrides and the Minches cSAC	119	Harbour porpoise *Phocoena phocoena*	Yes	Project within maximum foraging distance of species[5]
North Rona SAC	143	Reefs	No	Project zone of influence does not overlap with feature
		Vegetated sea cliffs of the Atlantic and Baltic Coasts	No	Project zone of influence does not overlap with feature
		Submerged or partially submerged sea caves	No	Project zone of influence does not overlap with feature
		Grey seal *Halichoerus grypus*	Yes	Project within maximum foraging distance of species[6]
North Caithness Cliffs SPA	0.27	Common Guillemot	Yes	Project within maximum foraging distance of species[7]
		Kittiwake	Yes	Project within maximum foraging distance of species
		Razorbill	Yes	Project within maximum foraging distance of species

[5] Harbour porpoise are distributed widely all around the Orkney Islands and are also found throughout the Pentland Firth, including Thurso Bay, Dunnet Bay and Gills Bay and therefore may have some connectivity to SAC (Northridge *et al*., 1995, Hughes, 1998).

[6] While grey seals are known to travel up to 2,100 km on foraging trips, most foraging trips remain within 145 km from haul-out sites (SCOS, 2015).

[7] Seabirds range over large distances on foraging trips (Scottish Government, 2011).

European Site	Closest distance to redevelopment (km)	Features	Screened In?	Justification
		Atlantic Puffin	Yes	Project within maximum foraging distance of species
		Peregrine	No	Project extent and adjacent cliffs are sub optimal for peregrine[8]

7.2 European site and qualifying feature description

Based on the identification of European sites and their qualifying features applicable to the project provided above in Section 7.1, the following qualifying features have been brought forward for further screening in relation to project activities.

Table 7.2: Summary of European Sites and their qualifying features brought forward for further assessment

European Site	Qualifying Feature
Inner Hebrides and the Minches cSAC	Harbour porpoise
Moray Firth SAC	Bottlenose dolphin
Faray and Holm of Faray SAC	Grey seal
North Rona SAC	Grey seal
Sanday SAC	Harbour seal
Dornoch Firth and Morrich More SAC	Harbour seal
River Thurso SAC	Salmon
North Caithness Cliffs SPA	Breeding guillemot, peregrine and seabird assemblage.

A description of identified European sites and features screened into this assessment has been provided below in sections 7.2.1 to 7.2.5.

7.2.1 Inner Hebrides and the Minches cSAC (Harbour porpoise)

Description

The Inner Hebrides and the Minches cSAC comprises an area of 13,540 km^2. The water depth within the site ranges from mean low water springs at the coast to depths of around 250 m. The cSAC lies within the West Scotland management unit (MU). The MU supports approximately 31.4% of the harbour porpoise (*Phocoena phocoena*) population present within the UK's part of the West Scotland management unit in depths of less than 200 m.

Often associated with nearshore headlands and strong tidal currents, harbour porpoise are commonly observed within shallow bays, estuaries and narrow tidal channels (Pierpoint, 2008; Pierpoint, Baines and Earl, 1999). Harbour porpoise exhibit diet flexibility, feeding on a varied diet of fish, cephalopods and crustaceans.

Harbour porpoise are distributed widely and are found throughout the Pentland Firth, including Thurso Bay, Dunnet Bay and Gills Bay. The total harbour porpoise abundance for Block S of the SCANS III

[8] Suitable peregrine nesting habitat survey was carried during the EIA and identified the nearest suitable area was situated ca. 660m away from the project, and even this was very sub-optimal and unlikely to support breeding birds.

abundance estimates in which the project is located was calculated as 6,147 individuals (Hammond, 2017) (Figure 11.8 of the ES).

Harbour porpoise feed on a wide variety of fish that are associated with a range of seabed substrates, and they generally focus on the most abundant local species.

While it is not possible to completely discount the connectivity between the cSAC harbour porpoise population and the project, the numbers of harbour porpoise that frequent the project zone of influence that are associated with the cSAC may be limited due to the large distance between the project and the cSAC (119 km).

Draft Conservation Objectives

1. To maintain site integrity and ensure the site continues to make a contribution to harbour porpoise remaining at favourable conservation status in UK waters.
2. To avoid significant killing, injury, or disturbance of harbour porpoise.
3. To maintain the habitat and prey of harbour porpoise in favourable condition.

7.2.2 Moray Firth SAC (Bottlenose dolphin)

Description

Bottlenose dolphin are seen in the Moray Firth at all times of year, however numbers are lower in winter and spring and peak in summer (Wilson *et al.,* 1997). As part of the Scottish East Coast population it is likely that seasonality on the Caithness coast is similar to that of the Moray Firth.

In northern Scotland, the Scottish East Coast population is concentrated in the Moray Firth, individuals of these populations are largely associated with the Moray Firth SAC. Whilst some sightings in the Pentland Firth and Thurso Bay have been recorded, the species does not occur regularly along the Caithness Coast.

The population of the Moray Firth SAC is estimated to be around 130 individuals (Wilson *et al.* 1999). The north-east Bottlenose dolphin Scotland population is thought to number around 200 animals (Thompson *et al.,* 2011, Cheney *et al.* 2013). Block S of the SCANS III survey covering the study area was calculated as 151 individuals (Hammond, 2017) (Figure 11.8 of the ES).

The bottlenose dolphin feeds on a wide range of benthic and pelagic fish species in addition to cephalopods; in Scottish waters the stomach contents of stranded animals indicate that the species preys primarily upon cod (*Gadus morhua*), saithe (*Pollachinus virens*), whiting (Merlangius merlagusand sandeel (Ammodytidae) (Santos *et al.,* 2001), all of which occur along the Caithness coast, with Thurso Bay providing nursery grounds for saithe and sandeel.

While it is not possible to completely discount the connectivity between the SAC bottlenose dolphin population and the project, the numbers of bottlenose dolphin that frequent the project zone of influence that are associated with the SAC may be limited due to the low numbers of dolphin individuals observed along the Caithness costs compared with the sighting number within the Moray Firth (Reid *et. al,* 2003).

Conservation Objectives

1. To avoid deterioration of the habitats of the qualifying species (bottlenose dolphin *Tursiops truncatus*) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained, and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest.
2. To ensure for the qualifying species that the following are established then maintained in the long term:

a. Population of the species as a viable component of the site;
b. Distribution of the species within the site;
c. Distribution and extent of habitats supporting the species;
d. Structure, function and supporting processes of habitats supporting the species; and
e. No significant disturbance of the species.

7.2.3 Faray and Holm of Faray and North Rona SAC's (Grey seal)

Description

Faray and Holm of Faray are two uninhabited islands in the northern part of Orkney that support a well-established grey seal *Halichoerus grypus* breeding colony. Grey seal tend to be found in areas where there is easy access from the shore. The islands support the second-largest breeding colony in the UK, contributing around 9% of annual UK pup production.

North Rona is a remote and very exposed island in the North Atlantic off the north-west tip of mainland Scotland. The islands are rarely disturbed by human activities in the grey seal breeding season. Grey seal are found over much of the island and use many of the submerged sea caves that are found around the coast. North Rona supports the third-largest breeding colony in the UK, representing some 5% of annual UK pup production.

While grey seal are known to travel up to 2,100 km on foraging trips, most foraging trips remain within 145 km from haul-out sites (SCOS, 2015). Tagged grey seal have been previously recorded in Thurso Bay (Russell *et al.,* 2017); and based on observed transit distances, individuals sighted within the vicinity of Thurso bay are likely connected to Faray and Holm of Faray SAC (77 km from the project) and North Rona SAC (143 km from the project).

Grey seal forage mainly on the sea bed at depths of up to 100 m although they are probably capable of feeding at all the depths found across the UK continental shelf. They take a wide variety of prey including sandeels, gadoids (cod, whiting, haddock (*Melanogrammus aeglefinus*), ling), and flatfish (plaice (*Pleuronectes platessa*), sole (*Solea solea*), flounder (*Platichthys flesus*), dab (*Limanda limanda*)). Amongst these, sandeels are typically the predominant prey species.

Conservation Objectives

1. To avoid deterioration of the habitats of the qualifying species (Grey seal *Halichoerus grypus*) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained, and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest.
2. To ensure for the qualifying species that the following are established then maintained in the long term:
    a. Population of the species as a viable component of the site;
    b. Distribution of the species within the site;
    c. Distribution and extent of habitats supporting the species;
    d. Structure, function and supporting processes of habitats supporting the species; and
    e. No significant disturbance of the species.

7.2.4 Sanday SAC and Dornoch Firth and Morrich More SAC (Harbour seal)

Description

Sanday is situated in the north-east of the Orkney archipelago and supports the largest group of harbour seal (*Phoca vitulina*) at any discrete site in Scotland. The breeding groups, found on intertidal haul-out sites that are unevenly distributed around the Sanday coast, represent over 4% of the UK population. Nearshore kelp beds that surround Sanday are important foraging areas for harbour seal, and the colony is linked to a very large surrounding population in the Orkney archipelago.

The Dornoch Firth is the most northerly large estuary in Britain and supports a significant proportion of the inner Moray Firth population of the harbour seal. The seals, which utilise sand-bars and shores at the mouth of the estuary as haul-out and breeding sites, are the most northerly population to utilise sandbanks. Their numbers represent almost 2% of the UK population.

Tagged harbour seal have been tracked within Thurso Bay (Jones *et al.,* 2017; Russell *et al.,* 2017). Based on observed transit distances, and tracking data, it is possible that individuals sighted within the vicinity of the project are connected to Sanday SAC (86 km from the project site) or to Dornoch Firth and Morrich More SAC (89 km from the project site).

Harbour seal foraging distance from haul-out sites is much smaller than that of grey seal, feeding normally within 40-50 km from haul out sites (Thompson *et al.,* 1996). Harbour seal diet is known to be more varied than grey seal, taking a wide variety of prey including sandeels (predominant species), gadoids, herring (*Clupea herangus*) and sprat (*Sprattus sprattus*), flatfish, octopus and squid from both pelagic and benthic environments (Ramasco *et al.,* 2015; Hammond *et. al.,* 2016). Diet, however, varies seasonally and from region to region.

Conservation Objectives

1. To avoid deterioration of the habitats of the qualifying species (harbour seal *Phoca vitulina*) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained, and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest.
2. To ensure for the qualifying species that the following are established then maintained in the long term:
    a. Population of the species as a viable component of the site;
    b. Distribution of the species within the site;
    c. Distribution and extent of habitats supporting the species;
    d. Structure, function and supporting processes of habitats supporting the species; and
    e. No significant disturbance of the species.

7.2.5 River Thurso SAC

Description

The River Thurso is located 2 km from the redevelopment site. The River Thurso flows north to its mouth on the north coast of Scotland. River Thurso supports a higher proportion of multi sea-winter salmon (*Salmo salar*) than is found in many rivers further south in the species' range. This is aided by the northerly location of the river and the cooler ambient water temperature, resulting in slower-growing juveniles which smolt (a young salmon which becomes silvery and migrates to the sea for the first time) at an older age, and tend to return as older multi sea-winter salmon. In addition to these

multi sea-winter fish, grilse (fish that return to fresh water after a single winter at sea) also return to the River Thurso, meaning that the river supports the full range of salmon life-history types.

Data and information on the movements of salmon during their sea migration is limited. Smolts are believed to school within Thurso Bay following exit from the river before moving to deep-sea feeding areas. Adult and sub-adult salmon form Scottish rivers have been found to migrate to areas around Greenland and the Faroe Islands (Malcom *et al.,* 2010).

Salmon originating in Scottish rivers are thought to use nearshore areas, spending most of their migratory time in the surface 1 to 6 m of the water column, diving to depths of 280 m to feed. Evidence suggest smolts originating from the east coast rivers travel through the Pentland Firth on their way to feeding grounds and as such it can be expected that salmon migrating from the River Thurso would follow the same route (Malcom *et al.*, 2010). Communication with the Caithness District Salmon Fishery Board (CDSFB) has indicated that Thurso Bay, including the area in vicinity to the project, are heavily used by smolts during April and May as they commence their migration from The River Thurso offshore, with returning adult salmon to the River Thurso present between April and September.

Conservation Objectives

1. To avoid deterioration of the habitats of the qualifying species (Salmon *Salmo salar*) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained, and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest.
2. To ensure for the qualifying species that the following are established then maintained in the long term:
    a. Population of the species as a viable component of the site;
    b. Distribution of the species within the site;
    c. Distribution and extent of habitats supporting the species;
    d. Structure, function and supporting processes of habitats supporting the species; and
    e. No significant disturbance of the species.

7.2.6 North Caithness Cliffs SPA

Description

The North Caithness Cliffs SPA lies within close proximity to the redevelopment site, at its nearest 0.27 km, located on the north coast of Caithness. The site comprises of five distinct units encompassing the sea cliffs between Red Point and Duncansby Head, and the western cliffs on the island of Stroma; and out to a seaward extension from the sea cliffs of approximately 2km into the marine environment to include the seabed, water column and surface.

The sea cliffs present within the North Caithness Cliffs SPA offer plentiful nesting habitat, supporting substantial proportions of the GB and North Atlantic biogeographical populations of seabirds. Seabirds range over large distances to forage with maximum distances ranging between 250km for Razorbill to 664km for fulmar (Scottish Government, 2011).

Seabird foraging behaviour vary amongst species. Auks, including common guillemot, razorbill and puffin, are dive feeders able to exploit benthic invertebrate and fish at varying dive depths of the water column (Akiko *et al*., 2015). Kittiwake and fulmar on the other hand are primarily surface feeders, taking prey through from the surface whilst swimming or in flight roaming over large areas to locate food.

Peregrine are resident species in GB and are the only non-seabird included on the North Caithness Cliffs SPA designation. Peregrine nest on high sea-cliff ledges and foraging over open terrain feeding primarily on other birds caught on the wing.

Conservation Objectives

3. To avoid deterioration of the habitats of the qualifying species (common guillemot *Uria aalge*, fulmar *Fulmarus glacialis*, kittiwake *Rissa tridactyla*, Atlantic puffin *Fratercula arctica*, razorbill *Alca torda*, and peregrine *Falco peregrinus*) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained.
4. To ensure for the qualifying species that the following are maintained in the long term:
    a. Population of the species as a viable component of the site;
    b. Distribution of the species within the site;
    c. Distribution and extent of habitats supporting the species;
    d. Structure, function and supporting processes of habitats supporting the species; and
    e. No significant disturbance of the species.

7.3 Screening of project activities on qualifying features

The matrices that are provided below set out the author's professional view on whether a significant effect on qualifying features is considered likely. These have been provided for information and with the aim of assisting the competent authority in reaching a conclusion. The matrices are based upon an approach set out within the Planning Inspectorate's Advice Note 10 on HRA (The Planning Inspectorate, 2017; Version 8) relating to Nationally Significant Infrastructure Projects (NSIP). Although the proposal is not an NSIP, the matrix approach used is relevant to defining the extent of impacts from the Proposals on identified designated sites features and whether the conservation objectives of each site can still be achieved if the proposal were to go ahead.

Matrix Key:

✓ - Likely significant effect cannot be excluded

× – Likely significant effect can be excluded

C = construction

O = operation

Where effects are not applicable to a particular feature they are greyed out.

Table 7.3 provides a summary of the screening process undertaken for marine mammals and Atlantic salmon. Table 7.4 provides a summary of the screening process undertaken for ornithological interests. These tables assess whether the likely effects of the project are going to be significant on identified qualifying features. The text subsequent to the tables provides a brief assessment to support the screening in or out of each of these likely significant effects (LSE) on the identified qualifying features.

Table 7.3: LSE matrix on marine mammals and salmon qualifying features.

European site features	**Name of European site(s):** River Thurso SAC, Moray Firth SAC, Faray and Holm of Faray SAC, Sanday SAC, Dornoch Firth and Morrich More SAC, Inner Hebrides and the Minches cSAC and North Rona SAC															
	Distance to the Project: 2 km – 143 km															
	LSE of the Project:															
	Noise and vibration		***Increased vessel movements (Collision risk)***		***Increased human presence***		***Construction footprint***		***Artificial Lighting***		***Accidental Pollution events***		***Liquid discharges***		***In - combination effects***	
	C	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***	***C***	***O***
Harbour porpoise	✓ A	× B	× C	× D			× E				✓ F	✓ G	× H		× I	× I
Bottlenose dolphin	✓ A	× B	× C	× D			× E				✓ F	✓ G	× H		× I	× I
Grey seal	✓ A	× B	× C	× D			× E				✓ F	✓ G	× H		× I	× I
Harbour seal	✓ A	× B	× C	× D			× E				✓ F	✓ G	× H		× I	× I
Salmon	✓ A	× B					× E				✓ F	✓ G	× H		× I	× I

A: Underwater noise emissions during the construction phase on marine mammal species and salmon: Underwater noise emissions from marine works and, in particular, those associated with piling activities has the potential to cause LSE to marine mammal species and migrating salmon causing acute and chronic effects (Popper *et al*., 2014). The potential for LSE therefore exists for underwater noise emissions during construction, and this aspect has been ***screened in*** for further assessment for marine mammal species and salmon.

B: Underwater noise emissions during the operation phase on marine mammal species and salmon: Underwater noise emissions during operation will remain similar to existing conditions. An increase in mooring of cruise ships is predicted to occur of up to 30 vessels per year and an additional 100 oil and gas related vessels per annum with associated cargo handling activities. This additional traffic would represent a 6% increase on current vessel arrivals at the port. The increase in underwater noise emissions from these vessels is therefore not considered significant considering current vessel activity. No potential for LSE is therefore anticipated for operational noise emissions, and this aspect ***is screened out*** of any further assessment.

C: Increased collision risk from vessel movements during construction on marine mammals: Vessels to be used during construction will include barges to provide a platform for dredging and piling activities and to transfer dredge material to the licensed dredge disposal ground offshore. Support vessels may also be used for transfer of materials and tools within the harbour or for health and safety purposes. Vessel speed within the harbour is restricted to <6 knots in accordance with port protocol and <10 knots is expected for barge movements associated with transfer of dredge material beyond the port limits. Laist *et al.,* (2001) found that following review of recorded vessel collisions with marine mammals incidents tended to only occur when the vessel speed was over 14 knots. The vessel speeds predicted during the project are therefore considered low enough not to result in a risk of collision to marine mammals . Therefore, there is no potential for LSE to marine mammal species populations from vessel movements during construction, and this aspect is ***screened out*** from any further assessment.

D: Increased collision risk from vessel movements during operation on marine mammals: An increase of up to 30 cruise ships per year and an additional 100 oil and gas is predicted during the operation phase in addition to existing vessel movements. All vessels will operate within harbour vessel speed requirements of <6 knots within the port limits. Vessel speeds are therefore considered low enough not to result in a risk of collision to marine mammals as per table footnote C (Laist *et al.,* 2001). Therefore, there is no potential for LSE to marine mammal species populations from vessel movements during operation phase, and this aspect is ***screened out*** from any further assessment.

E: Construction footprint and habitat removal disturbance during construction on marine mammals and salmon: All proposed infrastructure will be located within modified brownfield land located within port limits. Dredging and dredge disposal will be undertaken within the port itself and dredge material disposed within a licensed disposal area. Habitats associated with this highly modified environment are not considered suitable or to be of high value to marine mammal species or salmon. There is therefore no potential for LSE to marine mammal and salmon habitat from the project footprint during construction, and this aspect is ***screened out*** from any further assessment.

F: Accidental release of pollutants during construction phase on marine mammals and salmon: There is the potential for the accidental release of pollutants into the marine environment that could cause toxic effects to marine mammals and migratory fish species during construction works, as a result of accidental spills or leaks. Pollution may include diesel oil, leachates from cements and/or grouts used in construction, synthetic chemicals and bentonite muds used in pile boring. Therefore, there is the potential for LSE to marine mammals and salmon from accidental spill events during construction, and this aspect has been ***screened in*** for further assessment.

G: Accidental release of pollutants during operation phase on marine mammals and salmon: There is the potential for the accidental release of pollutants into the marine environment that could cause toxic effects to marine mammals and salmon during operation, as a result of accidental spills or

leaks. Pollution is most likely to include spillage or release of marine diesel oil. Therefore, there is the potential for LSE to marine mammals and salmon from accidental spill events during operation, and this aspect has been ***screened in*** for further assessment.

H: Liquid discharges during construction on marine mammals and salmon: During dredging and dredge disposal activities, sediments are disturbed causing increases in suspended sediment concentrations (SSC) in the water column for a total period of 12 days. SSC concentrations above background levels are predicted to range between 10 -60 mg/L outside the harbour extending generally to the limit of bay itself. The predicted variation is however not considered to be significant when compared with the natural range likely to be encountered within the bay. No LSE is therefore predicted as both marine mammal species and salmon are well adapted to turbid environments. Identified marine mammal species can navigate and forage using echolocation while salmon have acute sense of smell which helps to direct them to their home grounds to spawn and therefore do not rely on visual cues to navigate (Stabell, 1984; Dittman and Quinn, 1996; Lohmann *et al.* 2008). In addition, the period of dredging activities will be completed within a short period of 12 days in which low numbers of marine mammals and salmon predicted to encounter sediment plumes over the dredge period would not be affected. Given that no LSE are predicted, liquid discharges during construction on marine mammal and salmon has been ***screened out*** from further assessment.

I: In-combination effects during construction and operation on marine mammal and salmon: Following review of other plans and projects (Section 2) within proximity to the project and the project's zone of influence, it was identified that there was either no impact pathway or spatial/temporal overlap that would require further assessment of in-combination effects. Therefore, there is no potential for LSE to marine mammals and salmon from this project, in-combination with other plans and projects, and therefore this aspect is ***screened out*** from any further assessment.

Table 7.4: Likely significant effects matrix on ornithological features.

European site features	**Name of European site(s):** North Caithness Cliffs SPA						
	Distance to the Project: 0.27km						
	Likely Significant Effects of the Project:						
	Construction				**Operation**		
	Permanent Habitat Loss (A)	***Temporary Disturbance / Displacement (airborne noise) (B)***	***Temporary Disturbance / Displacement (visual) (C)***	***Accidental Pollution events (D)***	***Temporary Disturbance (traffic) (E)***	***Accidental Pollution Discharge (F)***	***In - combination effects (G)***
Common Guillemot	×	✓	✓	✓	×	✓	×
Fulmar	×	✓	✓	✓	×	✓	×
Kittiwake	×	✓	✓	✓	×	✓	×
Atlantic Puffin	×	✓	✓	✓	×	✓	×
Razorbill	×	✓	✓	✓	×	✓	×
Peregrine	×	✓	✓	✓	×	✓	×

A: Permanent/temporary habitat loss arising from land take and foreshore reclamation: The permanent land loss of 8400m^2 of near-shore foraging habitat as a result of extending the foreshore rock armour seaward, and approximately 5,560m^2 of open water habitat as a result of the widening of St Ola Pier, is situated outside the North Caithness Cliffs SPA boundary and constitutes a small area. The permanent loss of this small area of potential foraging habitat to wide ranging seabirds is not considered to be significant considering the extensive alternative area available along the north Caithness coast. No LSE is therefore anticipated, and this aspect **is screened *out*** of any further assessment.

B: Temporary disturbance and/or displacement from (airborne) construction noise: There is potential for a significant amount of noise to be emitted during the demolition, construction, and installation phases of the project. Predicted construction worst case noise levels during construction are approximately 50db at the nearest point of the North Caithness Cliffs SPA boundary. Therefore, there is the potential for LSE to ornithological features from noise disturbance during construction.

C: Temporary disturbance and/or displacement (visual): Vessels to be used during construction will include barges to provide a platform for dredging and piling activities and to transfer of dredge material to the licensed dredge disposal ground offshore. Support vessels may also be used for transfer of materials and tools within the harbour or for health and safety purposes. The disposal of dredging material could potentially cause negative impact on birds foraging within the SPA depending on the species sensitivity to vessel traffic. Therefore, there is the potential for LSE to ornithological features from visual disturbance during construction.

D: Accidental release of pollutants during construction phase: There is the potential for the accidental release of pollutants into the marine environment that could cause toxic effects to marine bird species during construction works, as a result of accidental spills or leaks. Pollution may include diesel oil, leachates from cements and/or grouts used in construction, synthetic chemicals and bentonite muds used in pile boring. Therefore, there is the potential for LSE to ornithological features from accidental spill events during construction.

E: Temporary disturbance from an increase in vessel traffic during operation: Vessel traffic conditions will remain similar to current levels. An increase in mooring of cruise ships is predicted to increase up to 30 vessels per year and an additional 100 oil and gas related vessels per annum with associated cargo handling activities. This additional traffic would represent a 6% increase on current vessel arrivals at the port. The increase in underwater disturbance to seabirds from these vessels is therefore not considered significant considering current vessel activity. No LSE is therefore anticipated, and this aspect ***is screened out*** of any further assessment.

F: Accidental release of pollutants during operation phase: There is the potential for the accidental release of pollutants into the marine environment that could cause toxic effects to seabirds during operation, as a result of accidental spills or leaks. Pollution is most likely to include spillage or release of marine diesel oil. Therefore, there is the potential for LSE to seabirds from accidental spill events during operation.

G: In-combination effects during construction and operation: Following review of other plans and projects (section 2) within the region and the projects zone of influence it was identified that there was either no impact pathway or spatial overlap that would require further assessment of in-combination effects. Therefore, there is no potential for LSE to seabirds from other plans and projects and this aspect is ***screened out*** from any further assessment.

8 STEP 3: APPROPRIATE ASSESSMENT

It has been identified that there is the potential for LSE on identified features within the River Thurso SAC, Moray Firth SAC, Faray and Holm of Faray SAC, Sanday SAC, Dornoch Firth and Morrich More SAC, Inner Hebrides and the Minches cSAC, North Rona SAC and the North Caithness Cliffs SPA, during the construction and operational phases of the proposed redevelopment as follows:

- Underwater noise emissions during construction on harbour porpoise, bottlenose dolphin, migratory fish species, grey and harbour seal;
- Airborne noise emissions and visual stimuli during construction on seabirds;
- Accidental pollution events during construction and operation on seabirds, harbour porpoise, bottlenose dolphin, migratory fish species, grey and harbour seal

All other remaining potential effects on features of identified designated sites have been screened out in Section 7.3 and have therefore not been taken forward for appropriate assessment.

Appropriate assessment has been provided for each qualifying feature of each European site. It has not been the purpose of the section to repeat information provided in the EIAR, rather, a summary assessment has been provided with cross reference to detailed information provided in the EIAR.

8.1 Embedded Mitigation

Trained and experienced Marine Mammal Observers (MMO) and/or Passive Acoustic Monitoring (PAM) would be engaged to follow JNCC protocol for minimising the risk of injury to marine mammals from piling noise, including the implementation of pre-piling watches and a soft-start protocol.

As part of the proposed project design, pollution prevention measures have been applied following published guidelines and best working practice for the prevention of pollution events.

The existing SHT Oil Spill Contingency Plan (OSCP) will take account of bunded fuel tanks associated with the proposed redevelopment, which require regular inspection, maintenance and testing for leakage in line with The Control of Pollution (Oil Storage) (Scotland) Regulations 2003.

8.2 Inner Hebrides and Minches cSAC

Summary information has been provided below in Table 8.1 assessing the potential for implications of the project on the site's conservation objectives. The only qualifying feature of the Inner Hebrides and Minches cSAC site screened in for appropriate assessment is harbour porpoise (based on the screening assessment undertaken in Section 7.3). The assessment has been conducted based on the likely occurrence of harbour as described in Section 7.2.1

Table 8.1: Summary of HRA outcome for the Inner Hebrides and Minches cSAC

Conservation Objective	Summary of HRA Findings	Reference to Evidence in ES
To maintain site integrity and ensure the site continues to make a contribution to harbour porpoise remaining at favourable conservation status in UK waters.	Due to the distance of the SAC from the project (119 km) it is likely that only low levels of connectivity will be associated between the site and the project in terms of harbour porpoise populations. Impacts identified from the project on harbour porpoise include underwater noise emissions and potential for accidental pollution events on the qualifying feature and/or habitat and prey species of the feature which are described further below. These potential impacts will not directly adversely affect the integrity of the site in terms of the contribution that the site provides to the conservation status of harbour porpoise in UK waters and therefore the project would not restrict this CO from being achieved.	No further evidence is considered necessary beyond that presented here, as this information is sufficient to reach this conclusion.
To avoid significant killing, injury, or disturbance of harbour porpoise.	Underwater noise emissions produced during construction, and in particular piling activities, has the potential to affect harbour porpoise individuals that may be found within the project's zone of influence (area in which underwater noise emissions can be detected) although as described in section 7.2.1 the numbers of harbour porpoise from the cSAC population that are likely to occur within the zone of influence are likely to be low given the low value of habitat and distance of the project from the cSAC. Impacts can include permanent injury and/or disturbance to harbour porpoise. Modelling undertaken showed that for high frequency cetaceans, within which harbour porpoise are grouped, would encounter auditory injury known as Permanent Threshold Shift (PTS) at a maximum range of 80 m from the source. Disturbance in the form of behavioural response from harbour porpoise from piling activities is predicted up to 4.6 km from the piling source. Harbour porpoise have been found to return to areas disturbed by noise within 1-3 days (Brandt *et al.,* 2011, Dähne *et al.*, 2013, Brandt *et al.,* 2016). An accidental pollution event could cause release toxic chemicals resulting in potential to toxic effect to harbour porpoise directly or indirectly through prey species. The extent of any spill that occurs during construction or operation would be entirely dependent upon the quantities and nature of the spillage, the dilution and dispersal properties of the waters and the bio-availability of the contaminant to species. The more toxic components of fuel spills are volatile and relatively short-lived. Heavier hydrocarbons, while less toxic, may persist for longer in the marine environment. However, any spill or leak within the harbour would be immediately diluted and rapidly dispersed. In addition, the implementation of pollution prevention measures during construction and an Oil Spill	Impacts on Marine Mammals from underwater noise emission during construction – EIAR – Chapter 11 – Paragraph 11.268 – 11.277. Accidental pollution events during construction and operation – EIAR – Chapter 11 – Paragraph 11.195 – 11.198 (construction) and Paragraph 11.327 – 11.332 (operation).

Conservation Objective	Summary of HRA Findings	Reference to Evidence in ES
	Contingency Plan (OSCP) during operation will include appropriate mitigation, guidelines and best working practice for the prevention of pollution events will ensure the likelihood of a spill event occurring would be highly unlikely. Given the low numbers of harbour porpoise predicted within the project zone of influence, level of connectivity between the project and the cSAC site and the embedded mitigation proposed it is highly unlikely that significant disturbance and or injury will occur to harbour porpoise with connectivity to the site as a consequence of the project.	
To maintain the habitat and prey of harbour porpoise in favourable condition.	Harbour porpoise exhibit diet flexibility, feeding on a varied diet of fish, cephalopods and crustaceans of which a number of these species are likely to be present within the harbour and wider Thurso Bay area. Excluding implementation of embededed mitigation measure such soft start procedure modelling predicted injury to fish from underwater noise emissions within 28 m from piling activities. Some disturbance to fish species has been predicted within a localised area of 1.8 km from the project from underwater noise emissions due to piling, with the impact occurring intermittently over a period of 6 months . It is therefore anticipated, that the fish prey populations can be maintained in a favourable condition. The small area of habitat predicted to be removed/ or disturbed by the project footprint and/ or dredge footprint is (not located within the European site) is not considered to be of high ecological value. In addition, the foraging range of harbour porpoise is likely to be extensive and given the relatively small area of habitat predicted to be disturbed, habitat associated with harbour porpoise will not be restricted from being maintained. As discussed above the extent of an accidental pollution event will be dependent on the quantities and nature of the spillage, the dilution and dispersal properties of the waters and the bio-availability of the contaminant to species. The implementation of pollution prevention measures and an OSCP will ensure the likelihood of a spill occurring is extremely low. Should a spill occur it is predicted that any spill would be immediately diluted and rapidly dispersed. In conclusion, the project will not restrict the ability to maintain the habitat and/or prey species of harbour porpoise in favourable condition. .	Harbour porpoise population and prey species information – Section 7.2.1. Habitat disturbance – EIAR - Chapter 11 - Paragraph 11.162 – 11.193 of the EIA. Baseline fish population - EIAR – Chapter 11 – Paragraph 11.58 – 11.60. Impacts to fish populations from underwater noise emissions - EIAR – Chapter 11 – 13.202 – 13.223. Impacts to fish population from accidental pollution events - EIAR – Chapter 11 - Paragraph 11.195 – 11.198 (construction) and Paragraph 11.327 – 11.332 (operation).

Based on the information presented above in Table 8.1, it is concluded that the project will not adversely affect the integrity of the Inner Hebrides and Minches cSAC site, alone or in-combination with other plans or projects.

8.3 Moray Firth SAC

Summary information has been provided below in Table 8.2 assessing the potential for implications of the project on the site's conservation objectives. The only qualifying feature of the Moray Firth SAC site screened in for appropriate assessment is bottlenose dolphin (based on the screening assessment undertaken in Section 7.3). The assessment has been conducted based on the likely occurrence of bottlenose dolphin as described in Section 7.2.2.

Table 8.2: Summary of HRA outcome for the Moray Firth SAC

Conservation Objective	Summary of HRA Findings	Reference to Evidence in ES
To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest.	The SAC is located 56 km from the project, therefore, the habitat and prey species populations of the bottlenose dolphin within the SAC site will not be affected by the project. The condition of habitat and prey species populations located outside the SAC, that may still contribute to the qualifying population, does however have the potential to be impacted by the project. The project will not impact on bottlenose dolphin habitat as the small area of habitat predicted to be removed/ or disturbed by the project from reclamation and dredging activities is not considered to be of high ecological value. Prey species populations outside the SAC will not be impacted. Some disturbance is likely to fish species within 1.8 km of the project boundary from underwater noise emissions from piling. Injury to fish from underwater noise emissions is predicted within 28 m from piling activities although it is highly unlikely fish populations will be significantly affected given the localised nature of the impact. Disturbance to the bottlenose dolphin as a feature of the SAC from the project is not anticipated. Low numbers are likely to be found within the project area zone of influence (Thurso Bay) based on recent survey data and distance from the SAC. Modelling undertaken to determine the significance of underwater noise emissions on bottlenose dolphin showed that for mid-frequency cetaceans, with which bottlenose dolphin are grouped, would not encounter auditory injury during piling activities. Disturbance in the form of behavioural response to piling activities could occur in an area of up to 4.6 km from the source although a recent study showed that pile driving conducted within the SAC by a separate project only showed a slight reduction in the presence of the species within the immediate vicinity of the noise source (Graham *et al*., 2017). In addition, the numbers of bottlenose dolphin from the SAC population that are likely to occur within the zone of influence are also likely to be low. Significant disturbance to bottlenose dolphin individuals is therefore not predicted. Impacts to bottlenose dolphin populations and prey species to accidental spill events is also not predicted. Significant disturbance is therefore not predicted. The implementation of pollution prevention measures and an OSCP will ensure the likelihood of a spill occurring is extremely low. Should a spill occur its predicted that any spill would be immediately diluted and rapidly dispersed. In conclusion, the project will not deteriorate the habitat of the qualifying species or cause significant disturbance to the qualifying species. associated with the SAC, and therefore will not prevent this CO from being maintained.	Bottlenose dolphin population and prey species information – Section 7.2.2. Habitat disturbance – EIAR - Chapter 11 - Paragraph 11.162 – 11.193 of the EIA. Baseline fish population - EIAR – Chapter 11 – Paragraph 11.58 – 11.60. Impacts to fish populations from underwater noise emissions - EIAR – Chapter 11 – 11.202 – 11.223. Impacts to fish population from accidental pollution events - EIAR – Chapter 11 - Paragraph 11.195 – 11.198 (construction) and Paragraph 11.327 – 11.332 (operation) Impacts on Marine Mammals from underwater noise emission during construction – EIAR – Chapter 11 – Paragraph 11.268 – 11.277. Accidental pollution events during construction and operation – EIAR – Chapter 11 – Paragraph 11.195 – 11.198 (construction) and Paragraph 11.327 – 11.332 (operation).
To ensure population of the species as a viable component of the site is maintained in the long term.	As per the assessment provided above impacts to bottlenose dolphin populations from underwater noise emissions and accidental pollution events are not predicted to occur, with low levels of disturbance predicted over the short to medium term. Therefore, the	As per evidence references provided above.

Conservation Objective	Summary of HRA Findings	Reference to Evidence in ES
	bottlenose dolphin population as a viable component of the site will continue to be maintained in the long-term.	
To ensure distribution of the species within the site is maintained in the long term.	The project will not impact on the distribution of species within the site and only small-scale disturbance to individuals are predicted outside the SAC boundary in the short to medium term. Therefore, the project does not have implications for maintaining this CO.	No further evidence is considered necessary beyond that presented here, as this information is sufficient to reach this conclusion.
To ensure distribution and extent of habitats supporting the species is maintained in the long term.	As described above the project will not impact on the distribution and extent of habitats supporting the species in the long term. Therefore, the project does not have implications for maintaining this CO.	As per evidence references provided above.
To ensure structure, function and supporting processes of habitats supporting the species is maintained in the long term.	The project will not impact on the structure, function and supporting processes of habitats supporting species as described above. Therefore, the project does not have implications for maintaining this CO.	As per evidence references provided above.
To ensure no significant disturbance of the species is maintained in the long term.	Low levels of disturbance to bottlenose dolphin in form of behavioural response to underwater noise emissions individuals are predicted within 4.6 km of the project where low numbers of individuals are predicted. Therefore, no significant disturbance is predicted in the long term and it can be concluded that the project will not prevent this CO from being maintained.	As per evidence references provided above.

Based on the information presented above in, Table 8.2, it is concluded that the project will not adversely affect the integrity of the Moray Firth SAC site, alone or in-combination with other plans or projects.

8.4 Faray and Holm of Faray and North Rona SAC's

Summary information has been provided below in Table 8.3 assessing the potential for implications of the project on the site's conservation objectives. The only qualifying feature of the Faray and Holm of Faray and North Rona SAC site screened in for appropriate assessment is grey seal (based on the screening assessment undertaken in Section 7.3. The assessment has been conducted based on the likely occurrence of grey seal as described in Section 7.2.3.

Table 8.3: Summary of HRA outcome for the Faray and Holm of Faray SAC and North Rona SAC

Conservation Objective	Summary of HRA Findings	Reference to Evidence in ES
To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest.	The Faray and Holm of Faray and North Rona SAC are located 77 km and 143 km respectively from the project, therefore, the habitat and prey species populations of the grey seal within the SAC sites will not be affected by the project. The condition of habitat and presence of prey species populations located outside the SAC, may still contribute to the qualifying population, does however have the potential to be impacted by the project.	Grey seal population and prey species information – Section 7.2.3. Habitat disturbance – EIAR - Chapter 11 - Paragraph 11.162 – 11.193.

Conservation Objective	Summary of HRA Findings	Reference to Evidence in ES
	The project will not impact on grey seal habitat as the small area of habitat predicted to be removed and/ or disturbed by the project from reclamation and dredging activities is not considered to be of high ecological value. Prey species populations of the grey seal outside the SAC will not be impacted. Some disturbance is likely to fish species within 1.8 km of the project boundary from underwater noise emissions from piling. Injury to fish from underwater noise emissions is predicted within 28 m from piling activities although it is highly unlikely fish populations will be significantly affected given the localised nature of the impact. Disturbance to the SAC grey seal populations from the project are also unlikely. Low numbers are likely to be found within the project area zone of influence (Thurso Bay) based on recent survey data and distance from the SAC. Modelling undertaken to determine the significance of underwater noise emissions on grey seal showed that for pinnipeds, with which grey seal are grouped, would not encounter auditory injury during piling activities. Disturbance in the form of behavioural response to piling activities could occur in an area of up to 4.6 km from the source. In addition, the numbers of grey seal from the SAC population that are likely to occur within the zone of influence are also likely to be low. Significant disturbance to grey seal is therefore not predicted. Impacts to grey seal populations and prey species to accidental spill events is also not predicted. Significant disturbance is therefore not predicted. The implementation of pollution prevention measures and an OSCP will ensure the likelihood of a spill occurring is extremely low. Should a spill occur its predicted that any spill would be immediately diluted and rapidly dispersed. In conclusion, the project will not deteriorate the habitat of the qualifying species or cause significant disturbance to the qualifying species. associated with the SAC, and therefore will not prevent this CO from being maintained	Baseline fish population - EIAR – Chapter 11 – Paragraph 11.58 – 11.60. Impacts to fish populations from underwater noise emissions - EIAR – Chapter 11 – 11.202 – 11.223. Impacts to fish population from accidental pollution events - EIAR – Chapter 11 - Paragraph 11.195 – 11.198 (construction) and Paragraph 11.327 – 11.332 (operation) Impacts on Marine Mammals from underwater noise emission during construction – EIAR – Chapter 11 – Paragraph 11.268 – 11.277. Accidental pollution events during construction and operation – EIAR – Chapter 11 – Paragraph 11.195 – 11.198 (construction) and Paragraph 11.327 – 11.332 (operation).
To ensure population of the species as a viable component of the site is maintained in the long term	As per the assessment provided above impacts to grey seal populations from underwater noise emissions and accidental pollution events are not predicted to occur with low levels of disturbance predicted over the short to medium term. Therefore, the grey seal populations as a viable component of each site will continue to be maintained in the long-term.	As per evidence references provided above.
To ensure distribution of the species within the site is maintained in the long term	The project will not impact on the distribution of species within the site and only small-scale disturbance to individuals are predicted outside the SAC boundary in the short to medium term. Therefore, the project does not have implications for maintaining this CO.	No further evidence is considered necessary beyond that presented here, as this information is sufficient to reach this conclusion.
To ensure distribution and extent of habitats supporting the species is maintained in the long term	As described above the project will not impact on the distribution and extent of habitats supporting the species in the long term. Therefore, the project does not have implications for maintaining this CO	As per evidence references provided above.

Conservation Objective	Summary of HRA Findings	Reference to Evidence in ES
To ensure structure, function and supporting processes of habitats supporting the species is maintained in the long term	As described above the project will not impact on the structure, function and supporting processes of habitats supporting species. Therefore, the project does not have implications for maintaining this CO	As per evidence references provided above.
To ensure no significant disturbance of the species is maintained in the long term	Low levels of disturbance to grey seal in form of behavioural response to underwater noise emissions individuals are predicted within 4.6 km of the project where low numbers of individuals are predicted. Therefore, no significant disturbance is predicted in the long term and it can be concluded that the project will not prevent this CO from being maintained.	As per evidence references provided above.

Based on the information presented above in Table 8.3, it is concluded that the project will not adversely affect the integrity of the Faray and Holm of Faray and North Rona SAC site, alone or in-combination with other plans or projects.

8.5 Sanday SAC and Dornoch Firth and Morrich More SAC

Summary information has been provided below in Table 8.4 assessing the potential for implications of the project on the site's conservation objectives. The only qualifying feature of the Sanday SAC and Dornoch Firth and Morrich More SAC site screened in for appropriate assessment is harbour seal (based on the screening assessment undertaken in Section 7.3. The assessment has been conducted based on the likely occurrence of harbour seal as described in Section 7.2.4.

Table 8.4: Summary of HRA outcome for the Sanday SAC and Dornoch Firth and Morrich More SAC

Conservation Objective	Summary of HRA Findings	Reference to Evidence in ES
To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest.	The Sanday SAC and Dornoch Firth and Morrich More SAC are located 86 km and 89 km respectively from the project, therefore, the habitat and prey species populations of the harbour seal within the SAC sites will therefore not be affected by the project. The condition of habitat and prey species populations located outside the SAC, that may still contribute to the qualifying population, does however have the potential to be impacted by the project. The project will not impact on harbour seal habitat as the small area of habitat predicted to be removed and/ or disturbed by the project from reclamation and dredging activities is not considered to be of high ecological value. Prey species populations of the harbour seal outside the SAC will not be impacted. Some disturbance is likely to fish species within 1.8 km of the project boundary from underwater noise emissions from piling. Injury to fish from underwater noise emissions is predicted within 28 m from piling activities although it is highly unlikely fish populations will be significantly affected given the localised nature of the impact.	Harbour seal population and prey species information – Section 7.2.4. Habitat disturbance – EIAR - Chapter 11 - Paragraph 11.162 – 11.193. Baseline fish population - EIAR – Chapter 11 – Paragraph 11.58 – 11.60. Impacts to fish populations from underwater noise emissions - EIAR – Chapter 11 – 11.202 – 11.223. Impacts to fish population from accidental pollution events - EIAR – Chapter 11 - Paragraph 11.195 –

Conservation Objective	Summary of HRA Findings	Reference to Evidence in ES
	Disturbance to the SAC harbour seal populations from the project are also unlikely. Low numbers are likely to be found within the project area zone of influence (Thurso Bay) based on recent survey data and distance from the SAC. Modelling undertaken to determine the significance of underwater noise emissions on harbour seal showed that for pinnipeds, with which harbour seal are grouped, would not encounter auditory injury during piling activities. Disturbance in the form of behavioural response to piling activities could occur in an area of up to 4.6 km from the source. In addition, the numbers of harbour seal from the SAC population that are likely to occur within the zone of influence are also likely to be low. Significant disturbance to harbour seal is therefore not predicted. Impacts to harbour seal populations and prey species to accidental spill events is also not predicted. Significant disturbance is therefore not predicted. The implementation of pollution prevention measures and an OSCP will ensure the likelihood of a spill occurring is extremely low. Should a spill occur its predicted that any spill would be immediately diluted and rapidly dispersed. In conclusion, the project will not deteriorate the habitat of the qualifying species or cause significant disturbance to the qualifying species. associated with the SAC, and therefore will not prevent this CO from being maintained.	11.198 (construction) and Paragraph 11.327 – 11.332 (operation) Impacts on Marine Mammals from underwater noise emission during construction – EIAR – Chapter 11 – Paragraph 11.268 – 11.277. Accidental pollution events during construction and operation – EIAR – Chapter 11 – Paragraph 11.195 – 11.198 (construction) and Paragraph 11.327 – 11.332 (operation).
To ensure population of the species as a viable component of the site is maintained in the long term	As per the assessment provided above impacts to harbour seal populations from underwater noise emissions and accidental pollution events are not predicted to occur with low levels of disturbance predicted over the short to medium term. Therefore, the harbour seal populations as a viable component of each site will continue to be maintained in the long-term.	As per evidence references provided above.
To ensure distribution of the species within the site is maintained in the long term	The project will not impact on the distribution of species within the site and only small-scale disturbance to individuals are predicted outside the SAC boundary in the short to medium term. Therefore, the project does not have implications for maintaining this CO.	No further evidence is considered necessary beyond that presented here, as this information is sufficient to reach this conclusion.
To ensure distribution and extent of habitats supporting the species is maintained in the long term	As described above the project will not impact on the distribution and extent of habitats supporting the species in the long term. Therefore, the project does not have implications for maintaining this CO.	As per evidence references provided above.
To ensure structure, function and supporting processes of habitats supporting the species is maintained in the long term	As described above the project will not impact on the structure, function and supporting processes of habitats supporting species. Therefore, the project does not have implications for maintaining this CO.	As per evidence references provided above.
To ensure no significant disturbance of the species is maintained in the long term	Low levels of disturbance to harbour seal in form of behavioural response to underwater noise emissions individuals are predicted within 4.6 km of the project where low numbers of individuals are predicted. Therefore, no significant disturbance is predicted in the long term and it can be concluded that the project will not prevent this CO from being maintained.	As per evidence references provided above.

Based on the information presented above in Table 8.4, it is concluded that the project will not adversely affect the integrity of the Sanday SAC and Dornoch Firth and Morrich More SAC site, alone or in-combination with other plans or projects.

8.6 River Thurso SAC

Summary information has been provided below in Table 8.5 assessing the potential for implications of the project on the site's conservation objectives. The only qualifying feature of the River Thurso SAC site screened in for appropriate assessment is Atlantic salmon (based on the screening assessment undertaken in Section 7.3. The assessment has been conducted based on the likely occurrence of salmon as described in Section 7.2.5.

Table 8.5: Summary of HRA outcome for the River Thurso SAC.

Conservation Objective	Summary of HRA Findings	Reference to Evidence in ES
To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for the qualifying interest.	The River Thurso SAC is located 2 km from the project, therefore, the habitat and prey species populations of the salmon within the SAC sites will therefore not be affected by the project. The project will not impact on salmon habitat as the small area of habitat predicted to be removed/ or disturbed by the project from reclamation and dredging activities is not considered to be of high ecological value or used by salmon as part of their migratory pattern. There is however the potential for disturbance to salmon from the SAC's as they migrate either from the river as smolts or from offshore waters to the rivers as adults to spawn. Modelling undertaken to determine the significance of underwater noise emissions on salmon showed that for group 2 fish, where swim bladder is not involved in hearing (particle motion detection), which salmon are grouped would encounter auditory injury at a distance up to 28 m during piling activities. Auditory injury is not predicted to occur as significant populations of salmon are not predicted within the harbour and will be exposed to piling noise within the distance range. Soft start piling will be implemented to allow for salmon individuals to move away on commencement of the activity. Disturbance in the form of a behavioural response could occur in an area of up to 1.8 km from the source. The Popper *et al*. (2014) guidelines predict that there is likely to be a high risk of a behavioural response including startle responses (also known as C-turn responses), strong avoidance behaviour, changes in swimming or schooling behaviour or changes of position in the water column within tens of meters, moderate risk within hundreds of metres and low risk at 1000's meters from the of the noise source. Depending on the strength of the response and the duration of the impact, there is potential for some of these responses to lead to significant effects at an individual level (e.g. reduced fitness, increased susceptibility to predation) or at a population level (e.g. avoidance or delayed migration to key spawning grounds), although these may also result in short term, intermittent changes in behaviour that have no wider effect, particularly once acclimatisation to the noise source is taken into account.	Salmon population and prey species information – Section 7.2.5. Impacts to fish populations from underwater noise emissions - EIAR – Chapter 11 – 11.202 – 11.234. Impacts to fish population from accidental pollution events - EIAR – Chapter 11 - Paragraph 11.195 – 11.198 (construction) and Paragraph 11.327 – 11.332 (operation) Accidental pollution events during construction and operation – EIAR – Chapter 11 – Paragraph 11.195 – 11.198 (construction) and Paragraph 11.327 – 11.332 (operation).

Conservation Objective	Summary of HRA Findings	Reference to Evidence in ES
	Research undertaken to determine the sensitivity of mature salmon to piling activities generally found that salmon may not be sensitive to piling noise (Nedwell and Howell, 2004; Nedwell *et al*., 2006) although some behavioural response may be observed during migration of the adult salmon population associated with River Thurso SAC. Less is known on the effects of underwater noise on migrating salmon smolts. Salmon smolts are known to congregate each year during April and May in Thurso Bay prior to migrating in shoals offshore. Their migration from the river to offshore areas are predominantly undertaken during nocturnal periods in the early part of the smolt migration period. Smolts are known to be analogous[9] compared with other fish in group 2, and therefore may be less sensitive to noise that mature salmon (Iwashita *et al.*,1999; Kenyon, 1996; and Wysocki and Ladich, 2001). However, it is uncertain whether smolts that have recently undergone smolting, as those found in Thurso Bay during April and May, may be more vulnerable to underwater noise as they may not have sufficient energy to immediately continue their migration offshore. Therefore, additional stress caused by underwater noise emission from piling may ultimately result in mortality either from continued stress from a collection of stressors or from predation as they migrate offshore without sufficient time to rest in Thurso Bay. By adopting the precautionary principle, the sensitivity of salmon smolts to disturbance from underwater noise from the project is considered to be higher than the sensitivity assessed for adult salmon. Due to this increased sensitivity, it has been proposed that piling be restricted to daylight hours during April and May to avoid the most sensitive migration periods for salmon smolts. Impacts to the SAC salmon population from accidental spill events are also not predicted. Significant disturbance is therefore not predicted. The implementation of pollution prevention measures and an OSCP will ensure the likelihood of a spill occurring is extremely low. Should a spill occur its predicted that any spill would be immediately diluted and rapidly dispersed. Given the intermittent, short term nature of piling activities to be undertaken and mitigation proposed for implementation no significant disturbance is predicted to the salmon species associated with the SAC.	
To ensure population of the species as a viable component of the site is maintained in the long term	As per the assessment provided above impacts to salmon populations from underwater noise emissions and accidental pollution events are not predicted to occur with low levels of disturbance predicted over the short to medium term. Therefore, the salmon populations as a viable component of the River Thurso SAC will continue to be maintained in the long-term.	As per evidence references provided above.

[9] Other fish found within group 2 have displayed an increase in sensitivity with body size and age.

Conservation Objective	Summary of HRA Findings	Reference to Evidence in ES
To ensure distribution of the species within the site is maintained in the long term	The project will not impact on the distribution of species within the site and only small-scale disturbance to individuals are predicted outside the SAC boundary in the short to medium term. Therefore, the project does not have implications for maintaining this CO.	As per evidence references provided above..
To ensure distribution and extent of habitats supporting the species is maintained in the long term	As described above the project will not impact on the distribution and extent of habitats supporting the species in the long term. Therefore, the project does not have implications for maintaining this CO.	No further evidence is considered necessary beyond that presented here, as this information is sufficient to reach this conclusion.
To ensure structure, function and supporting processes of habitats supporting the species is maintained in the long term	As described above the project will not impact on the structure, function and supporting processes of habitats supporting species. Therefore, the project does not have implications for maintaining this CO.	No further evidence is considered necessary beyond that presented here, as this information is sufficient to reach this conclusion.
To ensure no significant disturbance of the species is maintained in the long term	Low levels of disturbance to salmon in form of behavioural response to underwater noise emissions individuals are predicted within 1.8 km of the project where low numbers of individuals are predicted. Therefore, no significant disturbance is predicted in the long term and it can be concluded that the project will not prevent this CO from being maintained..	As per evidence references provided above.

Based on the information presented above in Table 8.5, it is concluded that the project will not adversely affect the integrity of the River Thurso SAC site, alone or in-combination with other plans or projects.

8.7 North Caithness Cliffs SPA

Summary information has been provided below in Table 8.5 to inform appropriate assessment of the potential impact of the project based on the screening assessment undertaken in section 7.3 on qualifying feature of the North Caithness Cliffs SPA.

Table 8.6: Summary of HRA outcome for the North Caithness Cliffs SPA.

Conservation Objective	Summary of HRA Findings	Reference to Evidence in EIAR
To avoid deterioration of the habitats of the qualifying species (common guillemot *Uria aalge*, fulmar *Fulmarus glacialis*, kittiwake *Rissa tridactyla*, Atlantic puffin *Fratercula arctica*, razorbill *Alca torda*, and peregrine *Falco peregrinus*) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained.	The North Caithness Cliffs SPA is located approximately 400m from the project, and therefore there is potential to cause significant disturbance to the qualifying species associated with the SPA. The project is located outside the SPA boundary and therefore the habitat will not be affected by the project. Potential disturbance caused by visual and audible emissions during the construction phase of the project has the potential to caused adverse impacts on the SPA's qualifying species due to its proximity.	Salmon population and prey species information – Section 7.2.5. Impacts to bird populations from noise emissions - EIAR – Chapter 12 – 12.73 – 12.96.

Conservation Objective	Summary of HRA Findings	Reference to Evidence in EIAR
	The impact of disturbance should consider how it will change the local distribution of the population and the effect it will have on the food supply, foraging efficiency and compensation for increased energy expenditure due to flight distance (Riddington *et al.,* 1996). There are several factors that influence the severity of the disturbance (e.g. magnitude, frequency, etc.) and the level of response elicited by bird species; responses range from the least severe where birds becoming alert, raising their heads, to the most severe where a flight initiated, and the area is temporary abandoned. Noise pollution generated during the construction phase of the project has the potential to cause disturbance to foraging and roosting birds associated with the SPA. Modelling undertaken to determine noise emissions during the construction phase predicted levels as low as 50db at the nearest point of the SPA boundary in a worst-case scenario, where a range of activities were occurring simultaneously. A study undertaken by Cutts *et al.,* (2013) found that regular construction noise below 50dB and piling noise below 70dB elicited no response from waterbirds, and thus birds within the SPA boundary will not be affected by noise disturbance. Similarly, Brown (1990) found that one species of tern did not displace the most severe response, taking flight, until it was exposed to noise levels greater than 85dB. Temporary disturbance due to noise is therefore not likely to have an impact on birds foraging or roosting within the SPA boundary. However, birds foraging within the harbour will be exposed to greater levels of noise temporarily displacing them from within close proximity to the works. Surveys of birds foraging within the harbour during the summer of 2018 recorded small numbers of SPA qualifying species representing only a small fraction of the total population. Furthermore, the project will only displace birds from a small area of the overall foraging habitat available on the north Caithness coast, where an abundance of suitable alternatives are available within close commuting range. Therefore, exclusion from the harbour during construction works will only have a minor impact on the overall fitness and breeding success of the population. Visual disturbance caused by boat traffic can also negatively affect seabirds causing a reduction in the time spend feeding and displacement from foraging grounds (Kahl, 1991). Cook and Burton (2010) found guillemots, razorbill, and puffin are sensitive to disturbance by shipping traffic associated with dredging and consequently will avoid areas were the activity is taking place; conversely kittiwake is typically unaffected by disturbance and are flexible in their habitat use. Vessel traffic will be concentrated around the harbour where visual disturbance will be most acute. Similar to the case that of noise pollution due to the large foraging ranges of seabirds, sometimes feeding many kilometres away from nest site the potential loss of foraging habitat within the harbour insignificant. Displacement from the area will result in an increase in energy expenditure require to find alternative foraging areas, however, given the small numbers of birds recorded using the harbour a temporary exclusion from foraging in the area will not affect the overall integrity of the SPA population.	Impacts to bird populations from noise emissions - EIAR – Chapter 12 – 12.99 – 12.106. Birds on the Water Survey Results within Harbour – Chapter 12 – Table 1.7 Accidental pollution events during construction and operation – EIAR – Chapter 12 – 12.121 – 12.131

Conservation Objective	Summary of HRA Findings	Reference to Evidence in EIAR
	Impacts to the SPA population from accidental spill events are also not predicted to cause LSE. Significant disturbance is therefore not predicted. The implementation of pollution prevention measures and an OSCP will ensure the likelihood of a spill occurring is extremely low. Should a spill occur its predicted that any spill would be immediately diluted and rapidly dispersed. Given the intermittent short-term nature of construction activities to be undertaken and mitigation proposed for implementation no significant disturbance is predicted to the ornithological features associated with the SPA.	
To ensure population of the species as a viable component of the site is maintained in the long term	As per the assessment provided above impacts populations of ornithological features from noise and audible disturbance, and accidental pollution events are not predicted to be significant with low levels of disturbance predicted over the short to medium term. Therefore, the bird populations as a viable component of the North Caithness Cliffs SPA will continue to be maintained in the long-term.	As per evidence references provided above.
To ensure distribution of the species within the site is maintained in the long term	The project will not impact on the distribution of species within the site and only small-scale disturbance to individuals predicted outside the SAC boundary in the short to medium term.	As per evidence references provided above.
To ensure distribution and extent of habitats supporting the species is maintained in the long term	As described above the project will not impact on the distribution and extent of habitats supporting the species in the long term.	No further evidence is considered necessary beyond that presented here, as this information is sufficient to reach this conclusion.
To ensure structure, function and supporting processes of habitats supporting the species is maintained in the long term	As described above the project will not impact on the structure, function and supporting processes of habitats supporting species.	No further evidence is considered necessary beyond that presented here, as this information is sufficient to reach this conclusion.
To ensure no significant disturbance of the species is maintained in the long term	Low levels of disturbance to ornithological features in the form of behavioural response to audible and visual disturbance individuals are predicted within 0.3 km of the project where low numbers of individuals are predicted. Therefore, no significant disturbance is predicted in the long term.	As per evidence references provided above.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT VOLUME II :TECHNICAL APPENDICES – CONTENTS

1 INTRODUCTION

Appendix 1.1 EIA Scoping Opinion

Appendix 1.2 Other Projects Considered for Cumulative Effects

Appendix 1.3 Pre-Application Consultation Report

Appendix 1.4 Competency of Experts

2 PROJECT DESCRIPTION

Appendix 2.1 Best Practicable Environmental Options Assessment Report

Appendix 2.2 Scrabster Harbour Oil Spill Contingency Plan

Appendix 2.3 Navigational Risk Assessment

3 ALTERNATIVES

(No Appendices)

4 WASTE

Appendix 4.1 Scrabster Harbour Trust Waste Management Plan

Appendix 4.2 Outline Site Waste Management Plan

5 TRAFFIC AND TRANSPORTATION

Appendix 5.1 Highland Council Scoping Correspondence

Appendix 5.2 Transport Scotland Scoping Correspondence

6 AIR QUALITY AND CLIMATE

Appendix 6.1 DMRB Screening Model Inputs and Outputs

Appendix 6.2 Construction Phase Distance Banding Figure

Appendix 6.3 Draft Dust Management Plan

7 NOISE AND VIBRATION

Appendix 7.1 Calibration Certificates

Appendix 7.2 Photographs of Noise Monitoring Locations

Appendix 7.3 Noise Monitoring Survey Results

8 GEOLOGY, HYDROGEOLOGY AND CONTAMINATION

Appendix 8.1 Preliminary Risk Assessment (PRA) Report

Appendix 8.2 Fugro Ground Investigation Report

Appendix 8.3 Whiteford Ground Investigation Report

9 COASTAL PROCESSES

(No Appendices)

10 WATER QUALITY

Appendix 10.1 Fugro Lab Results

11 MARINE BIODIVERSITY

Appendix 11.1 Underwater Noise Report

Appendix 11.2 Benthic Technical Report

Appendix 11.3 European Protected Species Supporting Information Report

12 TERRESTRIAL BIODIVERSITY AND ORNITHOLOGY

Appendix 12.1 Report to Inform Appropriate Assessment

13 INTERACTIONS

(No Appendices)