REPORT

Port of Leith Outer Berth Development

Approach Channel Deepening Supplementary Environmental Impact Assessment Report - Appendices

Client: Forth Ports Limited

Reference: PC4514-RHD-YY-XX-RP-EV-0033
Status: Final/01
Date: 15 December 2023

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Approved by: Jamie Gardiner

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Classification
Project related

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Appendix 1-1 Marine Directorate - Licensing Operations Team Scoping Opinion

Marine Directorate - Licensing Operations Team Scoping Opinion

Scoping Opinion adopted by the Scottish Ministers under Part 4 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017

Forth Ports Limited

Approach Channel Deepening Works, Port of Leith, Outer Berth

September 2023

Contents

1. Introduction

1.1 Background

1.1.1 On 29 June 2023, the Scottish Ministers received a scoping report from Forth Ports Limited ("the Applicant") as part of its request for a scoping opinion relating to approach channel deepening works at the Port of Leith Outer Berth ("the Proposed Works"). An updated scoping report ("the Scoping Report") was received on 6 July 2023. In accordance with regulation 14 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ("the 2017 MW Regulations") the Scottish Ministers considered the content of the Scoping Report to be sufficient.

1.1.2 The Proposed Works are to be undertaken as part of the works currently ongoing to construct the Port of Leith Outer Berth for which marine licences were granted in December 2022 ("the Licensed Works"). An Environmental Impact Assessment Report was submitted to support the applications for marine licences for the Licensed Works ("the 2022 EIA Report").

1.1.3 This scoping opinion is adopted by the Scottish Ministers under the 2017 MW Regulations ("the Scoping Opinion") in response to the Applicant's request and should be read in conjunction with the Scoping Report. The matters contained in the Scoping Report have been carefully considered by the Scottish Ministers and use has been made of professional judgment, based on expert advice from stakeholders and Marine Directorate in-house expertise and experience. This Scoping Opinion identifies the scope of impacts to be addressed and the method of assessment to be used in the Environmental Impact Assessment Report for the Proposed Works ("the Supplementary EIA Report"). The Scottish Ministers, in adopting this Scoping Opinion, have, in accordance with the 2017 MW Regulations, taken into account the information provided by the Applicant, in particular, information in respect of the specific characteristics of the Proposed Works, including its location and technical capacity and its likely impact on the environment. In addition, the Scottish Ministers have taken into account the representations made to them in response to the scoping consultation they have undertaken. In examining the Supplementary EIA Report, and any other environmental information, the Scottish Ministers will seek to reach an up to date reasoned conclusion on the significant effects on the environment from the Proposed Works. This reasoned conclusion will be considered as up to date if the Scottish Ministers are satisfied that current knowledge and methods of assessment have been taken account of. For the avoidance of doubt, this Scoping Opinion does not preclude the Scottish Ministers from requiring the Applicant to submit additional information in connection with any EIA Report submitted with applications for marine licences under the Marine (Scotland) Act 2010 ("the 2010 Act"). In the event that the Applicant does not submit applications

for marine licences under the 2010 Act for the Proposed Works within 12 months of the date of this Scoping Opinion, the Scottish Ministers strongly recommend that the Applicant seeks further advice from them regarding the validity of the Scoping Opinion.

2. The Proposed Works

2.1 Introduction

2.1.1 This section provides a summary of the description of the Proposed Works provided by the Applicant in the Scoping Report together with the Scottish Ministers' general comments in response. The details of the Proposed Works in the Scoping Report have not been verified by the Scottish Ministers and are assumed to be accurate.

2.2 Description of the Proposed Works

2.2.1 The Licensed Works involve redeveloping an existing berth on the inner edge of the eastern breakwater at the Port of Leith with associated capital dredging and sea deposit of dredged material. The construction works include removal of existing infrastructure, construction of a 125 metre berth and provision of a hardstanding area for loading and unloading vessels. The berth will be piled with a suspended concrete deck. The dredging involves 101,000 metres cubed ("m³") of material being removed and either used on site or deposited at the Narrow Deep offshore deposit site. This would create a berth pocket of -9.3 metres ("m") chart datum ("CD").

2.2.2 The purpose of the Proposed Works is to allow deeper drafted vessels, used in the construction and maintenance of infrastructure related to the offshore renewables industry, to be able to access the newly developed outer berth and to gain access to the port over a wider tidal window.

2.2.3 The Proposed Works consist of 4 main elements:

- Capital dredging of the approach channel to -8.0 m CD;
- Capital dredging of the Outer Berth dredge pocket to -12 m CD;
- Deposit of dredge material at the Narrow Deep B (FO038) sea deposit site unless the Best Practicable Environmental Option report identifies a better suitable alternative uses for the dredged material; and
- Construction of a retaining wall at the toe of the Eastern Breakwater.

2.2.4 The approach channel will be dredged by less than a metre down to -8 m CD . The Outer Berth pocket is being dredged to -9.0 m CD under the Licensed Works but it has been determined that this should be increased to a depth of -12.0 m CD and re-positioned northwards. In total the additional dredge under consideration is around 695,000 m³ and is expected to take approximately 3 months to complete. A chart showing the location of the dredge area is provided in Appendix 1.

2.2.5 It is anticipated that the dredge material will be deposited at the Narrow Deep B Deposit site (FO038) but a Best Practicable Environmental Option assessment will be presented prior to dredging to determine the most appropriate method and site of disposal.

2.2.6 As a result of the Proposed Works the Applicant predicts that the annual maintenance dredge requirement will increase from 25,000 m³ to approximately 62,000 m³.

2.2.7 The retaining wall, of approximately 50 m in length, shall be constructed to ensure the stability of the Eastern Breakwater following the repositioning and deepening of the outer berth dredge pocket. It is proposed that this will be constructed between the dredge pocket and the toe of the breakwater. It is considered likely that it will be constructed using land-based plant working from the Outer Berth and will involve the use of either vibration or impact piling. To get access for the crane, there may be a requirement to construct a small working area through infilling the area behind where the retaining wall will be situated. The size of the area needed will depend on the size of the crane to be used. The working area would either be removed following completion of piling or suitably protected with rock armour and left in-situ. Decisions made on the use of infill and whether this is to be left in situ must be detailed in the Supplementary EIA Report. Construction is expected to take around 4 weeks and may be carried out concurrently with the approach channel dredging work.

2.3 Onshore Planning

2.3.1 The Licensed Works were carried out under permitted development and therefore did not require planning permission. The Proposed Works do not alter the terrestrial elements and therefore there is no change to the planning requirements.

2.4 The Scottish Ministers' Comments

Description of the Proposed Works

2.4.1 The Scottish Ministers highlight that although the activities identified by the Applicant as requiring a marine licence are the construction of the piled wall at the toe of the breakwater and the deposit of the dredge material, the capital dredging itself will also require a marine licence and must be fully assessed in the Supplementary EIA Report.

2.4.2 There is little detail provided in the Scoping Report as to the method of construction for the piled wall. Greater detail of this work and materials to be used, including the proposed infill discussed in paragraph 2.2.7, should be

provided in the Supplementary EIA Report as well as information regarding possible impacts of this process.

2.4.3 The Applicant mentions only the intention to deposit dredged material at the Narrow Deep B deposit site. However, this may not be the most appropriate method of disposal of this significantly larger volume of material than was agreed under the Licensed Works. Furthermore, following chemical analysis of the sediment to be dredged to measure the concentration of contaminants that may be present, the material may not be suitable for this method of disposal. The Applicant must provide a full assessment of the beneficial use options for the dredged material in line with the waste hierarchy as part of the EIA Report and the BPEO, alongside the results from the sediment analysis. If deposit of dredged material at sea is proposed, a full justification for this must be provided. The impacts from the selected use of the dredged material must be detailed in the application.

Alternatives

2.4.4 The EIA Regulations require that the EIA Report include 'a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the Applicant, which are relevant to the Proposed Works and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects'.

2.4.5 The Scottish Ministers acknowledge that alternatives were considered to the Port of Leith outer berth development as a whole in the 2022 EIA Report. However, for the avoidance of doubt, the Scottish Ministers advise that the Supplementary EIA Report must include an up to date consideration of the reasonable alternatives studied as the parameters of the Proposed Works have been refined. The Scottish Ministers expect this to comprise a discrete section in the Supplementary EIA Report that provides details of the reasonable alternatives studied across all aspects of the Proposed Works and the reasoning for the selection of the chosen options, including a comparison of the environmental effects.

3. Contents of the EIA Report

3.1 Introduction

3.1.1 This section provides the Scottish Ministers' general comments on the approach and content of information to be provided in the Applicant's Supplementary EIA Report, separate to the comments on the specific receptor topics discussed in section 5 of this Scoping Opinion.

3.2 EIA Scope

3.2.1 Matters are not scoped out unless specifically addressed and justified by the Applicant and confirmed as being scoped out by the Scottish Ministers. The matters scoped out should be documented and an appropriate justification noted in the Supplementary EIA report.

3.3 Mitigation and Monitoring

3.3.1 Any embedded mitigation relied upon for the purposes of the assessment should be clearly and accurately explained in detail within the Supplementary EIA Report. The likely efficacy of the mitigation proposed should be explained with reference to residual effects. The Supplementary EIA Report must identify and describe any proposed monitoring of significant adverse effects and how the results of such monitoring would be utilised to inform any necessary remedial actions.

3.3.2 The Supplementary EIA Report should clearly demonstrate how the Applicant has had regard to the mitigation hierarchy, including giving consideration to the avoidance of key receptors. The Scottish Ministers advise that where the mitigation is envisaged to form part of a management or mitigation plan, the Supplementary EIA Report must set out these plans or the reliance on these in sufficient detail so the significance of the residual effect can be assessed and evaluated. This should also include identification of any monitoring and remedial actions (if relevant) in the event that predicted residual effects differ to actual monitored outcomes. Commitment to develop plans without sufficient detail is not considered to be suitable mitigation in itself.

3.3.3 The Supplementary EIA Report must include a table of mitigation which corresponds with the mitigation identified and discussed within the various chapters of the Supplementary EIA Report and accounts for the representations and advice attached in Appendix 2.

3.3.4 Where potential impacts on the environment 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 Supplementary EIA Report, the work that has

been undertaken, the results, what impact, if any, has been identified and why it is not significant.

3.4 Approach to the Supplementary EIA Report

3.4.1 The Scottish Ministers acknowledge that a number of the impacts from the Proposed Works have already been assessed in the 2022 EIA Report for the Licensed Works and where relevant, mitigation measures have been identified. On this basis, the Applicant has proposed that these topics are scoped out of the Supplementary EIA Report. The Scottish Ministers advise that where modelling and assessments from the 2022 EIA Report are relevant to the Proposed Works, a summary of this information should be provided in the Supplementary EIA Report with specific reference to the 2022 EIA Report for full details. All relevant mitigation measures for the Proposed Works must be fully detailed in the Supplementary EIA Report.

4. Consultation

4.1 The Consultation Process

4.1.1 Following receipt of the Scoping Report, the Scottish Ministers, in accordance with the 2017 MW Regulations, initiated a 30 day consultation process, which commenced on 14 July 2023. The following bodies were consulted, those marked in bold provided a response and those marked in italics sent nil returns or stated they had no comments:

- **NatureScot, operating name of Scottish Natural Heritage**
- **Scottish Environment Protection Agency**
- ***Edinburgh City Council***
- **Historic Environment Scotland ("HES")**
- **Maritime and Coastguard Agency**
- ***Northern Lighthouse Board***
- Leith Harbour and Newhaven Community Council
- UK Chamber of Shipping
- Crown Estate Scotland
- ***Ministry of Defence***
- Fisheries Management Scotland
- Forth DSFB
- Forth Rivers Trust
- Fishery Office Eyemouth
- ***North and East Coast Inshore Fisheries Group***
- Marine Safety Forum
- Marine Policy and Planning
- National Trust for Scotland
- **Royal Yachting Association**
- Royal Society for the Protection of Birds
- Scottish Creel Fishermen's Federation
- ***Scottish Fishermen's Federation***
- Scottish Fishermen's Organisation
- **Scottish Water**
- Scottish White Fish Producers Association
- Scottish Wildlife Trust
- Transport Scotland
- Visit Scotland
- Whale And Dolphin Conservation
- Scottish Southern Electricity Networks – Transmission

4.1.2 Specific advice was sought from Marine Directorate Science, Evidence, Data and Digital ("MD-SEDD"), formerly known as 'Marine Scotland Science' until 26 July 2023, the Marine Directorate – Marine Analytical Unit ("MAU") and Transport Scotland ("TS").

4.2 Responses received

4.2.1 From the list above a total of 11 responses were received. Advice was also provided by MD-SEDD and MAU. The purpose of the consultation was to seek representations to aid the Scottish Ministers' consideration of which potential effects should be scoped in or out of the Supplementary EIA Report.

4.2.2 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 Supplementary EIA Report and any marine licence applications. The representations and advice received are attached in Appendix 2 and each must be read in full for detailed requirements from individual consultees.

5. Interests to be considered within the EIA Report

5.1 Introduction

5.1.1 This section contains the Scottish Ministers' opinion on whether the impacts identified in the Scoping Report are to be scoped in or out of the EIA Report. The Scottish Ministers advise that the representations from consultees and advice from MAU and MD-SEDD must be considered in conjunction with the Scoping Opinion and with the expectation that recommendations and advice as directed through this Scoping Opinion are implemented.

5.2 Coastal Processes

5.2.1 The Applicant has considered potential impacts on coastal processes in section 4.3 of the Scoping Report. Specifically, this includes consideration of potential effects on bathymetry, waves and tidal currents and sediment transport. Sediment transportation has been scoped in for further assessment in the Supplementary EIA Report due to potential short term increases in suspended sediment concentrations during dredging activity of the approach channel and berth pocket and potential changes in seabed level. Bathymetry has been scoped out as hydrodynamic modelling indicates that no further assessment is required. The increased maintenance dredging requirement during the operational phase is also considered however the Applicant concludes that no further assessment of this on coastal processes is required. Waves and tidal currents have been scoped out as the Applicant has assessed that the risk of adverse effects on the seabed and the coast is low.

5.2.2 The Scottish Ministers agree with the content and approach to the assessment of coastal processes proposed in the Scoping Report and advise that this must be included in the Supplementary EIA Report. This is supported by the MD-SEDD advice.

5.3 Marine sediment and water quality

5.3.1 The Applicant discusses marine sediment and water quality in section 4.4 of the Scoping Report. The Applicant proposes that the potential impact of contaminant release due to sediment disturbance during dredging and deposit activities is scoped into the EIA. In order to assess this potential impact, the Applicant proposes to conduct a sediment sampling campaign prior to commencing dredging. The Scottish Ministers advice that the results of this sampling must be presented within the Supplementary EIA Report along with an assessment of any predicted impacts.

5.3.2 The Scottish Ministers are in agreement with the Applicant that the topic of marine sediment and water quality in relation to potential release of contaminants is scoped in to the EIA for the Proposed Works

5.4 Ornithology

5.4.1 The Applicant proposes, in the consideration of potential ornithological impacts in section 4.5 of the Scoping Report, that further surveys are not required and the existing data may be used in the current setting. Potential impacts proposed to be scoped in for further assessment are visual disturbance to birds caused by the increase in vessel activity at the deposit site and changes in water quality and prey availability as a result of the sediment plume arising from dredging.

5.4.2 The Scottish Ministers note the previous concerns that were raised by NatureScot in relation to the impact of the Licensed Works, in particular the use of the Narrow Deep deposit site, on the conservation objectives of the Outer Firth of Forth and St Andrews Bay Complex Special Protection Area. The Scottish Ministers advise that consideration is given to this in relation to the Proposed Works and that this should be included within the Supplementary EIA Report.

5.4.3 Noise generated by piling works for the construction of the retaining wall are proposed to be scoped out as they will be of lower magnitude than previously assessed in the 2022 EIA Report and therefore will not cause any greater disturbance. Disturbance to waterbirds by dredging activity has also been scoped out because it will be within an already busy shipping area and so it is judged that the disturbance caused by increased activity will not have an impact on the birds in the area.

5.4.4 The Scottish Ministers are in agreement with the elements proposed by the Applicant to be scoped in for and out from further assessment in the Supplementary EIA report and that further surveys are not required.

5.5 Benthic ecology

5.5.1 The Applicant has considered the potential impacts on benthic ecology in section 4.6 of the Scoping Report. Direct loss of benthic habitat/communities within the proposed dredge footprint, the release of contaminants during dredging and deposit and smothering of benthic communities as a result of the deposition of suspended sediment during dredging and deposit have been scoped in for further assessment in the Supplementary EIA Report. Potential impacts during the operational phase of the Proposed Works have been scoped out from further assessment by the Applicant.

5.5.2 The Scottish Ministers agree with the content and approach to the assessment of benthic ecology proposed in the Scoping Report and advise that this must be included in the Supplementary EIA Report.

5.6 Fish and Shellfish Ecology

5.6.1 The Applicant has considered the potential impacts on fish and shellfish ecology in section 4.7 of the Scoping Report. Underwater noise during dredging activity, the potential for increased suspended sediment concentration during dredging and deposit and release of contaminants during dredging and deposit have been scoped in for further assessment in the Supplementary EIA Report. As the 2022 EIA Report assessed the potential effects on changes to habitat availability on fish and shellfish species as negligible no further assessment is deemed to be required. In addition, piling noise from the construction of the proposed retaining wall is predicted to be of a lower magnitude than previously assessed in the 2022 EIA Report and therefore the Scoping Report concludes that no further assessment is required.

5.6.2 The Scottish Ministers agree with the content and approach to the assessment of fish and shellfish ecology proposed in the Scoping Report and advise that this must be included in the Supplementary EIA Report.

5.7 Marine mammals

5.7.1 The Applicant has considered potential impacts on marine mammals in section 4.8 of the Scoping Report. The potential for auditory injury and/or behavioural impacts from underwater noise during dredging works has been scoped in for further assessment in the Supplementary EIA Report. In addition, changes in water quality and prey availability as a result of sediment plume from dredging is scoped in for further assessment. Considering the previous assessment and mitigation measures detailed in the 2022 EIA Report and noting that the piling for the Proposed Works will be temporary and of short duration, no further assessment of the potential impacts from piling on marine mammals is proposed.

5.7.2 The Scottish Ministers agree with the content and approach to the assessment of marine mammals proposed in the Scoping Report and advise that this must be included in the Supplementary EIA Report. The Scottish Ministers highlight that any mitigation measures that are relevant to the Proposed Works must be included in the Supplementary EIA Report.

5.8 Marine Archaeology and Cultural Heritage

5.8.1 The Scoping Report identifies that the Proposed Works may have an impact on marine archaeology and cultural heritage due to greater extent of the dredge

activities. The assessment of the potential impacts can be found in section 4.9 of the Scoping Report. It concludes that marine archaeology and cultural heritage can be scoped out of further assessment in the Supplementary EIA Report but that a geoarchaeological method statement and Protocol for Archaeological Discoveries ("PAD") will be produced.

5.8.2 In its representation, HES stated that it was content that the Proposed Works will not result in significant impacts on its interests and therefore marine archaeology and cultural interests could be scoped out of the Supplementary EIA Report. HES welcomed the proposed consultation with it regarding the geotechnical method statement and PAD should archaeological remains be identified during the dredging process.

5.8.3 The Scottish Ministers are in agreement with the Applicant and HES that this topic is scoped out of further assessment in the Supplementary EIA Report for the Proposed Works but that a geoarchaeological method statement and PAD should be submitted alongside the EIA.

5.9 Cumulative Impacts

5.9.1 In section 5 of the Scoping Report the Applicant details their approach to the consideration of potential cumulative impacts. The Scottish Ministers agree with the proposed approach and the list of projects to be included.

5.10 Topics Scoped Out of the Supplementary EIA Report

5.10.1 The Applicant proposed that a number of topics were scoped out of the Supplementary EIA Report on the basis that either there is no pathway for effect from the Proposed Works or that any impacts can be controlled by standard mitigation measures already in place for the Licensed Works. A list of these topics can be found in section 4.2 of the Scoping Report. No representations or advice was received to disagree with the conclusion of the Scoping Report. However, the Scottish Ministers direct that where relevant mitigation was identified in the 2022 EIA Report, this should be included in the Supplementary EIA Report.

6. Application and EIA Report

6.1 General

6.1.1 The EIA Report must be in accordance with the 2017 MW Regulations and the Scottish Ministers draw your attention in particular to, regulation 6. In accordance with the 2017 MW EIA Regulations, the Scottish Ministers advise that the EIA Report must be based on this Scoping Opinion.

6.1.2 The Scottish Ministers note the need to carry out an assessment under The Conservation (Natural Habitats, &c.) Regulations 1994. This assessment must be coordinated with the EIA in accordance with the 2017 MW Regulations.

6.1.3 A gap analysis template is attached at Appendix 3 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. As part of the submission of the EIA Report the Scottish Ministers advise that Applicant must provide confirmation of how this Scoping Opinion is reflected in the EIA Report.

7. Multi-Stage Regulatory Approval

7.1 Background

7.1.1 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 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.

7.1.2 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”.

7.1.3 A marine licence, if granted, by the Scottish Ministers for the Proposed Works, may have several conditions attached requiring approvals etc. which fall under this definition, for example the approval of a CMS. 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.

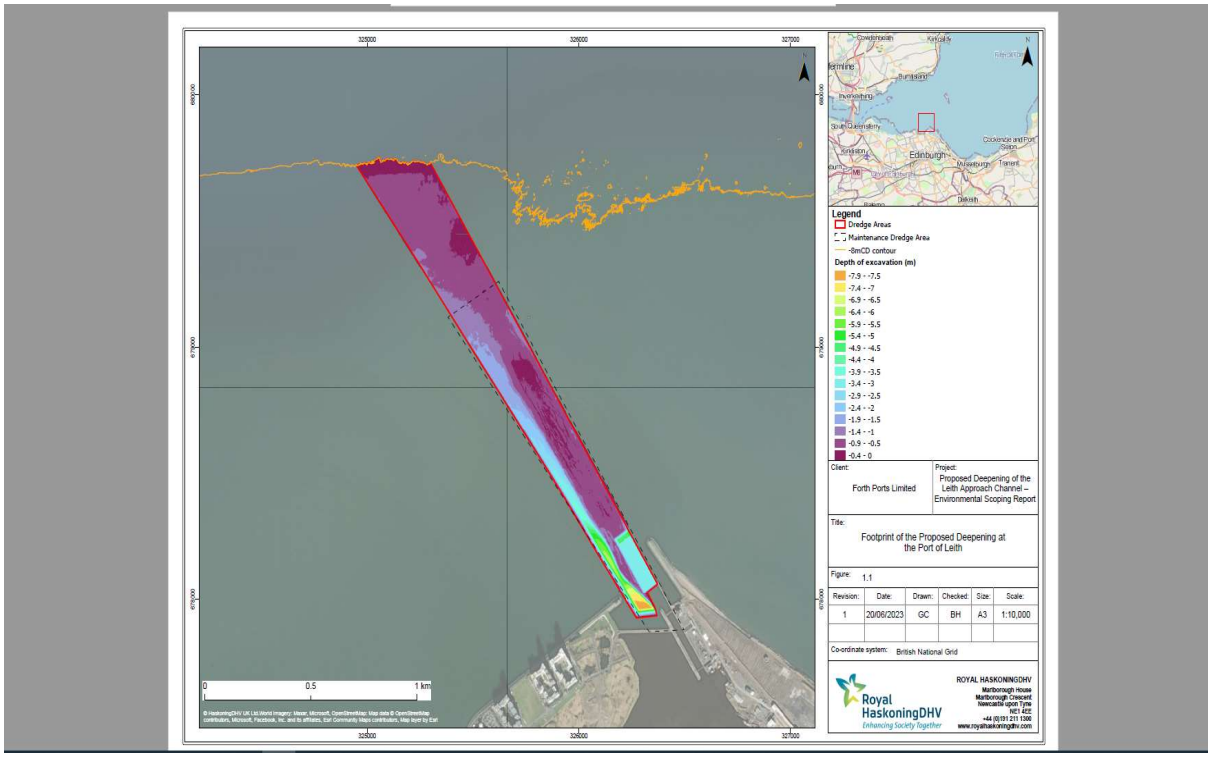
7.1.4 If during the consideration of information provided in support of an application for multi-stage regulatory approval the Scottish Ministers consider that the works may have significant environmental effects which have not previously been identified in the EIA Report (perhaps due to revised construction 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.

Signed

Anni Mäkelä
Marine Licensing Group Leader
29 September 2023

Authorised by the Scottish Ministers to sign in that behalf.

Appendix 1: Chart showing proposed capital dredging area


Legend
Dredge Areas
Maintenance Dredge Area
-5mCD contour
Depth of excavation (m)
-7.9 - -7.5
-7.4 - -7
-6.9 - -6.5
-6.4 - -6
-5.9 - -5.5
-5.4 - -5
-4.9 - -4.5
-4.4 - -4
-3.9 - -3.5
-3.4 - -3
-2.9 - -2.5
-2.4 - -2
-1.9 - -1.5
-1.4 - -1
-0.9 - -0.5
-0.4 - 0
Client:
Forth Ports Limited
Project:
Proposed Deepening of the Leith Approach Channel – Environmental Scoping Report
Title:
Footprint of the Proposed Deepening at the Port of Leith
Figure: 1.1
Revision: 1
Date: 20/06/2023
Drawn: GC
Checked: BH
Size: A3
Scale: 1:10,000
Co-ordinate system: British National Grid
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0.5
1 km

Appendix 2: Consultation Responses & Advice

Edinburgh City Council

From: Keith Miller [redacted]
Sent: 08 August 2023 08:37
To: MS Marine Licensing; Judith Horrill
Subject: FW: SCOP-0027- Forth Ports Ltd (per Royal Haskoning DHV) - Additional dredge and construction - Port of Leith, Outer Berth- Consultation on Request for Scoping Opinion – Response Required by 13 August 2023

Good morning Judith,
Thank you for consulting the Council with regard to the scoping report associated with the above proposal. The Council has considered the report, and supports the proposed approach. It has no other comments or suggestions.
Kind regards
Keith Miller

Keith Miller | Senior Planning Officer | Development Planning | Planning & Building Standards | Sustainable Devt | Place Directorate | The City of Edinburgh Council | Waverley Court, Level G3, 4 East Market Street, Edinburgh, EH8 8BG | [redacted] | www.edinburgh.gov.uk
You can access our services at www.edinburgh.gov.uk/planning-building and follow the Planning Edinburgh blog for updates on our service.

Marine Coastguard Agency

From: navigation safety <navigationsafety@mcga.gov.uk>
Sent: 15 August 2023 14:23
To: MS Marine Licensing
Subject: RE: SCOP-0027- Forth Ports Ltd (per Royal Haskoning DHV) - Additional dredge and construction - Port of Leith, Outer Berth- Consultation on Request for Scoping Opinion – Response Required by 13 August 2023

Objective: -1

Dear Judith

SCOPING OPINION FOR THE PROPOSED Additional dredge and construction - Port of Leith, Outer Berth.

Thank you for your email dated 14 July 2023 in which you invited our views on the Scoping Report for the additional dredge and construction at the Port of Leith outer berth. Apologies for our delay in replying due to staff overlap on annual leave. The scoping report has been examined by staff from Technical Services Navigation Branch and we would like to comment as follows:

It is our understanding is that the Scoping Report addresses the following proposed works under the project:

• the deepening of the approach channel to -8.0m CD;
• the deepening of the Outer Berth berth pocket to -12.0m CD;
• the disposal of dredge material at a suitable location; and
• the installation of a retaining wall at the toe of the Eastern Breakwater.

We note that the works are taking place within a Statutory Harbour Authority - the Port of Leith and therefore they are responsible for the safety of shipping and navigation during the construction work and during the operational phase of the berth. The MCA would expect to see the works carried out in accordance with the Port Marine Safety Code and its' Guide to Good practice. The port's Marine Safety Management System should be updated to incorporate the additional works.

We would expect that UKHO be informed about any changes to the seabed in order to update their charts and we recommend this is in accordance with the Harbour Master's Guide to Hydrographic and Maritime Information Exchange.

We note that the impact on shipping and navigation has been scoped out of this report, on the basis that "*the Proposed Scheme only differs from the Outer Berth development by way of the increased dredge footprint / volume and the (limited) additional piling associated with installation of the retaining wall. Therefore there is no pathway for effect with the Proposed Scheme; and / or ii) any impacts could be controlled by standard measures already implemented for the Outer Berth development".*

The MCA would expect any works below the MHWL to be subject to appropriate marine licensing conditions under the Marine Scotland Act 2010 and / or Marine and Coastal Access Act 2009. This should include consideration of the impact of works on other marine users. We are likely to be content that any navigational safety concerns can be addressed by suitably worded conditions in any consent at the formal application stage on this occasion.

Kind regards
Navigation Safety Branch

Helen Duncan

Marine Licensing Project Lead
Marine Licensing and Consenting
UK Technical Services Navigation navigationsafety@mcga.gov.uk

Maritime & Coastguard Agency

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Email: enquiries@nlb.org.uk

Your Ref: SCOP-0027
Our Ref: GB/ML/F1_01_230

Judith Horrill
Marine Licensing Casework Officer
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20 July 2023

THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 ("THE MW EIA REGULATIONS") - CONSULTATION UNDER PART 4, REGULATION 14(4) OF THE MW EIA REGULATIONS

SCOP-0027- Forth Ports Ltd (per Royal Haskoning DHV) - Additional dredge and construction - Port of Leith, Outer Berth

Thank you for your e-mail correspondence dated 14th July 2023 relating to the EIA Scoping opinion submitted by **Forth Ports Ltd (per Royal Haskoning DHV)** for their proposals for additional dredge and construction at Port of Leith, Outer Berth.

Northern Lighthouse Board are content with the proposed EIA study and will respond in full to the Marine Licence application or variation.

Yours sincerely

[redacted]

Peter Douglas
Navigation Manager

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

Judith Horrill
Marine Licensing Officer
Marine Scotland
MS.MarineLicensing@gov.scot

14 August 2023

Our ref: CEA171787/A4165451

Dear Judith

THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 ("the MW EIA Regulations")

CONSULTATION UNDER PART 4, REGULATION 14(4) OF THE MW EIA REGULATIONS

SCOP-0027- FORTH PORTS LTD (PER ROYAL HASKONING DHV) - ADDITIONAL DREDGE AND CONSTRUCTION - PORT OF LEITH, OUTER BERTH

Thank you for your EIA scoping consultation of 14 July 2023 regarding additional dredge and construction in relation to the Outer Berth development at the Port of Leith.

As we understand, this consists of deepening the approach channel and outer berth pocket, disposal of the dredged material, and construction of a retaining wall at the end of the Eastern Breakwater.

Advice

The scoping report is comprehensive and clear with regards the topics and potential issues to be scoped in or scoped out, and with what further assessments are to be carried out. Having reviewed the information we are content with the topics scoped into the EIA and the approach to assessments, which largely follow those carried out for the Outer Berth project EIA.

It's noted that some of the topics scoped out of the EIA are because modelling or assessments have already been completed and potential impacts concluded as non-significant, or because assessments undertaken/mitigation applied in the original EIA are still relevant. It will be useful to summarise or refer to this information within the EIA document also, to keep all the information together for ease of reference.

We note that the HRA will be updated alongside the EIA and the results replicated within the EIA and we are content with this.

Should you wish to discuss these comments further then please do not hesitate to contact me at my e-mail address.

Yours sincerely,

Carolyn Clark

Operations Officer - South

[redacted]

Scottish Environment Protection Agency

From: Planning South <Planning.South@sepa.org.uk>
Sent: 17 July 2023 14:16
To: MS Marine Licensing
Cc: Judith Horrill
Subject: SEPA Ref: 9827 - SCOP/0027

OFFICIAL

Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017
SCOP/0027
Additional dredge and construction
Port of Leith, Outer Berth

Dear Judith

Thank you for the above consultation. Based on the information provided, it appears that this application falls below the thresholds for which SEPA provide site specific advice. Please refer to our standing advice and other guidance which is available on our website at www.sepa.org.uk/environment/land/planning.

Section 3 of our Standing Advice on Marine Consultations is advice for Marine Scotland. The advice provided applies to all development where applicable. The onus is on you (Marine Scotland), to assess the scope of the proposed marine works and to determine which sections are applicable.

If there is a significant site-specific issue, not addressed by our guidance or other information provided on our website, with which you would want our advice, then please reconsult us highlighting the issue in question and we will try our best to assist.

I trust these comments are of assistance - please do not hesitate to contact me if you require any further information.

Kind regards,
Jonathan Werritty
Senior Planning Officer

OFFICIAL

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

By email to:
MS.MarineLicensing@gov.scot

Marine Scotland
Marine Laboratory
375 Victoria Road
Aberdeen
AB11 9DB

Longmore House
Salisbury Place
Edinburgh
EH9 1SH

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

Our case ID: 300051634
Your ref: SCOP-0027
10 August 2023

Dear Marine Scotland

The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017
Forth Ports Ltd (per Royal Haskoning DHV) - Additional dredge and construction
Port of Leith, Outer Berth - Scoping Report

Thank you for your consultation which we received on 14 July 2023 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).

Proposed Development

We understand that the proposed amendment to the Outer Berth development comprises the increase of the depth and offshore extent of the approach channel to the port. Much of the proposed works lie within an area subject to periodic maintenance dredging and impacts on marine archaeology and cultural heritage were Scoped out of the Outer Berth EIA.

Scope of assessment

We are content that the proposed development would not result in significant impacts on our interests. We are therefore content for Marine Archaeology and Cultural Heritage to be scoped out of the EIA for the proposals. We welcome that HES will be consulted on the geotechnical method statement and Protocol for Archaeological Discoveries would be produced should archaeological remains be identified during the dredging process.

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 https://conservation.historic-scotland.gov.uk/.

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

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 6890 or by email on [redacted]

Yours faithfully

Historic Environment Scotland

Sunday, 23 July 2023

Marine Licensing
375 Victoria Road

Aberdeen

Development Operations
The Bridge
Buchanan Gate Business Park
Cumbernauld Road
Stepps
Glasgow
G33 6FB

Development Operations
Freephone Number - 0800 3890379
E-Mail - DevelopmentOperations@scottishwater.co.uk
www.scottishwater.co.uk
Follow Us

Dear Customer,

Port of Leith - Scoping Report, Leith, EH6 6PG
Our Ref: DSCAS-0091014-NL6
Proposal: Proposed Deepening of the Leith Approach Channel

Please quote our reference in all future correspondence

Audit of Proposal

Scottish Water has no objection to this planning application; however, the applicant should be aware that this does not confirm that the proposed development can currently be serviced. Please read the following carefully as there may be further action required. Scottish Water would advise the following:

Drinking Water Protected Areas

A review of our records indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed activity.

Surface Water

For reasons of sustainability and to protect our customers from potential future sewer flooding, Scottish Water will not accept any surface water connections into our combined sewer system.

There may be limited exceptional circumstances where we would allow such a connection for brownfield sites only, however this will require significant justification from the customer taking account of various factors including legal, physical, and technical challenges.

In order to avoid costs and delays where a surface water discharge to our combined sewer system is anticipated, the developer should contact Scottish Water at the earliest opportunity

with strong evidence to support the intended drainage plan prior to making a connection request. We will assess this evidence in a robust manner and provide a decision that reflects the best option from environmental and customer perspectives.

General notes:

- Scottish Water asset plans can be obtained from our appointed asset plan providers:
    - Site Investigation Services (UK) Ltd
    - Tel: 0333 123 1223
    - Email: sw@sisplan.co.uk
    - www.sisplan.co.uk

I trust the above is acceptable however if you require any further information regarding this matter please contact me on **0800 389 0379** or via the e-mail address below or at planningconsultations@scottishwater.co.uk.

Yours sincerely,

Angela Allison
Development Services Analyst
PlanningConsultations@scottishwater.co.uk

Scottish Water Disclaimer:

"It is important to note that the information on any such plan provided on Scottish Water's infrastructure, is for indicative purposes only and its accuracy cannot be relied upon. When the exact location and the nature of the infrastructure on the plan is a material requirement then you should undertake an appropriate site investigation to confirm its actual position in the ground and to determine if it is suitable for its intended purpose. By using the plan you agree that Scottish Water will not be liable for any loss, damage or costs caused by relying upon it or from carrying out any such site investigation."

Ministry of Defence

From: DIO-Safeguarding-Offshore (MULTIUSER) <DIO-Safeguarding-Offshore@mod.gov.uk>
Sent: 21 August 2023 14:55
To: MS Marine Licensing
Subject: 20230821 SCOP-0027 Port of Leith Approach Channel Deepening, Forth Ports Ltd (Royal Haskoning DHV) DIO10059336

Objective: -1

Good afternoon Judith

Thank you for your email below with regards to the intention to undertake additional dredge and construction works at the Port of Leith, Outer Berth.

Following a review of your notification, I can confirm that the MOD Safeguarding have no objections to this activity however, we request that the Developer notifies our team at DIO-Safeguarding-Offshore@mod.gov.uk once all work is complete.

Kind regards

[redacted]

Anne McGarva| Assistant Safeguarding Officer
Defence Infrastructure Organisation
Estates | Safeguarding
DIO Head Office | St George's House | DMS Whittington | Lichfield |Staffordshire |WS14 9PY
Skype: +44 (0)3001623630 | [redacted] | [redacted]

Mental Health First Aider® MHFA England

Please consider the environment before printing this e-mail

North and East Coast Regional Inshore Fisheries Group

From: Jennifer Mouat [redacted]
Sent: 11 August 2023 16:49
To: MS Marine Licensing
Subject: Re: SCOP-0027- Forth Ports Ltd (per Royal Haskoning DHV) - Additional dredge and construction - Port of Leith, Outer Berth- Consultation on Request for Scoping Opinion – Response Required by 13 August 2023

Good afternoon

The NECRIFG have no comments to make on this application.

Kindest

Jennifer

Sent from my iPhone

> On 11 Aug 2023, at 13:12, MS.MarineLicensing@gov.scot wrote:

Scottish Fishermen's Federation

From: Elspeth Macdonald [redacted]
Sent: 15 August 2023 18:30
To: MS Marine Licensing; Judith Horrill
Subject: FW: SCOP-0027- Forth Ports Ltd (per Royal Haskoning DHV) - Additional dredge and construction - Port of Leith, Outer Berth- Consultation on Request for Scoping Opinion - Response Required by 13 August 2023

Objective: -1

Dear Judith

With apologies for the late response, SFF submits a nil response on this occasion.

Kind regards

Elspeth

Elspeth Macdonald
Chief Executive

Scottish Fishermen's Federation
24 Rubislaw Terrace | Aberdeen | AB10 1XE
T: +44 (0) 1224 646944 | M: [redacted]
E: [redacted] | sff.co.uk
Follow us: Facebook | Twitter

Royal Yachting Association

From: Pauline McGrow [redacted]
Sent: 08 August 2023 09:57
To: MS Marine Licensing
Subject: RE: SCOP-0027- Forth Ports Ltd (per Royal Haskoning DHV) - Additional dredge and construction - Port of Leith, Outer Berth- Consultation on Request for Scoping Opinion – Response Required by 13 August 2023

Hi Judith,

I write to inform you that RYA Scotland agrees that tourism and recreation should be scoped out of the EIA.

Kind Regards

Pauline

Pauline McGrow
Senior Administrator
Mob: [redacted]

Royal Yachting Association Scotland
T: 0131 317 7388
E: [redacted]

T: +44 (0)131 244 2500
E: MSS_Advice@gov.scot

Judith Horrill
Marine Directorate Licensing Operations Team
Marine Laboratory
375 Victoria Road
Aberdeen
AB11 9DB

15 August 2023

LEITH APPROACH CHANEL DEEPENING – SCOPING REPORT

Marine Directorate advisers have reviewed the request from MD-LOT and provide the following advice.

Commercial fisheries

MD-SEDD are content that commercial fisheries can be scoped out of the EIA.

Physical environment / coastal processes

MD-SEDD are content that some components of coastal processes will be scoped into the EIA (as described in section 4.3.2) and others will be scoped out (as described in section 4.3.3). MD-SEDD agree with the proposed approach of the assessment (as described in section 4.3.4).

Yours sincerely,

Science, Evidence, Data and Digital (SEDD) advisers

Marine Directorate

Marine Laboratory, 375 Victoria Road,
Aberdeen AB11 9DB
www.gov.scot/marinescotland

Marine Analytical Unit

From: Inga Freimane
Sent: 11 August 2023 14:03
To: Judith Horrill
Cc: Amy McQueen; Kathleen Allen; Kay Barclay; William Ellison; Reme Diaz
Subject: RE: Request for MAU advice on scoping

Dear Judith,

Apologies for not replying earlier.

The report suggests to scope out socio-economics. The MAU agrees with this assessment.

Kind regards,
Inga

Appendix 3: Gap Analysis

Applicant to complete:

Consultee	No.	Point for Inclusion	EIA Report Section	Justification
	1			
	2			
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	24			

Appendix 5-1 Geophysical survey

Aspect
Land+Hydrographic Surveys
CHARTERED SURVEYORS

TEL: 01294 313 399 • WEB: WWW.ASPECTSURVEYS.COM

MULTIBEAM BATHYMETRIC, SIDE-SCAN SONAR, MAGNETOMETER & GEOPHYSICAL SURVEY

LEITH DOCK APPROACHES, FIRTH OF FORTH

JULY 2023

PROJECT REF: A8764

REV: 00

Client:
Forth Ports Ltd
Rosyth Port Office
Terminal Building
Rosyth
Fife
KY11 2XP

FORTH PORTS

ices Approved Development Partner

Achilles UVDB SILVER PLUS

QAS International ISO 14001:2015 REGISTERED COMPANY

QAS International ISO 45001:2018 REGISTERED COMPANY

QAS International ISO 9001:2015 REGISTERED COMPANY

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DOCUMENT ISSUE RECORD

DATE	REVISON	COMPILED	CHECKED	NOTES
21/08/2023	00	OM	CKS	FIRST ISSUE

This document has been prepared for the Client named on the front cover. Aspect Land & Hydrographic Surveys Ltd (ALHS) accept no liability or responsibility for any use that is made of this document other than by the Client for the purpose of the original commission for which it has been prepared.

1. SUMMARY

On the instruction of Forth Ports Ltd, Aspect Land & Hydrographic Surveys Ltd (herein ALHS) were commissioned to undertake a multibeam bathymetric, side-scan sonar, magnetometer and geophysical survey at Leith Dock Approaches, Firth of Forth.

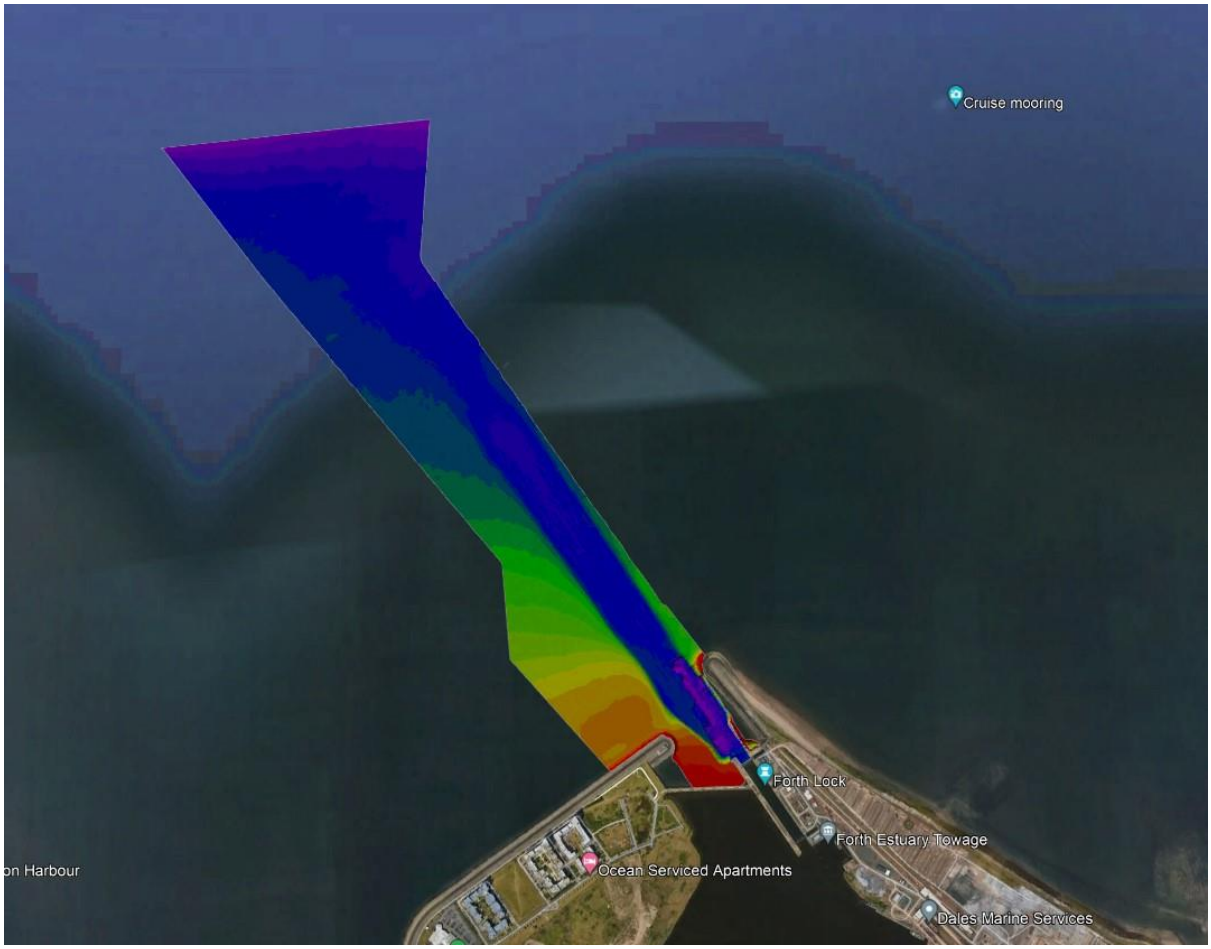


FIGURE 1 - SURVEY LOCATION: LEITH DOCK APPROACHES [GOOGLE EARTH IMAGE]

2. DELIVERABLES REGISTER

A list of the rendered deliverables is provided in the table below:

File Name	Contents
A8764_Leith Dock Approaches_MBES_CD_20230720.dwg A8764_Leith Dock Approaches_MBES_CD_20230720.pdf	2D CAD drawing of bathymetric survey data to CD also issued as a PDF for ease of viewing
A8764_Leith Dock Approaches_MBES_Image_AVG_20230720_Rv1.tif A8764_Leith Dock Approaches_MBES_Image_AVG_20230720_Rv1.tfw	Imagery from MBES
A8764_Leith Dock Approaches_MBES_Image_AVG_20230720_Rv1.kmz	Google Earth view of survey
A8764_Leith Dock Approaches_MBES_0-5m_MIN_CD_Rv1.xyz A8764_Leith Dock Approaches_MBES_0-5m_AVG_CD_Rv1.xyz	ASCII xyz of detailed areas at 0.1/0.5 grid

A8764_Leith Dock Approaches_MBES_0-1m_CD_Rv1.xyz	
A8764_Leith Dock Approaches_Backscatter_Image.tiff	Backscatter Image
A8764_Leith Dock Approaches_MBES_Targets	Target list of MBES and Image
A8764_Leith Dock Approaches_SSS_CD_20230720.dwg A8764_Leith Dock Approaches_SSS_CD_20230720.pdf	2D CAD drawing of SSS survey also issued as a PDF for ease of viewing
A8764_Leith Dock Approaches_SSS_withoutTargets_20230720.tif A8764_Leith Dock Approaches_SSS_withoutTargets_20230720.tfw A8764_Leith Dock Approaches_SSS_withTargets_20230720.tif A8764_Leith Dock Approaches_SSS_withTargets_20230720.tfw	Imagery from SSS
A8764_Leith Dock Approaches_SSS_Targets_20230720.xlsx	Target list of SSS
A8764_Leith Dock Approaches_MAG_20230720.dwg A8764_Leith Dock Approaches_MAG_20230720.pdf	2D CAD drawing of MAG survey also issued as a PDF for ease of viewing
A8764_Leith Dock Approaches_MAG_Gamma_20230720.tif A8764_Leith Dock Approaches_MAG_Gamma_20230720.tfw A8764_Leith Dock Approaches_MAG_Gratio_20230720.tif A8764_Leith Dock Approaches_MAG_Gratio_20230720.tfw	Imagery from MAG, Gamma and Gratio
A8764_Leith Dock Approaches_MAG_Gamma_20230720.xyz A8764_Leith Dock Approaches_MAG_Gratio_20230720.xyz	ASCII xyz of Gamma and Gratio
A8764_Leith Dock Approaches_MAG_Gamma_Targets.xlsx A8764_Leith Dock Approaches_MAG_Gratio_Targets.xlsx	Target list of MAG, Gamma and Gratio with Image
A8764_Leith Dock Approaches_SBP_HORIZONS_CD_20230720.dwg A8764_Leith Dock Approaches_SBP_HORIZONS_CD_20230720.pdf	2D CAD drawing of SBP data to CD. Also rendered as a PDF for ease of viewing on non-CAD systems
A8764_Leith Dock Approaches_SBP_THICKNESS_20230720.dwg A8764_Leith Dock Approaches_SBP_THICKNESS_20230720.pdf	2D CAD drawing of SBP data to a thickness. Also rendered as a PDF for ease of viewing on non-CAD systems
A8764_Leith Dock Approaches_SBP_HORIZONS_SBP_CD_H1_20230720.xyz A8764_Leith Dock Approaches_SBP_CD_H2_20230720.xyz	ASCII xyz of digitised SBP Horizon (Chart Datum)
A8764_Leith Dock Approaches_SBP_THICKNESS_H1_20230720.xyz A8764_Leith Dock Approaches_SBP_THICKNESS_H2_20230720.xyz	ASCII xyz thickness of digitised SBP Horizon
Files in folder “SBP images\No Digitisation”	JPG images of undigitized SBP
Files in folder “SBP images\Digitisation”	JPG Images of individual survey lines including digitised horizons
WEB Folder: index.htm	Web presentation of the SBP data (launch by double clicking index.htm within this folder)
A8764_Leith Dock Approaches_Report of Survey.pdf	pdf Report of Survey

3. SCOPE OF WORKS

The multibeam bathymetry will provide, where practically possible, full coverage of the seabed although total ensonification is only achievable where water depths permit. Backscatter was also acquired with the aim to highlighting changes in seabed morphology.

Acoustic imagery was derived from an Edgetech 4125 dual frequency side-scan sonar system.

A single Geometrics G-882 magnetometer was used to detect the presence of any ferrous objects, although information will not be used as part of any pUXO assessment.

A geophysical survey was completed by means of seismic reflection techniques and was required to determine sub-seabed geological strata. The outputs seek to determine the depths to all significant seismic reflectors, particularly those that can be correlated to changes in geological strata but will not quantify any strata [i.e., till, gravel, sand, mud, etc.].

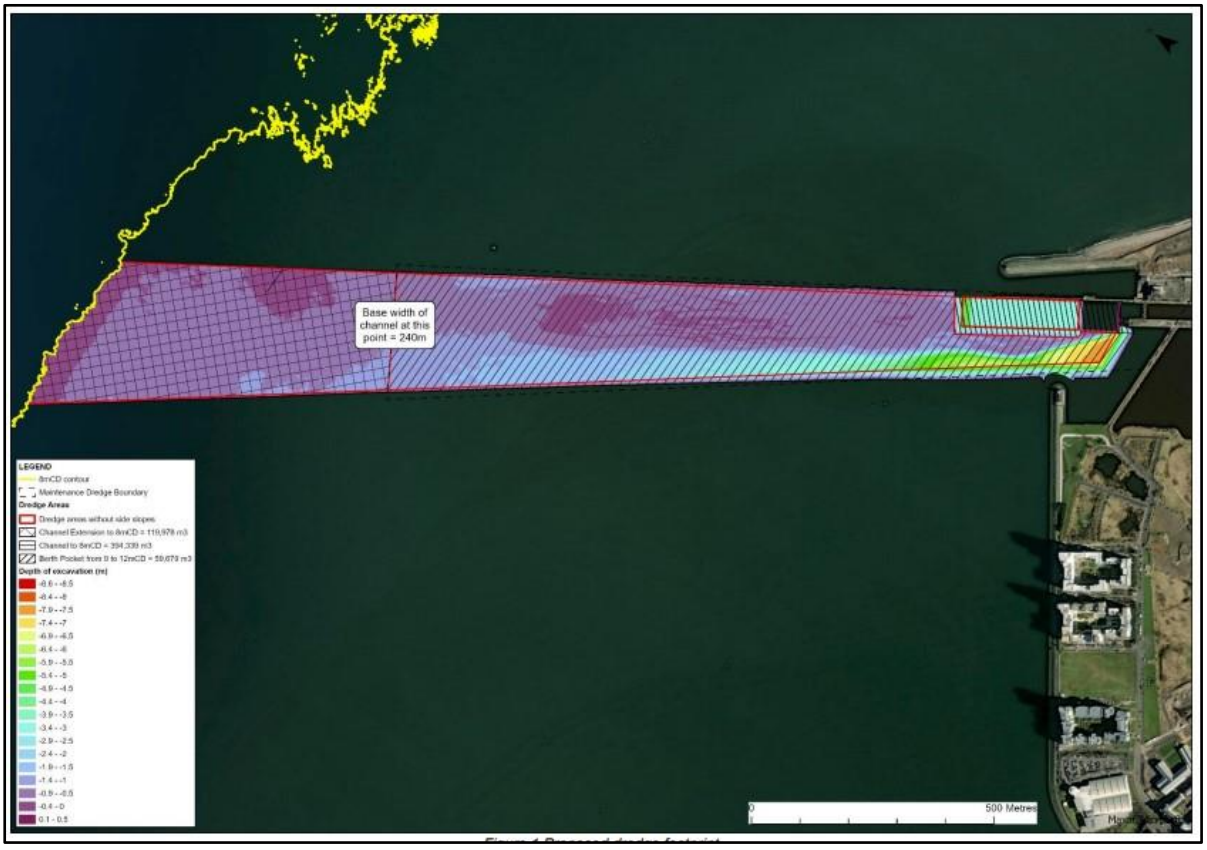


FIGURE 2 - SURVEY EXTENTS

4. GEODESY AND DATUM

The horizontal datum used throughout the data gathering phase of the survey was OSGB36 (OSTN15). Data has been rendered in OSGB36 Datum, British National Grid.

The vertical datum for all data issued is Chart Datum. OSTN15 defines OSGB36 National Grid in conjunction with the National GPS Network.

In this respect OSTN15 can be considered error free (not including any GPS positional errors). The agreement between OSTN15 and the old triangulation network stations (down to 3rd order) is 0.1m rms.

Chart Datum is 2.90m below Ordnance Datum at Leith.

5. MULTIBEAM BATHYMETRY

Multibeam bathymetry was conducted within the Leith Dock Approaches to provide full coverage of the area and identify any surface objects. The equipment used in the completion of the multibeam bathymetric survey can be seen in the table below:

Survey Vessel	Coastal Sensor II
Positioning System	Trimble Applanix POS MV
GPS Correction Source	Trimble VRS NOW Network RTK
Echosounder	R2Sonic 2022 Multibeam System 400kHz
Motion Compensator	Trimble Applanix POS MV

ALHS' R2Sonic 2022 multibeam sonar system was used for the bathymetric survey. This was controlled using Sonic Control software during data gathering.

Detailed data with full seabed coverage was gathered throughout the survey area because of the R2Sonic 2022's narrow beam width and high ping rate and the selection of 400kHz as an operating frequency.

The system was operated at the maximum ping rate achievable throughout the survey, such that the ping rate was controlled by the depth of water.

Sound Velocity (SV) dips were carried out prior to commencing survey operations and thereafter whenever the surface sound velocity varied by more than 2 ms^{-1}. The SV dips were carried out using a Valeport Swift dipping probe with Datalog Express software, and the data was incorporated into the Hysweep Survey software for real-time corrections.

Positioning was achieved using an Applanix POS MV Inertial system, providing horizontal and vertical positioning. Motion compensation for the system was provided by an Applanix POS MV motion sensor mounted directly at the sonar head.

An R2Sonic Sonar Interface Module (SIM) was used to control the sonar throughout the course of data gathering. The multibeam data was transmitted to the survey laptop running Hypack Hysweep over an Ethernet connection. Hypack Hysweep Survey was used for data gathering. Hypack MBMax software was used for post-processing. The stages of multibeam processing are detailed in Annex B.

Data was gathered to give at least 100% ensonification over the survey area, and this allowed full quality assurance checks to be carried out.

Calibration values for the survey vessel were calculated from a patch test conducted on the day of data collection. Details of the conduct of the patch test can be seen in Annex C.

The depths encountered when surveying the Leith Dock Approaches area ranged from 3.0m above to 9.5m below CD.

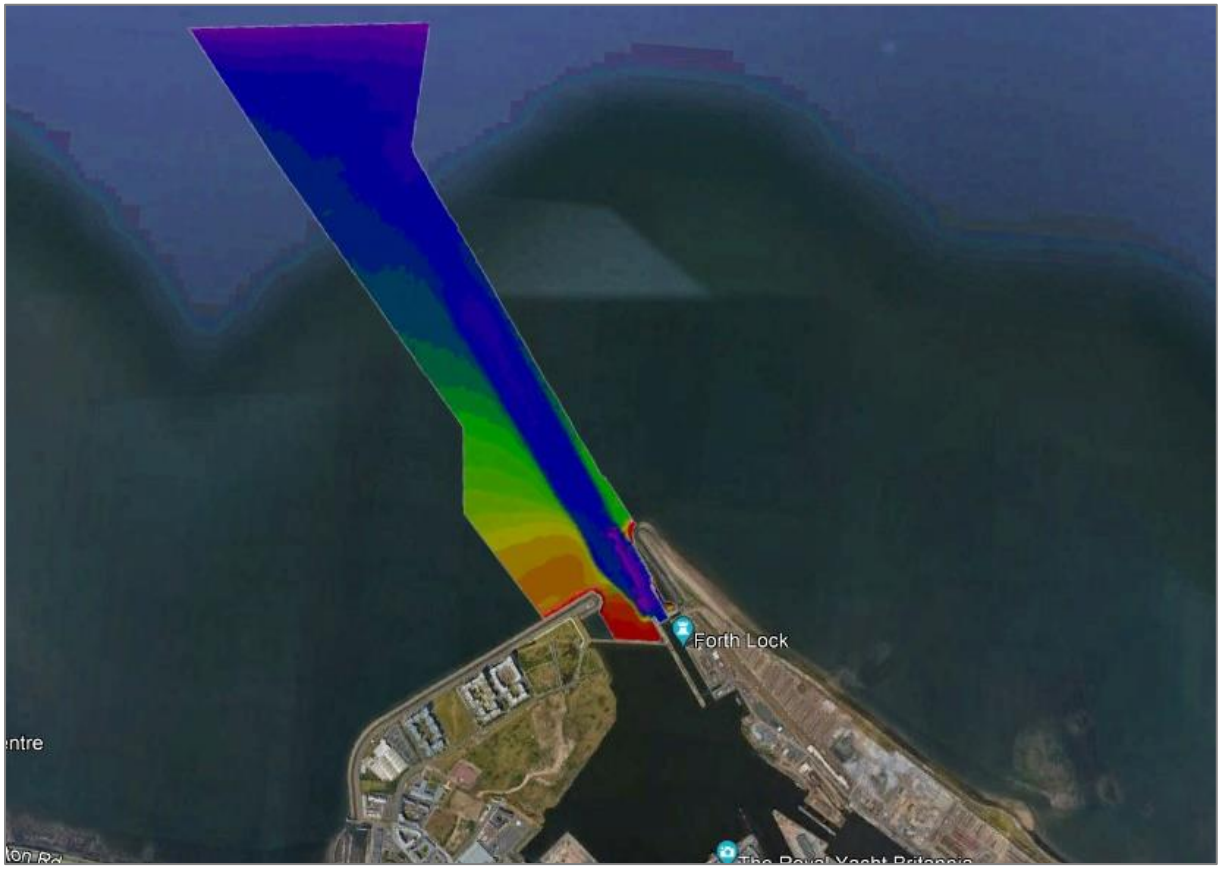


FIGURE 3 - MULTIBEAM SURVEY EXTENTS: LEITH DOCK APPROACHES]

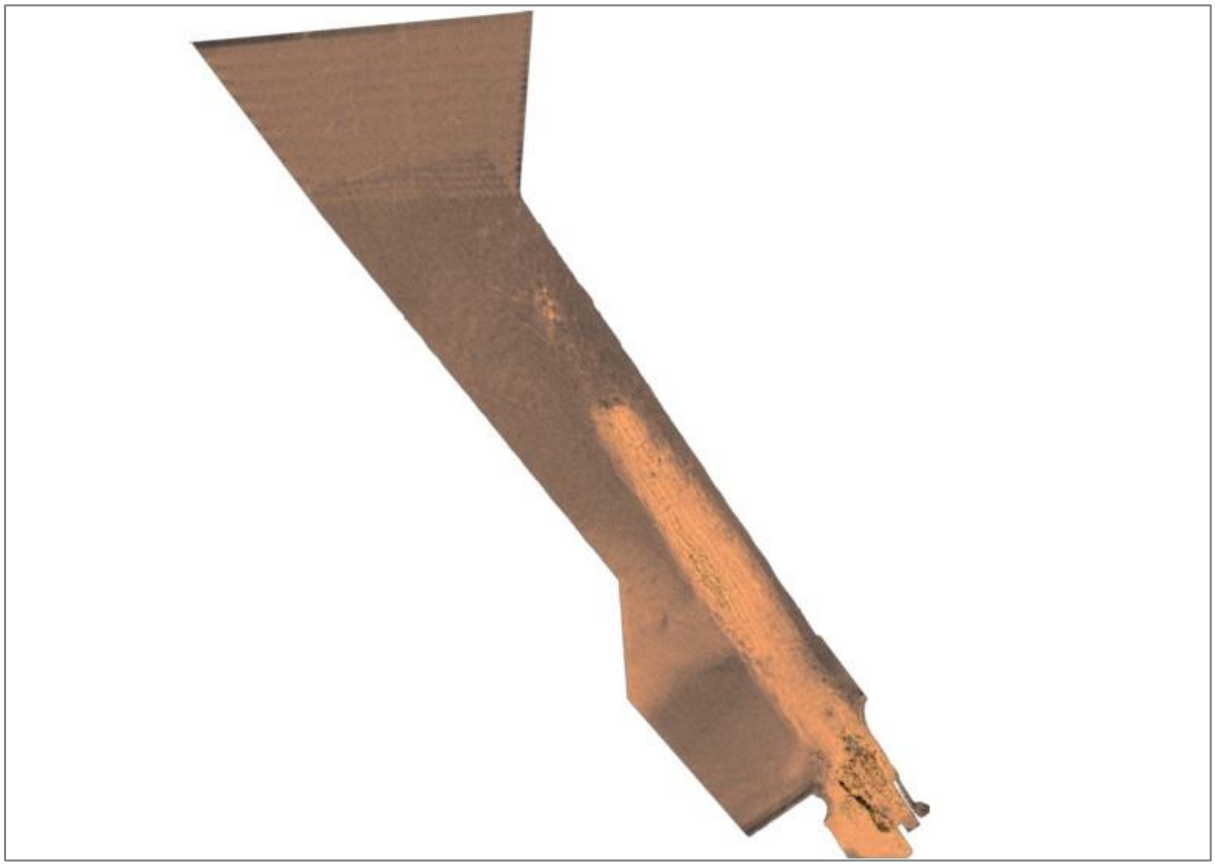


FIGURE 4 - OVERVIEW OF BACKSCATTER DATA

118 objects were seen in the MBES data at Leith Dock Approaches, which are detailed in the table below:

Name	WGS84 Latitude	WGS84 Longitude	X	Y	Depth	Dimensions (LxBxH (m)) and Description
Object 1	55 59.36694 N	003 11.048567 W	326225.8	678020.5	0.72	1.33 x 1.09 x 0.40 - Boulder
Object 2	55 59.380063 N	003 10.902028 W	326378.6	678042.2	7.54	0.81 x 0.74 x 0.44 - Unknown linear object
Object 3	55 59.406395 N	003 10.940129 W	326339.8	678091.7	7.99	0.23 x 0.31 x 0.52 - Linear Object
Object 4	55 59.47912 N	003 11.05846 W	326219.1	678228.7	6.6	2.59 x 1.38 x 0.47 - Linear Object
Object 5	55 59.476479 N	003 11.056099 W	326221.5	678223.8	6.41	0.98 x 1.53 x 0.72 - boulder
Object 6	55 59.472409 N	003 11.010087 W	326269.2	678215.4	6.66	0.82 x 0.47 x 0.29 - Boulder
Object 7	55 59.473434 N	003 11.009445 W	326269.9	678217.3	6.44	0.58 x 1.23 x 0.39 - Boulder
Object 8	55 59.473608 N	003 10.993051 W	326286.9	678217.3	2.13	0.79 x 0.32 x 0.31 - Boulder
Object 9	55 59.473328 N	003 10.991321 W	326288.7	678216.8	1.62	0.70 x 0.84 x 0.27 - Rectangular object, anchor block?
Object 10	55 59.495151 N	003 11.016659 W	326263.1	678257.7	4.42	0.41 x 0.18 x 0.13 - Boulder
Object 11	55 59.489611 N	003 11.013027 W	326266.7	678247.4	4.29	1.12 x 1.03 x 0.42 - Boulder
Object 12	55 59.491231 N	003 11.020088 W	326259.4	678250.5	4.57	0.96 x 0.55 x 0.46 - Boulder
Object 13	55 59.492441 N	003 11.009237 W	326270.7	678252.5	4.17	1.36 x 1.28 x 0.40 - Tire
Object 14	55 59.504277 N	003 10.992671 W	326288.3	678274.2	3.82	0.49 x 0.39 x 0.19 - Boulder
Object 15	55 59.498201 N	003 11.02688 W	326252.6	678263.5	4.38	0.74 x 0.38 x 0.18 - Boulder
Object 16	55 59.498932 N	003 11.026065 W	326253.4	678264.9	4.42	0.40 x 0.16 x 0.17 - Boulder
Object 17	55 59.497038 N	003 11.023362 W	326256.2	678261.3	4.29	0.37 x 0.44 x 0.29 - Boulder

Object 18	55 59.498644 N	003 11.022334 W	326257.3	678264.3	4.23	0.83 x 0.87 x 0.34 - Boulder
Object 19	55 59.498727 N	003 11.021048 W	326258.6	678264.4	4.42	0.41 x 0.30 x 0.12 - Boulder
Object 20	55 59.499156 N	003 11.018464 W	326261.3	678265.2	4.38	1.16 x 0.70 x 0.24 - Large Boulder
Object 21	55 59.500992 N	003 11.016981 W	326262.9	678268.5	4.47	0.68 x 0.69 x 0.16 - boulder
Object 22	55 59.502926 N	003 11.014934 W	326265.1	678272.1	4.47	0.79 x 0.98 x 0.14 - Tire
Object 23	55 59.501199 N	003 11.012332 W	326267.8	678268.8	4.43	0.53 x 0.44 x 0.17 - Boulder
Object 24	55 59.496646 N	003 11.009798 W	326270.3	678260.3	3.9	1.57 x 1.08 x 0.45 - Boulder
Object 25	55 59.50601 N	003 11.040661 W	326238.5	678278.3	4.56	0.91 x 0.92 x 0.17 - tire
Object 26	55 59.506965 N	003 11.021569 W	326258.4	678279.7	4.4	0.92 x 0.89 x 0.16 - tire
Object 27	55 59.512199 N	003 11.020479 W	326259.7	678289.4	4.27	1.21 x 1.08 x 0.18 - Tire
Object 28	55 59.508046 N	003 11.017293 W	326262.8	678281.6	4.17	0.81 x 0.55 x 0.32 - Boulder
Object 29	55 59.510787 N	003 11.015451 W	326264.8	678286.7	4.47	0.76 x 0.48 x 0.11 - Boulder
Object 30	55 59.511284 N	003 11.013631 W	326266.7	678287.6	4.46	0.57 x 0.29 x 0.18 - Boulder
Object 31	55 59.511123 N	003 11.012953 W	326267.4	678287.3	4.43	0.52 x 0.29 x 0.16 - Boulder
Object 32	55 59.510244 N	003 11.011387 W	326269	678285.6	4.34	0.52 x 0.45 x 0.16 - boulder
Object 33	55 59.50883 N	003 11.010402 W	326270	678283	4.28	0.72 x 0.49 x 0.37 - Boulder
Object 34	55 59.514295 N	003 11.031835 W	326247.9	678293.5	4.35	0.96 x 1.08 x 0.20 - Tire
Object 35	55 59.511917 N	003 11.026356 W	326253.5	678289	4.41	0.86 x 0.85 x 0.13 - tire
Object 36	55 59.521369 N	003 11.035744 W	326244.1	678306.7	4.31	1.01 x 1.12 x 0.16 - Tire
Object 37	55 59.518731 N	003 11.042118 W	326237.4	678301.9	4.56	0.96 x 0.86 x 0.17 - tire
Object 38	55 59.51436 N	003 11.052054 W	326226.9	678294	5.16	1.33 x 0.80 x 0.23 - Rectangular object
Object 39	55 59.529387 N	003 11.060237 W	326218.9	678322	4.77	0.71 x 0.58 x 0.29 - Boulder
Object 40	55 59.529629 N	003 11.062686 W	326216.3	678322.5	4.82	0.85 x 0.29 x 0.25 - Linear Object
Object 41	55 59.534212 N	003 11.064251 W	326214.8	678331	4.81	0.80 x 0.70 - 0.13 - Boulder
Object 42	55 59.513975 N	003 11.177234 W	326096.7	678295.5	6.67	1.95 x 0.86 x 0.16 - Rectangular object
Object 43	55 59.532644 N	003 11.095011 W	326182.8	678328.6	6.83	1.05 x 0.68 x 0.39 - Anchor Block
Object 44	55 59.579622 N	003 11.116378 W	326162.1	678416.2	4.59	0.80 x 0.36 x 0.21 - Boulder
Object 45	55 59.566751 N	003 11.092525 W	326186.5	678391.9	4.3	1.29 x 0.52 x 0.11 - Rectangular Object
Object 46	55 59.563717 N	003 11.089633 W	326189.4	678386.2	4.25	0.94 x 0.65 x 0.10 - Boulder
Object 47	55 59.564795 N	003 11.086857 W	326192.3	678388.1	4.25	0.81 x 0.42 x 0.11 - Boulder
Object 48	55 59.563611 N	003 11.081541 W	326197.8	678385.8	4.21	0.64 x 0.73 x 0.18 - tire
Object 49	55 59.567286 N	003 11.145029 W	326131.9	678393.8	7.22	0.54 x 0.25 x 0.23 - Linear Object
Object 50	55 59.566879 N	003 11.230381 W	326043.2	678394.6	6.76	1.51 x 0.55 x 0.41 - Boulder
Object 51	55 59.598681 N	003 11.28978 W	325982.4	678454.6	6.71	2.13 x 1.07 x 0.24 - Boulder
Object 52	55 59.603829 N	003 11.324537 W	325946.5	678464.8	5.05	1.44 x 1.05 x 0.15 - Boulder
Object 53	55 59.606397 N	003 11.326205 W	325944.8	678469.6	5.05	0.73 x 0.37 x 0.08 - Boulder
Object 54	55 59.606661 N	003 11.327154 W	325943.8	678470.1	5.12	0.73 x 0.37 x 0.08 - Boulder
Object 55	55 59.608685 N	003 11.331313 W	325939.6	678473.9	5.11	0.79 x 0.77 x 0.16 - Boulder
Object 56	55 59.610559 N	003 11.333814 W	325937	678477.4	5.09	1.14 x 1.03 x 0.13 - tire
Object 57	55 59.614373 N	003 11.333566 W	325937.4	678484.5	5.26	1.15 x 0.81 x 0.29 - Boulder
Object 58	55 59.613793 N	003 11.34005 W	325930.6	678483.5	5.1	1.65 x 0.75 x 0.13 - Boulder
Object 59	55 59.620922 N	003 11.346502 W	325924.2	678496.9	5.26	1.59 x 0.66 x 0.18 - Boulder
Object 60	55 59.592222 N	003 11.130365 W	326148	678439.8	4.63	0.46 x 0.37 x 0.17 - boulder
Object 61	55 59.593284 N	003 11.130349 W	326148	678441.7	4.54	1.55 x 1.14 x 0.21 - boulder

Object 62	55 59.607957 N	003 11.159116 W	326118.6	678469.5	4.84	1.13 x 0.76 x 0.38 - boulder
Object 63	55 59.607831 N	003 11.15817 W	326119.5	678469.2	4.99	0.80 x 0.60 x 0.17 - boulder
Object 64	55 59.607827 N	003 11.156929 W	326120.8	678469.2	5.01	0.33 x 0.29 x 0.11 - Boulder
Object 65	55 59.610714 N	003 11.141521 W	326136.9	678474.3	4.58	0.46 x 0.37 x 0.11 - tire
Object 66	55 59.618651 N	003 11.160454 W	326117.5	678489.3	4.8	0.55 x 0.35 x 0.19 - boulder
Object 67	55 59.61796 N	003 11.153805 W	326124.4	678487.9	4.66	0.92 x 0.65 x 0.24 - boulder
Object 68	55 59.621814 N	003 11.150603 W	326127.9	678495	4.63	0.73 x 0.77 x 0.17 - Boulder
Object 69	55 59.625443 N	003 11.171762 W	326106	678502.1	4.69	1.10 x 1.13 x 0.5 - Boulder
Object 70	55 59.622082 N	003 11.166926 W	326110.9	678495.8	4.88	0.69 x 0.40 x 0.22 - Boulder
Object 71	55 59.635271 N	003 11.184596 W	326092.9	678520.6	5.09	1.06 x 0.59 x 0.33 - Boulder
Object 72	55 59.630992 N	003 11.185071 W	326092.3	678512.7	5.23	1.28 x 0.83 x 0.53 - Boulder
Object 73	55 59.635136 N	003 11.185795 W	326091.7	678520.4	5.18	0.52 x 0.42 x 0.36 - Boulder
Object 74	55 59.631792 N	003 11.180296 W	326097.3	678514.1	5.18	1.51 x 0.21 x 0.22 - Linear Object
Object 75	55 59.636072 N	003 11.18212 W	326095.5	678522	4.99	1.13 x 0.97 x 0.17 - Rectangular object
Object 76	55 59.645265 N	003 11.196532 W	326080.9	678539.3	5.21	1.23 x 0.36 x 0.19 - Boulder
Object 77	55 59.639181 N	003 11.196807 W	326080.4	678528.1	5.55	0.87 x 0.47 x 0.19 - boulder
Object 78	55 59.642483 N	003 11.188097 W	326089.5	678534	4.94	1.99 x 0.61 x 0.17 - Boulder
Object 79	55 59.659293 N	003 11.221654 W	326055.2	678565.8	5.61	1.97 x 1.22 x 0.28 - Boulder
Object 80	55 59.64884 N	003 11.20374 W	326073.5	678546.1	5.5	0.72 x 0.57 x 0.20 - Tire
Object 81	55 59.675312 N	003 11.24221 W	326034.3	678595.9	5.59	0.97 x 0.71 x 0.37 - Boulder
Object 82	55 59.679295 N	003 11.237273 W	326039.6	678603.2	5.29	1.31 x 0.68 x 0.22 - Boulder
Object 83	55 59.679841 N	003 11.230999 W	326046.1	678604.1	5.04	0.99 x 0.44 x 0.35 - Boulder
Object 84	55 59.757561 N	003 11.504633 W	325764.2	678753.2	6.06	2.13 x 1.07 x 0.67 - boulder
Object 85	55 59.743031 N	003 11.488496 W	325780.5	678725.9	6.37	1.10 x 0.87 x 0.34 - Boulder
Object 86	55 59.740125 N	003 11.481798 W	325787.3	678720.4	6.4	1.24 x 1.03 x 0.21 - Boulder
Object 87	55 59.736854 N	003 11.472155 W	325797.3	678714.2	6.93	2.56 x 0.79 x 0.21 - Linear Object
Object 88	55 59.85535 N	003 11.555063 W	325714.9	678935.4	6.78	1.77 x 1.34 x 0.76 - Boulder
Object 89	55 59.85225 N	003 11.541644 W	325728.7	678929.5	7.04	1.93 x 1.04 x 0.52 - Boulder
Object 90	55 59.85913 N	003 11.547666 W	325722.7	678942.3	7.21	1.21 x 0.80 x 0.18 - Boulder
Object 91	55 59.865277 N	003 11.513011 W	325758.9	678953.1	6.91	1.15 x 0.77 x 0.38 - Boulder
Object 92	55 59.858205 N	003 11.682255 W	325582.7	678943	5.26	0.82 x 1.25 x 1.11 - vertical linear object
Object 93	55 59.908102 N	003 11.657675 W	325609.9	679035.1	6.73	0.91 x 0.81 x 0.24 - Boulder
Object 94	55 59.966724 N	003 11.690887 W	325577.3	679144.5	6.8	1.02 x 0.70 x 0.51 - boulder
Object 95	55 59.978759 N	003 11.660721 W	325609	679166.2	6.73	2.33 x 0.74 x 0.5 - Linear object
Object 96	56 0.021053 N	003 11.756515 W	325510.8	679246.4	6.79	1.15 x 0.54 x 0.28 - Boulder
Object 97	56 0.0189 N	003 11.725517 W	325542.9	679241.9	7.09	0.86 x 0.64 x 0.33 - boulder
Object 98	56 0.061936 N	003 11.782533 W	325485.1	679322.7	6.91	3.68 x 1.06 x 0.51 - Large flat object
Object 99	56 0.043777 N	003 11.762643 W	325505.1	679288.7	6.86	0.71 x 0.44 x 0.36 - boulder
Object 100	56 0.043823 N	003 11.761249 W	325506.6	679288.7	6.88	1.22 x 0.59 x 0.35 - boulder
Object 101	56 0.047532 N	003 11.757394 W	325510.7	679295.5	6.98	0.86 x 0.48 x 0.24 - boulder
Object 102	56 0.039863 N	003 11.748719 W	325519.5	679281.2	6.6	0.79 x 0.86 x 0.56 - Boulder
Object 103	56 0.064997 N	003 11.835967 W	325429.6	679329.4	7.02	1.39 x 0.39 x 0.28 - Boulder
Object 104	56 0.039534 N	003 11.829868 W	325435.1	679282	6.81	1.12 x 0.73 x 0.31 - Boulder
Object 105	56 0.055164 N	003 11.827062 W	325438.6	679311	7	0.36 x 0.20 x 0.37 - Vertical linear object

Object 106	56 0.048636 N	003 11.803625 W	325462.7	679298.4	6.82	1.23 x 0.77 x 0.46 - Boulder
Object 107	56 0.021355 N	003 12.029896 W	325226.6	679251.9	6.4	1.72 x 0.67 x 0.28 - Linear object
Object 108	56 0.06829 N	003 12.050997 W	325206.2	679339.3	6.47	1.31 x 0.67 x 0.44 - boulder
Object 109	56 0.096348 N	003 11.791977 W	325476.3	679386.7	7.35	0.97 x 0.67 x 0.22 x boulder
Object 110	56 0.09426 N	003 11.788872 W	325479.5	679382.8	7.4	0.59 x 0.55 x 0.19 - Boulder
Object 111	56 0.091353 N	003 11.786762 W	325481.6	679377.4	7.36	0.95 x 0.43 x 0.16 - Boulder
Object 112	56 0.208861 N	003 12.008419 W	325255	679599.3	6.39	1.08 x 0.52 x 0.97 - Tall object
Object 113	56 0.283066 N	003 12.21512 W	325042.6	679740.7	7.74	1.75 x 1.27 x 0.17 - Linear objects
Object 114	56 0.282959 N	003 11.808199 W	325465.5	679733.1	7.89	0.34 x 0.44 x 0.20 - Boulder
Object 115	56 0.194733 N	003 11.997156 W	325266.2	679572.9	7.25	1.05 x 0.54 x 0.13 - Linear Object
Object 116	56 0.277532 N	003 12.43577 W	324813	679734.4	7.8	1.68 x 0.40 x 0.22 x - Linear Object
Object 117	56 0.170723 N	003 12.296827 W	324954	679533.8	6.82	1.23 x 1.11 x 0.21 - Tire
Object 118	55 59.499815 N	003 11.019437 W	326260.3	678266.4	4.33	0.45 x 0.36 x 0.29 - boulder

6. SIDE-SCAN SONAR

An Edgetech 4125 dual frequency side-scan sonar was deployed and operated at 400kHz & 900kHz, providing both area coverage and high-definition acoustic imagery.

The system comprised of the following:

- Topside Processor Unit
- EdgeTech DISCOVER Acquisition Software
- Dual Frequency Towfish c/w Responder interface heading, pitch, roll & depth sensor
- 150m soft tow cable

The system was towed alongside the starboard side of the survey vessel using a soft-tow cable with positioning achieved by inputting the offsets from the GPS antenna to the tow point and recording the length of cable out. From this, the position of the tow fish could be calculated.

FIGURE 5 - EDGETECH 4125 SIDE-SCAN SONAR]

A USBL system was not used to position the side-scan tow fish due to the relatively shallow water depths across the site with manual layback used instead. This method does introduce a degree of uncertainty, but this was mitigated for by ensuring that reciprocal lines were run over objects to verify that the layback calculations were working as expected.

On completion of the data capture phase, all information was post-processed in Chesapeake SonarWiz, software. In addition, the high-resolution multibeam data was used as a cross-check for the side-scan sonar data where significant targets were identified.

A total of 87 side scan sonar targets were identified during the post-processing stage and are itemised below with supplementary information including position, dimensions and description where known. The targets consist of tires, object and debris.

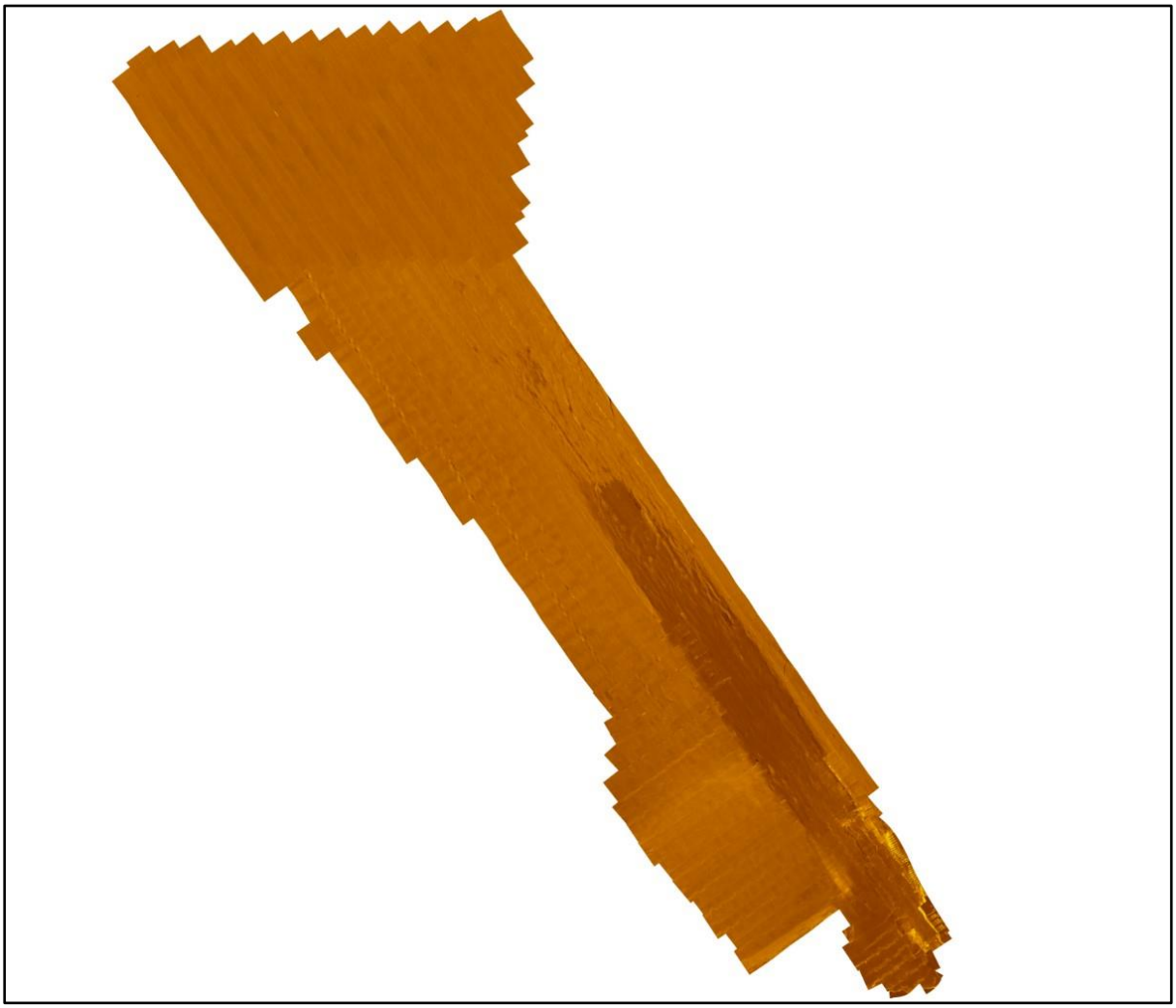
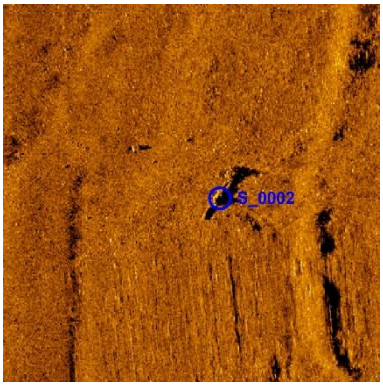
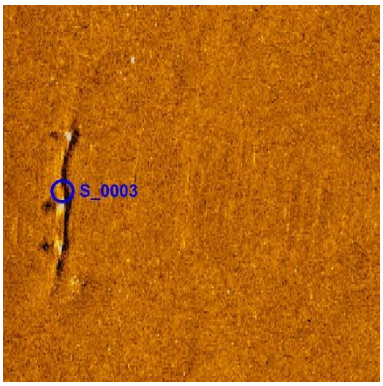
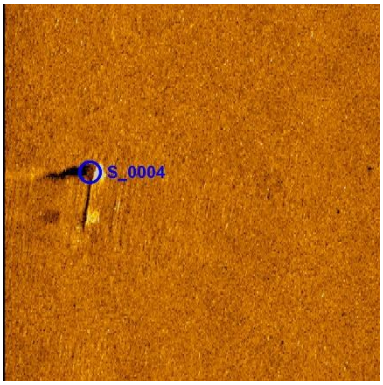
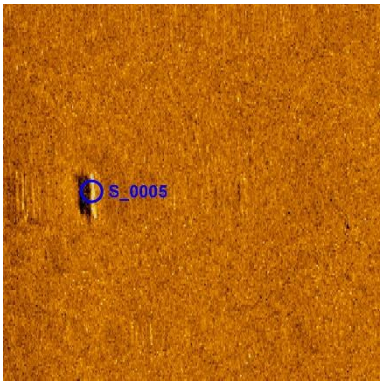
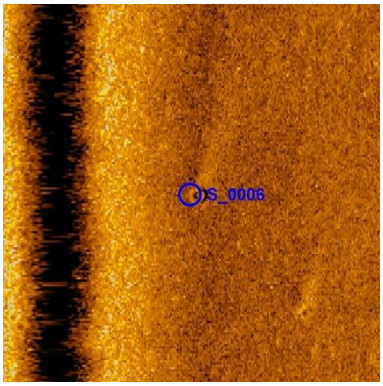
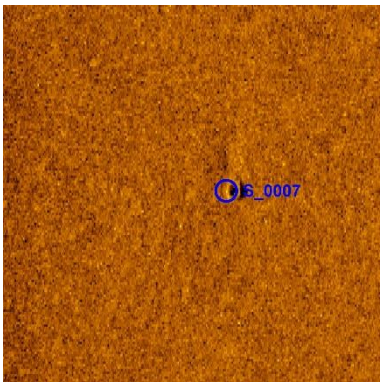
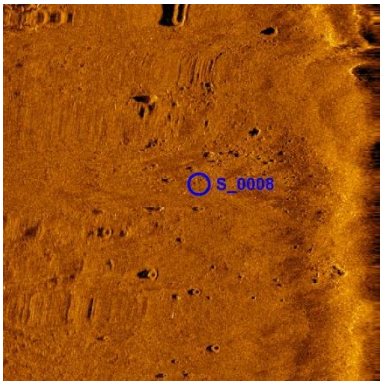
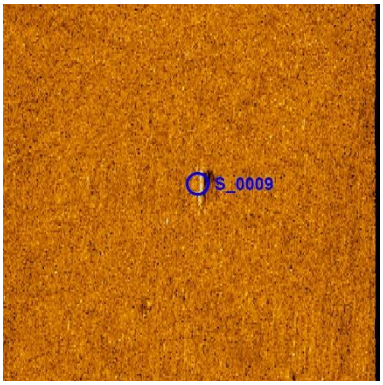
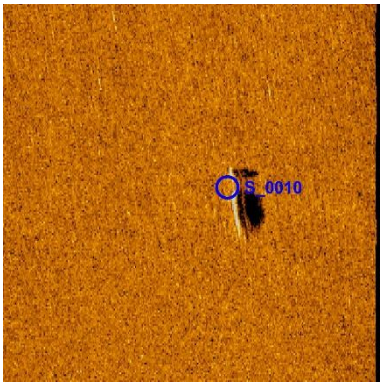
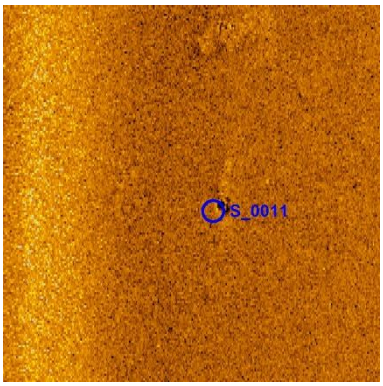
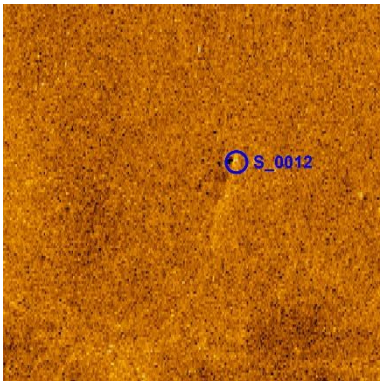
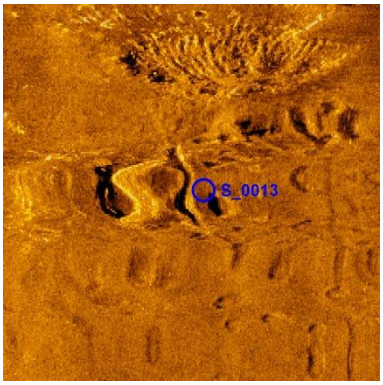
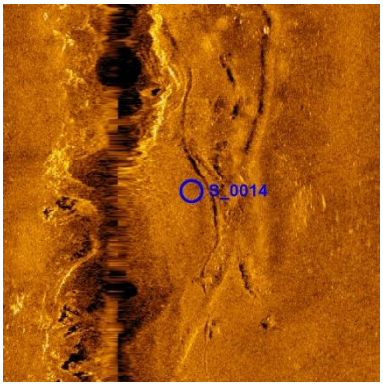


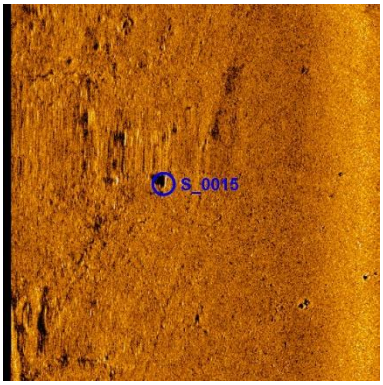
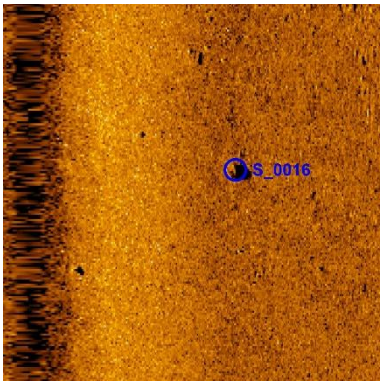
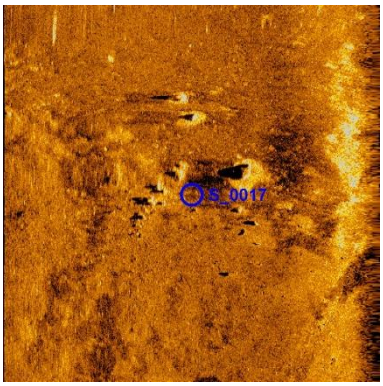
FIGURE 6 - OVERVIEW OF SIDE-SCAN SONAR DATA

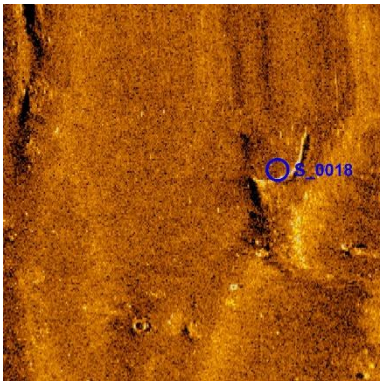
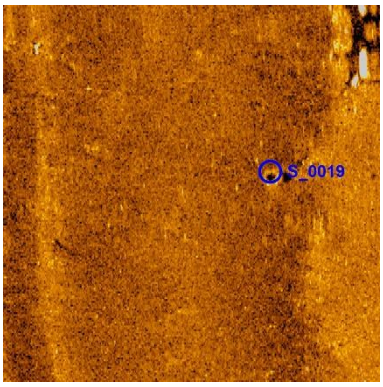
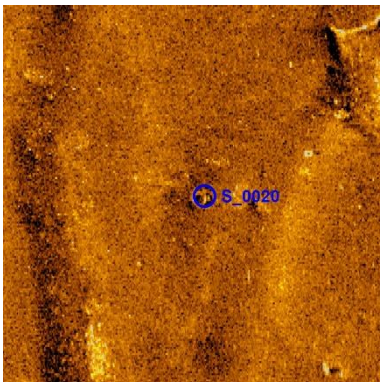
Target Image	Target Info	User Entered Info
	**S_0002** • Sonar Time at Target: 26/07/2023 13:11:24 • Click Position 55.9998787604 -3.1943221462 (WGS84) (X) 325610.87 (Y) 679192.12 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726135620.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726140914.jsf • Range to target: 24.93 Meters • Fish Height: 5.26 Meters • Heading: 138.700 Degrees • Water Depth: 4.32 Meters	**Dimensions and attributes** • Target Width: 0.70 Meters • Target Height: 0.41 Meters • Target Length: 5.21 Meters • Target Shadow: 2.09 Meters • Description: Long Object

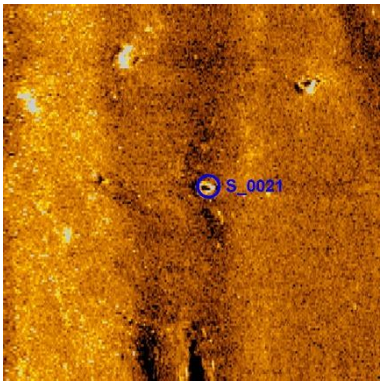
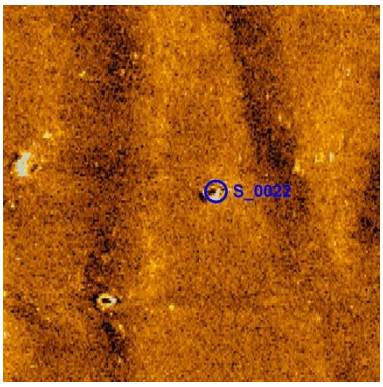
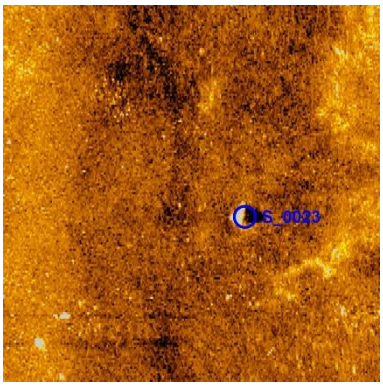
	**S_0003** • Sonar Time at Target: 27/07/2023 09:36:25 • Click Position 55.9932392526 -3.1909006503 (WGS84) (X) 325811.52 (Y) 678449.52 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727102356.jsf • Range to target: 44.37 Meters • Fish Height: 7.06 Meters • Heading: 227.700 Degrees • Water Depth: 2.36 Meters	**Dimensions and attributes** • Target Width: 0.58 Meters • Target Height: 0.08 Meters • Target Length: 11.10 Meters • Target Shadow: 0.52 Meters • Description: Long Object
	**S_0004** • Sonar Time at Target: 27/07/2023 09:59:13 • Click Position 55.9976863692 -3.1947270400 (WGS84) (X) 325581.39 (Y) 678948.56 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727104303.jsf • Range to target: 41.53 Meters • Fish Height: 8.43 Meters • Heading: 141.000 Degrees • Water Depth: 2.61 Meters	**Dimensions and attributes** • Target Width: 1.18 Meters • Target Height: 0.70 Meters • Target Length: 6.59 Meters • Target Shadow: 3.75 Meters • Description: Long Object
	**S_0005** • Sonar Time at Target: 27/07/2023 10:26:48 • Click Position 55.9987358052 -3.1991907235 (WGS84) (X) 325305.02 (Y) 679070.18 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727111029.jsf • Range to target: 42.38 Meters • Fish Height: 8.77 Meters • Heading: 322.200 Degrees • Water Depth: 2.46 Meters	**Dimensions and attributes** • Target Width: 0.35 Meters • Target Height: 0.16 Meters • Target Length: 3.25 Meters • Target Shadow: 0.81 Meters • Description: Long Object
	**S_0006** • Sonar Time at Target: 27/07/2023 08:43:33 • Click Position 55.9920188005 -3.1900576007 (WGS84) (X) 325861.77 (Y) 678312.79 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727093117.jsf • Range to target: 9.88 Meters • Fish Height: 5.75 Meters • Heading: 47.900 Degrees • Water Depth: 2.65 Meters	**Dimensions and attributes** • Target Width: 1.13 Meters • Target Height: 0.12 Meters • Target Length: 1.09 Meters • Target Shadow: 0.22 Meters • Description: Tire

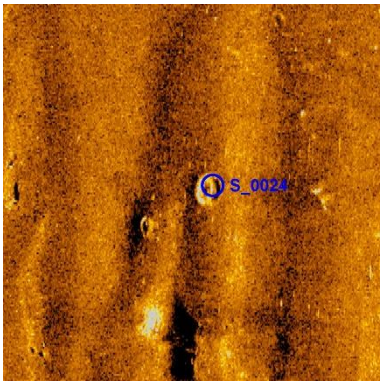
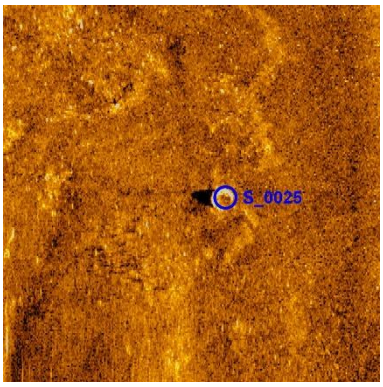
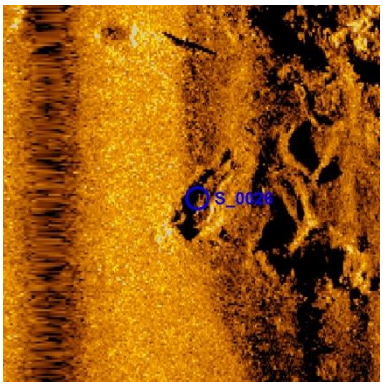
	**S_0007** • Sonar Time at Target: 27/07/2023 08:43:46 • Click Position 55.9920543171 -3.1895201734 (WGS84) (X) 325895.36 (Y) 678316.16 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727093117.jsf • Range to target: 25.69 Meters • Fish Height: 6.04 Meters • Heading: 55.100 Degrees • Water Depth: 2.65 Meters	**Dimensions and attributes** • Target Width: 1.12 Meters • Target Height: 0.09 Meters • Target Length: 0.80 Meters • Target Shadow: 0.40 Meters • Description: Tire
	**S_0008** • Sonar Time at Target: 27/07/2023 08:47:15 • Click Position 55.9917863954 -3.1837000973 (WGS84) (X) 326257.90 (Y) 678280.11 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727093515.jsf • Range to target: 23.15 Meters • Fish Height: 8.23 Meters • Heading: 168.700 Degrees • Water Depth: 2.49 Meters	**Dimensions and attributes** • Target Width: 0.00 Meters • Target Height: 0.00 Meters • Target Length: 184.63 Meters • Target Shadow: 0.00 Meters • Description: Tires
	**S_0009** • Sonar Time at Target: 27/07/2023 09:58:11 • Click Position 55.9982835716 -3.1970136268 (WGS84) (X) 325439.93 (Y) 679017.50 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727104303.jsf • Range to target: 35.61 Meters • Fish Height: 8.72 Meters • Heading: 153.500 Degrees • Water Depth: 2.52 Meters	**Dimensions and attributes** • Target Width: 0.31 Meters • Target Height: 0.09 Meters • Target Length: 3.08 Meters • Target Shadow: 0.37 Meters • Description: Small object
	**S_0010** • Sonar Time at Target: 27/07/2023 10:40:25 • Click Position 56.0011973512 -3.2017144144 (WGS84) (X) 325152.39 (Y) 679346.87 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727112619.jsf • Range to target: 38.33 Meters • Fish Height: 8.57 Meters • Heading: 318.800 Degrees • Water Depth: 2.54 Meters	**Dimensions and attributes** • Target Width: 0.54 Meters • Target Height: 0.40 Meters • Target Length: 5.04 Meters • Target Shadow: 1.85 Meters • Description: Linear Object

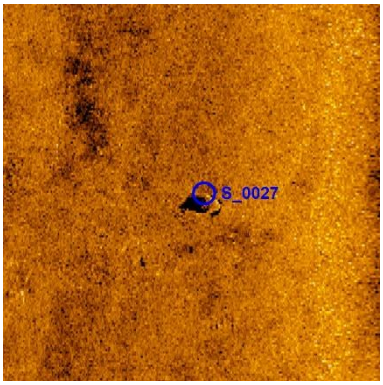
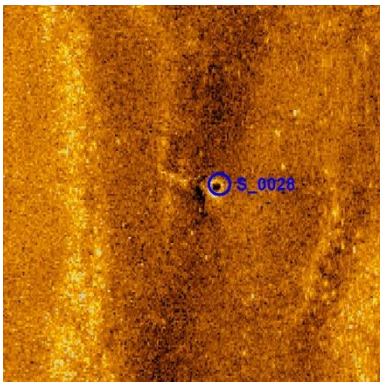
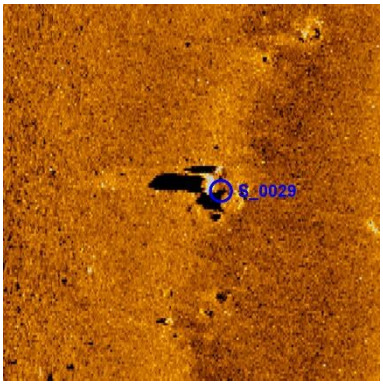
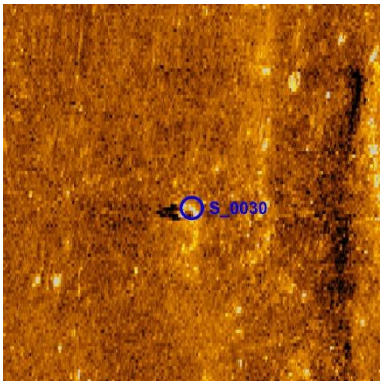
	**S_0011** • Sonar Time at Target: 27/07/2023 08:32:17 • Click Position 55.9911400747 -3.1891740481 (WGS84) (X) 325915.20 (Y) 678214.04 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727092016.jsf • Range to target: 19.59 Meters • Fish Height: 5.11 Meters • Heading: 52.000 Degrees • Water Depth: 2.55 Meters	**Dimensions and attributes** • Target Width: 1.00 Meters • Target Height: 0.06 Meters • Target Length: 1.55 Meters • Target Shadow: 0.24 Meters • Description: Tire
	**S_0012** • Sonar Time at Target: 27/07/2023 08:40:08 • Click Position 55.9928848707 -3.1883002671 (WGS84) (X) 325973.05 (Y) 678407.28 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727092838.jsf • Range to target: 28.38 Meters • Fish Height: 7.16 Meters • Heading: 221.900 Degrees • Water Depth: 2.39 Meters	**Dimensions and attributes** • Target Width: 0.76 Meters • Target Height: 0.06 Meters • Target Length: 0.99 Meters • Target Shadow: 0.25 Meters • Description: Tire
	**S_0013** • Sonar Time at Target: 27/07/2023 08:47:24 • Click Position 55.9914229030 -3.1841916853 (WGS84) (X) 326226.55 (Y) 678240.18 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727093515.jsf • Range to target: 27.17 Meters • Fish Height: 10.03 Meters • Heading: 153.400 Degrees • Water Depth: 2.52 Meters	**Dimensions and attributes** • Target Width: 0.00 Meters • Target Height: 0.00 Meters • Target Length: 85.58 Meters • Target Shadow: 0.00 Meters • Description: Long Objects
	**S_0014** • Sonar Time at Target: 27/07/2023 08:53:43 • Click Position 55.9905008096 -3.1836525171 (WGS84) (X) 326258.42 (Y) 678136.98 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727094140.jsf • Range to target: 10.33 Meters • Fish Height: 9.74 Meters • Heading: 143.500 Degrees • Water Depth: 2.50 Meters	**Dimensions and attributes** • Target Width: 0.00 Meters • Target Height: 0.00 Meters • Target Length: 48.09 Meters • Target Shadow: 0.00 Meters • Description: Long Object

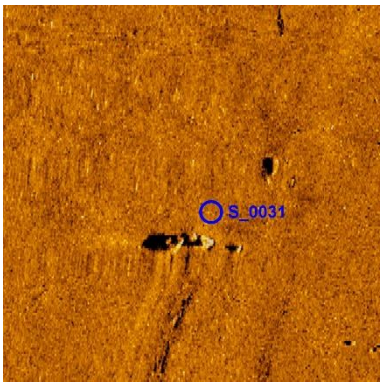
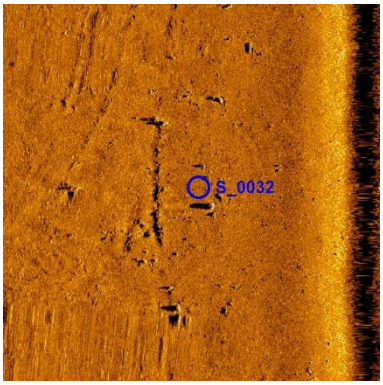
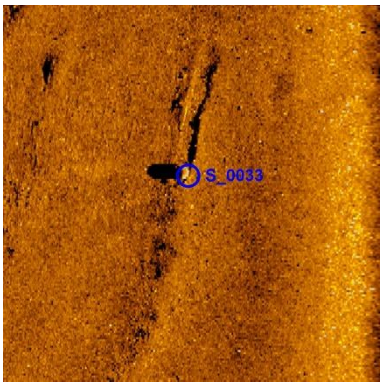
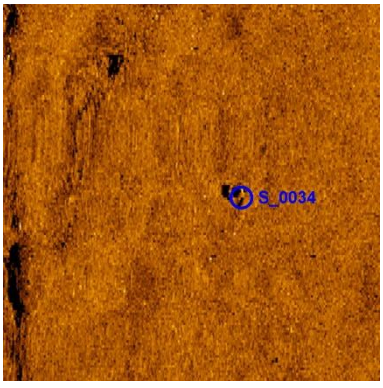
	**S_0015** • Sonar Time at Target: 26/07/2023 14:11:19 • Click Position 56.0003657054 -3.1959753914 (WGS84) (X) 325508.70 (Y) 679248.10 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 29.92 Meters • Fish Height: 5.50 Meters • Heading: 129.300 Degrees • Water Depth: 4.05 Meters	**Dimensions and attributes** • Target Width: 0.39 Meters • Target Height: 0.29 Meters • Target Length: 1.68 Meters • Target Shadow: 1.67 Meters • Description: Small Object
	**S_0016** • Sonar Time at Target: 26/07/2023 14:10:47 • Click Position 56.0006401013 -3.1971955673 (WGS84) (X) 325433.13 (Y) 679279.95 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 15.57 Meters • Fish Height: 5.60 Meters • Heading: 143.700 Degrees • Water Depth: 3.95 Meters	**Dimensions and attributes** • Target Width: 0.71 Meters • Target Height: 0.33 Meters • Target Length: 0.98 Meters • Target Shadow: 0.98 Meters • Description: Small Object
	**S_0017** • Sonar Time at Target: 26/07/2023 14:14:18 • Click Position 55.9976178274 -3.1925295000 (WGS84) (X) 325718.33 (Y) 678938.57 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 24.37 Meters • Fish Height: 5.94 Meters • Heading: 139.600 Degrees • Water Depth: 4.24 Meters	**Dimensions and attributes** • Target Width: 0.00 Meters • Target Height: 0.00 Meters • Target Length: 89.94 Meters • Target Shadow: 0.00 Meters • Description: Small Objects

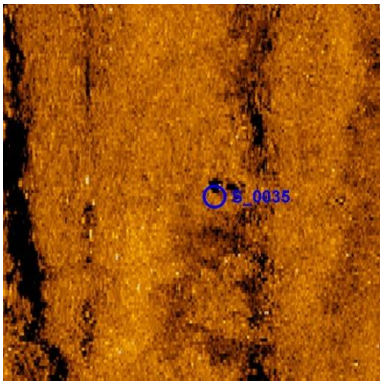
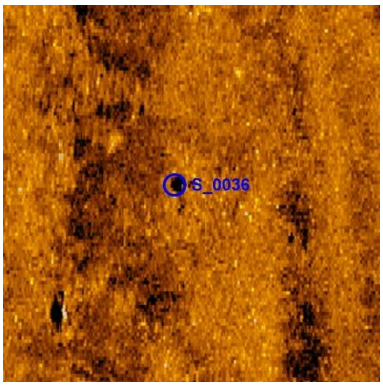
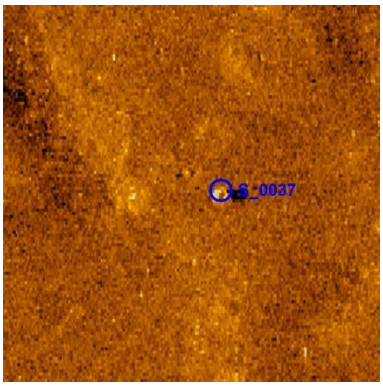
	**S_0018** • Sonar Time at Target: 26/07/2023 14:16:02 • Click Position 55.9957652638 -3.1913695789 (WGS84) (X) 325787.12 (Y) 678731.14 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 34.87 Meters • Fish Height: 5.80 Meters • Heading: 132.300 Degrees • Water Depth: 4.23 Meters	**Dimensions and attributes** • Target Width: 0.30 Meters • Target Height: 0.08 Meters • Target Length: 5.93 Meters • Target Shadow: 0.48 Meters • Description: long object
	**S_0019** • Sonar Time at Target: 26/07/2023 14:15:42 • Click Position 55.9960527720 -3.1917841585 (WGS84) (X) 325761.81 (Y) 678763.59 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 36.76 Meters • Fish Height: 5.75 Meters • Heading: 136.200 Degrees • Water Depth: 4.31 Meters	**Dimensions and attributes** • Target Width: 1.48 Meters • Target Height: 0.08 Meters • Target Length: 1.40 Meters • Target Shadow: 0.51 Meters • Description: Tire
	**S_0020** • Sonar Time at Target: 26/07/2023 14:15:55 • Click Position 55.9959111726 -3.1913605210 (WGS84) (X) 325787.96 (Y) 678747.37 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 24.39 Meters • Fish Height: 5.46 Meters • Heading: 122.100 Degrees • Water Depth: 4.31 Meters	**Dimensions and attributes** • Target Width: 0.98 Meters • Target Height: 0.09 Meters • Target Length: 1.09 Meters • Target Shadow: 0.41 Meters • Description: Tire

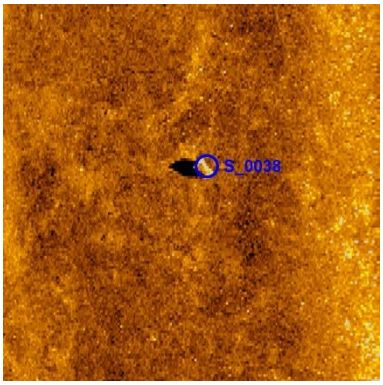
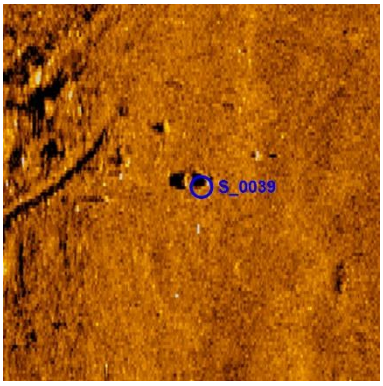
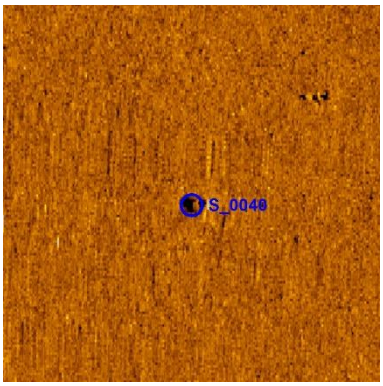
	**S_0021** • Sonar Time at Target: 26/07/2023 14:16:14 • Click Position 55.9957040960 -3.1909033984 (WGS84) (X) 325816.08 (Y) 678723.84 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 16.06 Meters • Fish Height: 6.48 Meters • Heading: 135.700 Degrees • Water Depth: 4.28 Meters	**Dimensions and attributes** • Target Width: 1.03 Meters • Target Height: 0.18 Meters • Target Length: 0.92 Meters • Target Shadow: 0.47 Meters • Description: Tire
	**S_0022** • Sonar Time at Target: 26/07/2023 14:16:17 • Click Position 55.9956248697 -3.1909236568 (WGS84) (X) 325814.66 (Y) 678715.04 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 22.31 Meters • Fish Height: 6.33 Meters • Heading: 137.500 Degrees • Water Depth: 4.18 Meters	**Dimensions and attributes** • Target Width: 1.13 Meters • Target Height: 0.04 Meters • Target Length: 0.96 Meters • Target Shadow: 0.14 Meters • Description: Tire
	**S_0023** • Sonar Time at Target: 26/07/2023 14:19:53 • Click Position 55.9923903024 -3.1868196081 (WGS84) (X) 326064.47 (Y) 678350.66 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 23.38 Meters • Fish Height: 5.75 Meters • Heading: 127.200 Degrees • Water Depth: 4.08 Meters	**Dimensions and attributes** • Target Width: 0.86 Meters • Target Height: 0.30 Meters • Target Length: 1.98 Meters • Target Shadow: 1.30 Meters • Description: Small object

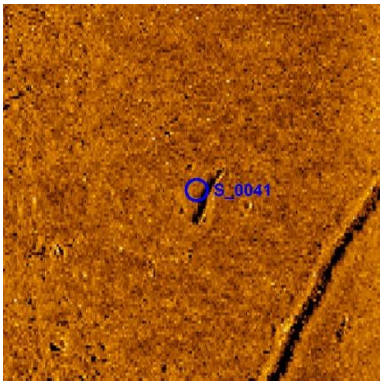
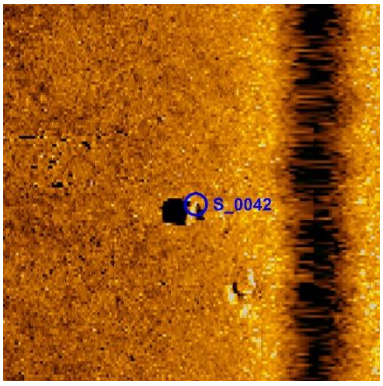
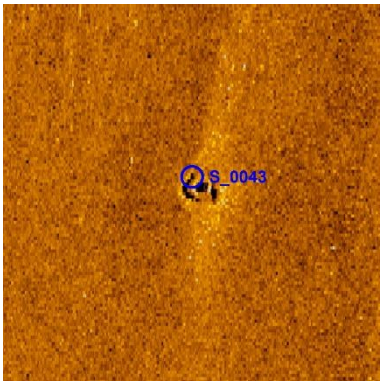
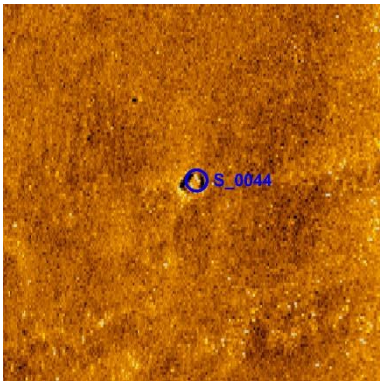
	**S_0024** • Sonar Time at Target: 26/07/2023 14:27:44 • Click Position 55.9952912497 -3.1900075834 (WGS84) (X) 325871.16 (Y) 678676.93 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151123.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726152417.jsf • Range to target: 27.68 Meters • Fish Height: 5.65 Meters • Heading: 335.100 Degrees • Water Depth: 4.26 Meters	**Dimensions and attributes** • Target Width: 1.80 Meters • Target Height: 0.03 Meters • Target Length: 2.47 Meters • Target Shadow: 0.17 Meters • Description: Small object
	**S_0025** • Sonar Time at Target: 26/07/2023 14:50:00 • Click Position 55.9918682383 -3.1862555857 (WGS84) (X) 326098.65 (Y) 678291.95 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726152631.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726153925.jsf • Range to target: 20.12 Meters • Fish Height: 3.12 Meters • Heading: 142.600 Degrees • Water Depth: 4.14 Meters	**Dimensions and attributes** • Target Width: 1.62 Meters • Target Height: 0.21 Meters • Target Length: 2.00 Meters • Target Shadow: 1.49 Meters • Description: Small object
	**S_0026** • Sonar Time at Target: 26/07/2023 13:17:39 • Click Position 55.9950947261 -3.1879922764 (WGS84) (X) 325996.49 (Y) 678652.89 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726135620.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726140914.jsf • Range to target: 9.70 Meters • Fish Height: 3.95 Meters • Heading: 137.800 Degrees • Water Depth: 4.30 Meters	**Dimensions and attributes** • Target Width: 0.77 Meters • Target Height: 0.21 Meters • Target Length: 1.22 Meters • Target Shadow: 0.55 Meters • Description: Unkown Object

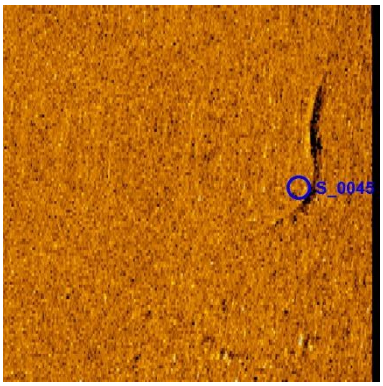
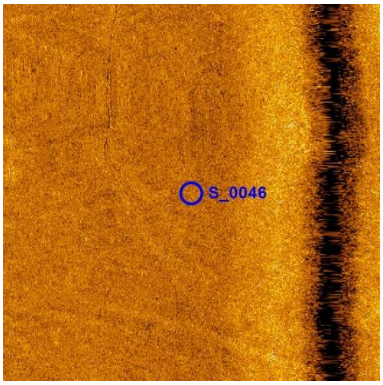
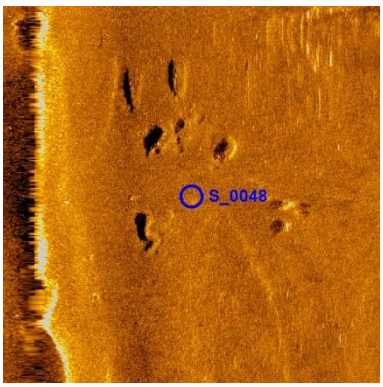
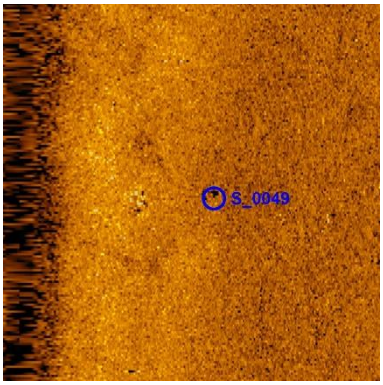
	**S_0027** • Sonar Time at Target: 26/07/2023 13:43:49 • Click Position 55.9977361675 -3.1918512710 (WGS84) (X) 325760.86 (Y) 678951.01 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726142637.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726143931.jsf • Range to target: 12.24 Meters • Fish Height: 5.41 Meters • Heading: 145.700 Degrees • Water Depth: 4.35 Meters	**Dimensions and attributes** • Target Width: 1.04 Meters • Target Height: 0.52 Meters • Target Length: 1.20 Meters • Target Shadow: 1.29 Meters • Description: Small Object
	**S_0028** • Sonar Time at Target: 26/07/2023 13:58:16 • Click Position 55.9956118037 -3.1896009719 (WGS84) (X) 325897.14 (Y) 678712.16 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726144110.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145404.jsf • Range to target: 18.21 Meters • Fish Height: 4.82 Meters • Heading: 337.300 Degrees • Water Depth: 4.81 Meters	**Dimensions and attributes** • Target Width: 0.89 Meters • Target Height: 0.12 Meters • Target Length: 1.12 Meters • Target Shadow: 0.47 Meters • Description: Tire
	**S_0029** • Sonar Time at Target: 26/07/2023 14:28:45 • Click Position 55.9959978659 -3.1915948251 (WGS84) (X) 325773.51 (Y) 678757.27 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151123.jsf • Range to target: 14.61 Meters • Fish Height: 5.21 Meters • Heading: 333.500 Degrees • Water Depth: 4.33 Meters	**Dimensions and attributes** • Target Width: 1.27 Meters • Target Height: 0.42 Meters • Target Length: 1.13 Meters • Target Shadow: 1.26 Meters • Description: Unkown objects
	**S_0030** • Sonar Time at Target: 26/07/2023 13:25:54 • Click Position 55.9926914993 -3.1856050344 (WGS84) (X) 326140.80 (Y) 678382.87 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726141310.jsf • Range to target: 23.12 Meters • Fish Height: 5.46 Meters • Heading: 323.300 Degrees • Water Depth: 3.62 Meters	**Dimensions and attributes** • Target Width: 0.90 Meters • Target Height: 0.20 Meters • Target Length: 0.82 Meters • Target Shadow: 0.90 Meters • Description: Small object

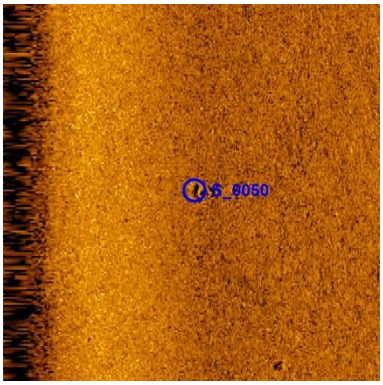
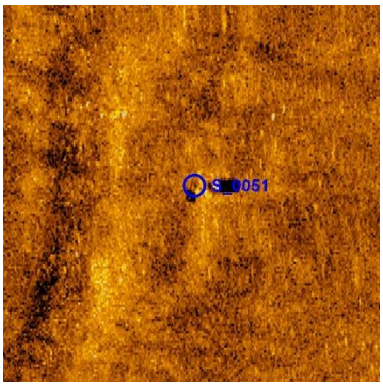
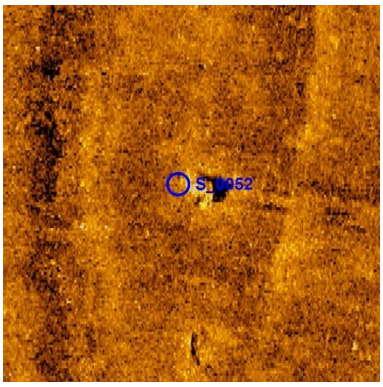
	**S_0031** • Sonar Time at Target: 26/07/2023 13:34:40 • Click Position 56.0010446511 -3.1963493912 (WGS84) (X) 325486.68 (Y) 679324.06 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726141937.jsf • Range to target: 24.93 Meters • Fish Height: 5.99 Meters • Heading: 330.600 Degrees • Water Depth: 3.69 Meters	**Dimensions and attributes** • Target Width: 0.00 Meters • Target Height: 0.00 Meters • Target Length: 37.45 Meters • Target Shadow: 0.00 Meters • Description: Small objects
	**S_0032** • Sonar Time at Target: 26/07/2023 13:34:16 • Click Position 56.0006797743 -3.1958586145 (WGS84) (X) 325516.59 (Y) 679282.92 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726141937.jsf • Range to target: 21.08 Meters • Fish Height: 6.09 Meters • Heading: 331.900 Degrees • Water Depth: 3.49 Meters	**Dimensions and attributes** • Target Width: 0.00 Meters • Target Height: 0.00 Meters • Target Length: 117.55 Meters • Target Shadow: 0.00 Meters • Description: Small Objects
	**S_0033** • Sonar Time at Target: 26/07/2023 13:41:38 • Click Position 55.9996785955 -3.1942933858 (WGS84) (X) 325612.28 (Y) 679169.81 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726142637.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726143931.jsf • Range to target: 13.06 Meters • Fish Height: 5.46 Meters • Heading: 134.100 Degrees • Water Depth: 4.27 Meters	**Dimensions and attributes** • Target Width: 0.50 Meters • Target Height: 0.77 Meters • Target Length: 1.17 Meters • Target Shadow: 2.16 Meters • Description: Small Object
	**S_0034** • Sonar Time at Target: 26/07/2023 13:44:12 • Click Position 55.9974589251 -3.1912546684 (WGS84) (X) 325797.53 (Y) 678919.51 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726142637.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726143931.jsf • Range to target: 23.43 Meters • Fish Height: 5.50 Meters • Heading: 131.800 Degrees • Water Depth: 4.28 Meters	**Dimensions and attributes** • Target Width: 0.75 Meters • Target Height: 0.09 Meters • Target Length: 0.85 Meters • Target Shadow: 0.40 Meters • Description: Tire

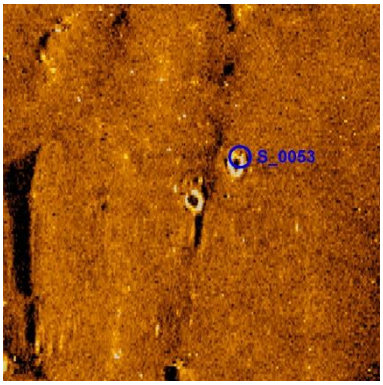
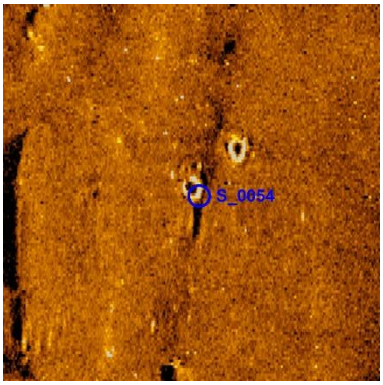
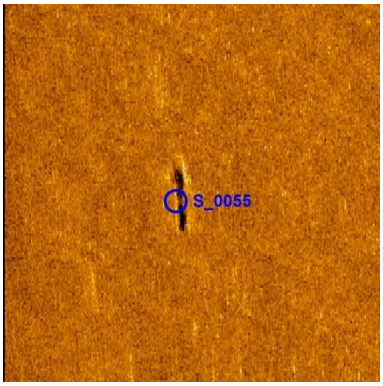
	**S_0035** • Sonar Time at Target: 26/07/2023 13:44:34 • Click Position 55.9971365467 -3.1908614386 (WGS84) (X) 325821.44 (Y) 678883.21 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726142637.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726143931.jsf • Range to target: 26.04 Meters • Fish Height: 5.50 Meters • Heading: 138.200 Degrees • Water Depth: 4.34 Meters	**Dimensions and attributes** • Target Width: 1.28 Meters • Target Height: 0.09 Meters • Target Length: 1.27 Meters • Target Shadow: 0.48 Meters • Description: Tire
	**S_0036** • Sonar Time at Target: 26/07/2023 13:45:22 • Click Position 55.9964425213 -3.1900097806 (WGS84) (X) 325873.23 (Y) 678805.05 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726142637.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726143931.jsf • Range to target: 25.12 Meters • Fish Height: 5.46 Meters • Heading: 133.200 Degrees • Water Depth: 4.18 Meters	**Dimensions and attributes** • Target Width: 0.78 Meters • Target Height: 0.09 Meters • Target Length: 0.70 Meters • Target Shadow: 0.44 Meters • Description: Tire
	**S_0037** • Sonar Time at Target: 26/07/2023 13:45:23 • Click Position 55.9961543194 -3.1905725287 (WGS84) (X) 325837.58 (Y) 678773.59 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726142637.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726143931.jsf • Range to target: 27.64 Meters • Fish Height: 5.50 Meters • Heading: 135.000 Degrees • Water Depth: 4.18 Meters	**Dimensions and attributes** • Target Width: 0.79 Meters • Target Height: 0.10 Meters • Target Length: 1.09 Meters • Target Shadow: 0.52 Meters • Description: Tire

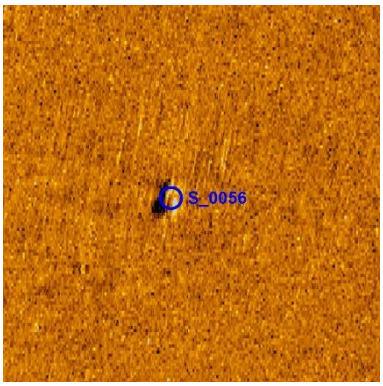
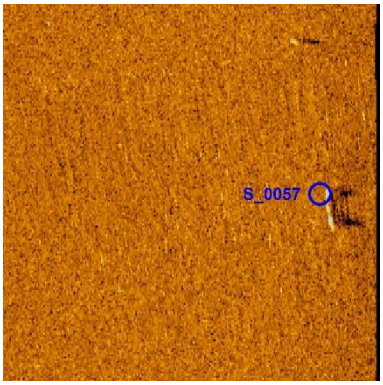
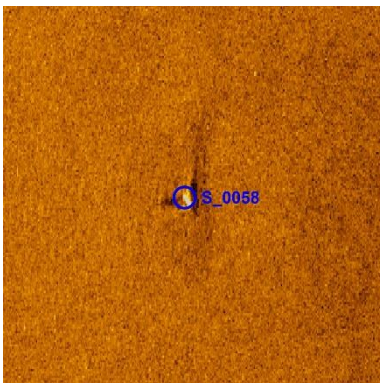
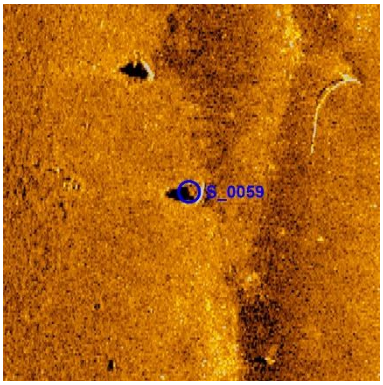
	**S_0038** • Sonar Time at Target: 26/07/2023 13:49:58 • Click Position 55.9921999367 -3.1847913507 (WGS84) (X) 326190.62 (Y) 678327.30 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726142637.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726143931.jsf • Range to target: 11.05 Meters • Fish Height: 5.50 Meters • Heading: 137.600 Degrees • Water Depth: 4.12 Meters	**Dimensions and attributes** • Target Width: 0.70 Meters • Target Height: 0.62 Meters • Target Length: 1.16 Meters • Target Shadow: 1.40 Meters • Description: Small Object
	**S_0039** • Sonar Time at Target: 26/07/2023 13:50:07 • Click Position 55.9921492647 -3.1844121900 (WGS84) (X) 326214.18 (Y) 678321.25 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726142637.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726143931.jsf • Range to target: 27.26 Meters • Fish Height: 5.26 Meters • Heading: 138.300 Degrees • Water Depth: 4.12 Meters	**Dimensions and attributes** • Target Width: 0.88 Meters • Target Height: 0.12 Meters • Target Length: 1.24 Meters • Target Shadow: 0.65 Meters • Description: Small Object
	**S_0040** • Sonar Time at Target: 26/07/2023 13:08:37 • Click Position 56.0023620033 -3.1964514027 (WGS84) (X) 325482.86 (Y) 679470.78 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726135620.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726140914.jsf • Range to target: 30.88 Meters • Fish Height: 5.70 Meters • Heading: 130.900 Degrees • Water Depth: 4.11 Meters	**Dimensions and attributes** • Target Width: 1.11 Meters • Target Height: 0.11 Meters • Target Length: 1.16 Meters • Target Shadow: 0.64 Meters • Description: Tire

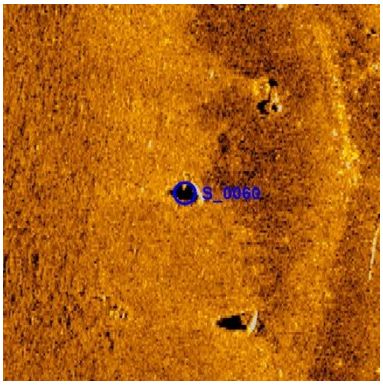
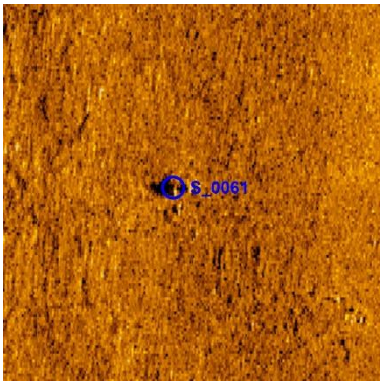
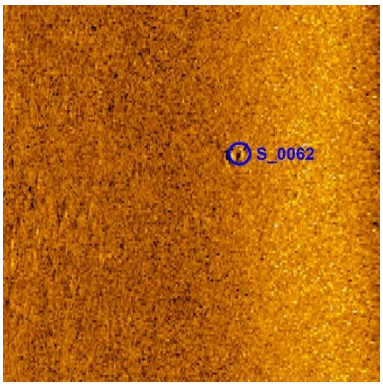
	**S_0041** • Sonar Time at Target: 26/07/2023 13:17:59 • Click Position 55.9949788813 -3.1874224582 (WGS84) (X) 326031.81 (Y) 678639.39 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726135620.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726140914.jsf • Range to target: 12.88 Meters • Fish Height: 3.80 Meters • Heading: 140.300 Degrees • Water Depth: 4.37 Meters	**Dimensions and attributes** • Target Width: 0.37 Meters • Target Height: 0.09 Meters • Target Length: 2.69 Meters • Target Shadow: 0.30 Meters • Description: Long Object
	**S_0042** • Sonar Time at Target: 26/07/2023 13:18:20 • Click Position 55.9946814151 -3.1870989688 (WGS84) (X) 326051.42 (Y) 678605.93 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726135620.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726140914.jsf • Range to target: 4.39 Meters • Fish Height: 3.51 Meters • Heading: 136.200 Degrees • Water Depth: 4.36 Meters	**Dimensions and attributes** • Target Width: 0.48 Meters • Target Height: 0.68 Meters • Target Length: 1.04 Meters • Target Shadow: 1.05 Meters • Description: Small Object
	**S_0043** • Sonar Time at Target: 27/07/2023 09:37:39 • Click Position 55.9937304977 -3.1919612932 (WGS84) (X) 325746.30 (Y) 678505.33 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727102604.jsf • Range to target: 17.38 Meters • Fish Height: 6.77 Meters • Heading: 49.800 Degrees • Water Depth: 2.68 Meters	**Dimensions and attributes** • Target Width: 1.69 Meters • Target Height: 0.10 Meters • Target Length: 1.40 Meters • Target Shadow: 0.27 Meters • Description: Round Object
	**S_0044** • Sonar Time at Target: 27/07/2023 09:39:28 • Click Position 55.9945371347 -3.1898228097 (WGS84) (X) 325881.24 (Y) 678592.80 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727102758.jsf • Range to target: 16.99 Meters • Fish Height: 8.67 Meters • Heading: 233.500 Degrees • Water Depth: 2.35 Meters	**Dimensions and attributes** • Target Width: 0.78 Meters • Target Height: 0.19 Meters • Target Length: 1.32 Meters • Target Shadow: 0.39 Meters • Description: Small Object

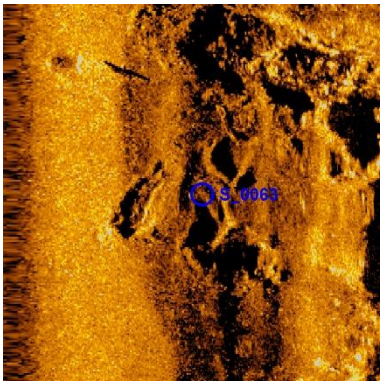
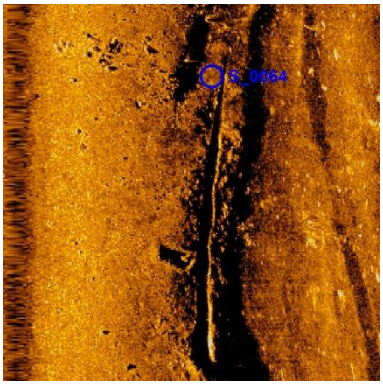
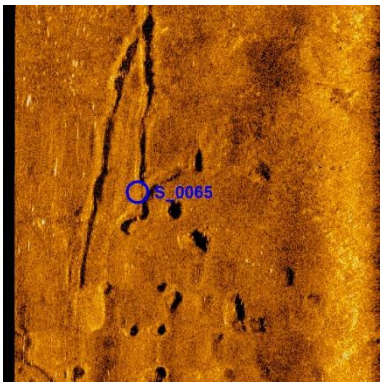
	**S_0045** • Sonar Time at Target: 27/07/2023 10:15:17 • Click Position 55.9998304272 -3.2001937761 (WGS84) (X) 325244.58 (Y) 679193.09 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727110158.jsf • Range to target: 45.27 Meters • Fish Height: 8.91 Meters • Heading: 142.800 Degrees • Water Depth: 2.51 Meters	**Dimensions and attributes** • Target Width: 0.37 Meters • Target Height: 0.11 Meters • Target Length: 11.77 Meters • Target Shadow: 0.55 Meters • Description: Long Object
	**S_0046** • Sonar Time at Target: 27/07/2023 10:22:27 • Click Position 55.9945550863 -3.1934280928 (WGS84) (X) 325656.39 (Y) 678598.68 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727111029.jsf • Range to target: 18.20 Meters • Fish Height: 7.21 Meters • Heading: 330.700 Degrees • Water Depth: 2.44 Meters	**Dimensions and attributes** • Target Width: 0.33 Meters • Target Height: 0.11 Meters • Target Length: 208.35 Meters • Target Shadow: 0.29 Meters • Description: Rope Attached
	**S_0048** • Sonar Time at Target: 27/07/2023 09:00:54 • Click Position 55.9894235243 -3.1835200126 (WGS84) (X) 326264.63 (Y) 678016.95 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727094809.jsf • Range to target: 21.83 Meters • Fish Height: 5.60 Meters • Heading: 131.000 Degrees • Water Depth: 2.49 Meters	**Dimensions and attributes** • Target Width: 0.86 Meters • Target Height: 0.41 Meters • Target Length: 102.60 Meters • Target Shadow: 1.72 Meters • Description: Small Objects
	**S_0049** • Sonar Time at Target: 26/07/2023 14:12:01 • Click Position 55.9995059342 -3.1956620466 (WGS84) (X) 325526.58 (Y) 679152.07 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 13.33 Meters • Fish Height: 5.55 Meters • Heading: 140.100 Degrees • Water Depth: 3.99 Meters	**Dimensions and attributes** • Target Width: 1.20 Meters • Target Height: 0.14 Meters • Target Length: 1.22 Meters • Target Shadow: 0.35 Meters • Description: Tire

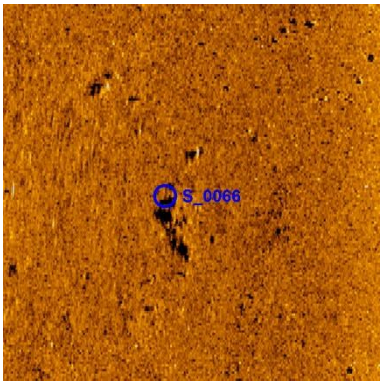
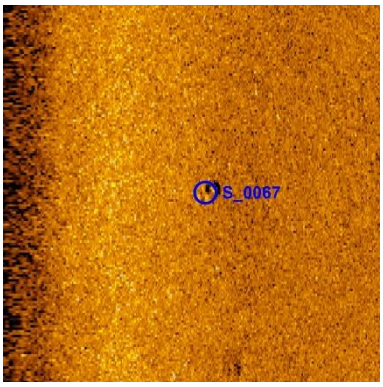
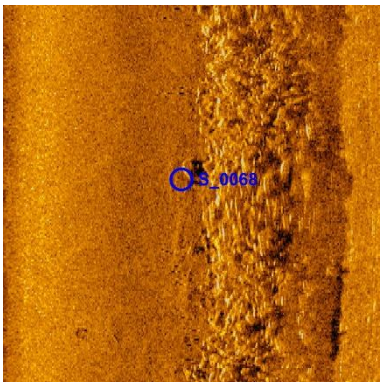
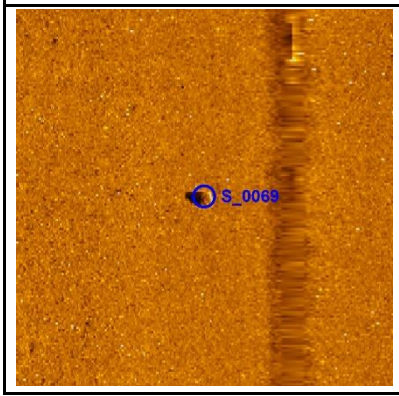
	**S_0050** • Sonar Time at Target: 26/07/2023 14:09:15 • Click Position 56.0020565855 -3.1989387400 (WGS84) (X) 325327.15 (Y) 679439.48 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 14.10 Meters • Fish Height: 5.26 Meters • Heading: 135.300 Degrees • Water Depth: 4.17 Meters	**Dimensions and attributes** • Target Width: 1.70 Meters • Target Height: 0.13 Meters • Target Length: 1.80 Meters • Target Shadow: 0.37 Meters • Description: Tire
	**S_0051** • Sonar Time at Target: 26/07/2023 14:14:41 • Click Position 55.9970236929 -3.1927607664 (WGS84) (X) 325702.76 (Y) 678872.69 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 23.94 Meters • Fish Height: 6.19 Meters • Heading: 141.200 Degrees • Water Depth: 4.22 Meters	**Dimensions and attributes** • Target Width: 1.55 Meters • Target Height: 0.25 Meters • Target Length: 1.64 Meters • Target Shadow: 1.01 Meters • Description: Small Object
	**S_0052** • Sonar Time at Target: 26/07/2023 14:14:52 • Click Position 55.9968681162 -3.1925234337 (WGS84) (X) 325717.26 (Y) 678855.12 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726145715.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151010.jsf • Range to target: 22.49 Meters • Fish Height: 5.75 Meters • Heading: 134.200 Degrees • Water Depth: 4.20 Meters	**Dimensions and attributes** • Target Width: 2.19 Meters • Target Height: 0.26 Meters • Target Length: 1.92 Meters • Target Shadow: 1.07 Meters • Description: Small Object

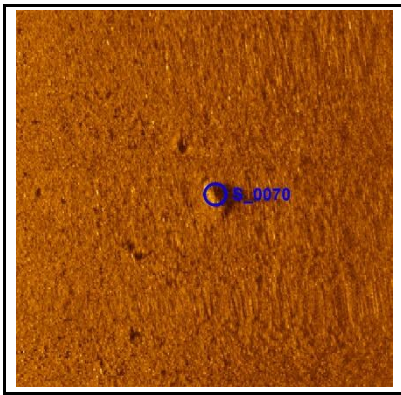
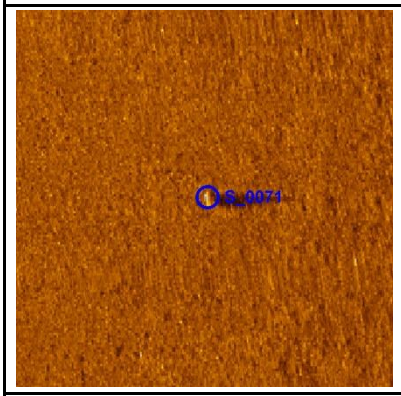
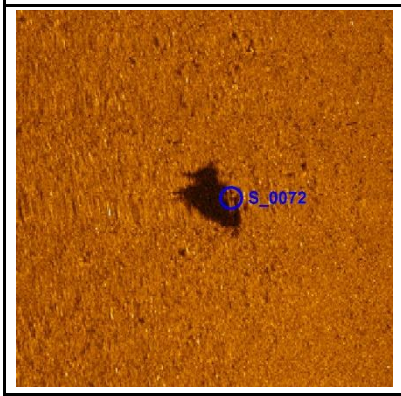
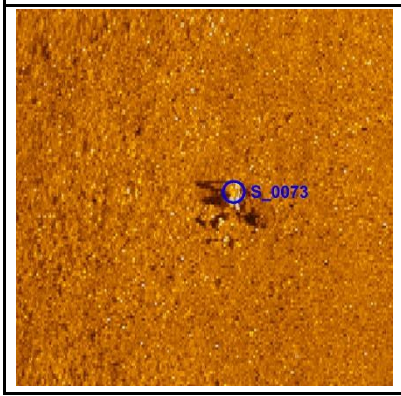
	**S_0053** • Sonar Time at Target: 26/07/2023 14:46:25 • Click Position 55.9950968971 -3.1902694154 (WGS84) (X) 325854.46 (Y) 678655.58 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726152631.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726153258.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726153925.jsf • Range to target: 19.15 Meters • Fish Height: 4.33 Meters • Heading: 141.500 Degrees • Water Depth: 4.16 Meters	**Dimensions and attributes** • Target Width: 1.37 Meters • Target Height: 0.06 Meters • Target Length: 1.07 Meters • Target Shadow: 0.27 Meters • Description: Circular Object/Tire
	**S_0054** • Sonar Time at Target: 26/07/2023 14:46:24 • Click Position 55.9951301070 -3.1902669836 (WGS84) (X) 325854.67 (Y) 678659.27 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726152631.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726153258.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726153925.jsf • Range to target: 21.37 Meters • Fish Height: 4.33 Meters • Heading: 137.300 Degrees • Water Depth: 4.13 Meters	**Dimensions and attributes** • Target Width: 1.55 Meters • Target Height: 0.04 Meters • Target Length: 1.18 Meters • Target Shadow: 0.20 Meters • Description: Circular Object
	**S_0055** • Sonar Time at Target: 27/07/2023 10:21:58 • Click Position 55.9939169868 -3.1929522453 (WGS84) (X) 325684.84 (Y) 678527.15 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727111029.jsf • Range to target: 37.20 Meters • Fish Height: 6.96 Meters • Heading: 311.800 Degrees • Water Depth: 2.41 Meters	**Dimensions and attributes** • Target Width: 0.40 Meters • Target Height: 0.04 Meters • Target Length: 5.33 Meters • Target Shadow: 0.22 Meters • Description: Unkown Object

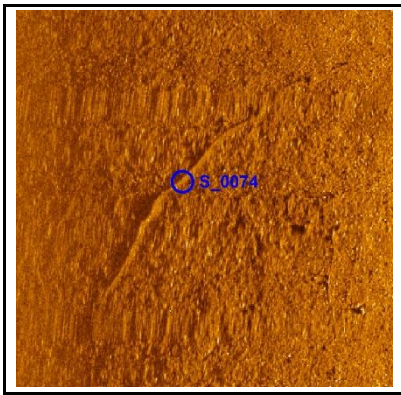
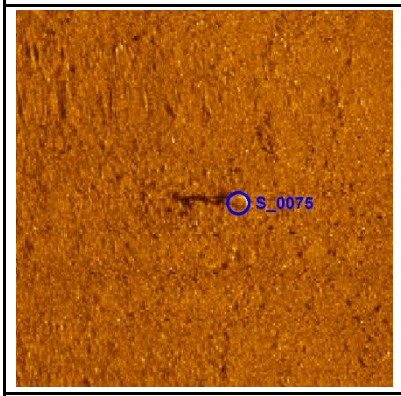
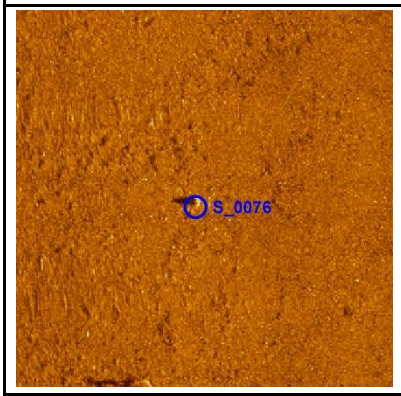
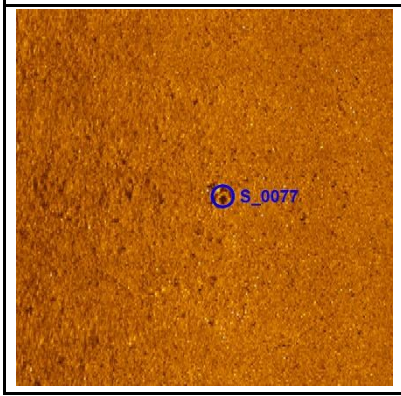
	**S_0056** • Sonar Time at Target: 27/07/2023 10:33:41 • Click Position 55.9994535253 -3.1991716495 (WGS84) (X) 325307.60 (Y) 679150.04 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727111939.jsf • Range to target: 30.27 Meters • Fish Height: 8.52 Meters • Heading: 141.200 Degrees • Water Depth: 2.45 Meters	**Dimensions and attributes** • Target Width: 1.05 Meters • Target Height: 0.22 Meters • Target Length: 2.27 Meters • Target Shadow: 0.81 Meters • Description: Small Object
	**S_0057** • Sonar Time at Target: 27/07/2023 10:39:27 • Click Position 56.0003524509 -3.2005026136 (WGS84) (X) 325226.33 (Y) 679251.52 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727112619.jsf • Range to target: 46.03 Meters • Fish Height: 8.43 Meters • Heading: 327.700 Degrees • Water Depth: 2.56 Meters	**Dimensions and attributes** • Target Width: 0.55 Meters • Target Height: 0.34 Meters • Target Length: 3.44 Meters • Target Shadow: 1.99 Meters • Description: Small Object
	**S_0058** • Sonar Time at Target: 27/07/2023 07:54:55 • Click Position 55.9892370110 -3.1869143420 (WGS84) (X) 326052.53 (Y) 677999.82 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727084309.jsf • Range to target: 26.56 Meters • Fish Height: 3.75 Meters • Heading: 49.300 Degrees • Water Depth: 2.65 Meters	**Dimensions and attributes** • Target Width: 0.49 Meters • Target Height: 0.29 Meters • Target Length: 1.28 Meters • Target Shadow: 2.27 Meters • Description: Small Object
	**S_0059** • Sonar Time at Target: 26/07/2023 14:28:25 • Click Position 55.9956799771 -3.1913802527 (WGS84) (X) 325786.29 (Y) 678721.66 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151123.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726152417.jsf • Range to target: 17.08 Meters • Fish Height: 5.26 Meters • Heading: 333.600 Degrees • Water Depth: 4.28 Meters	**Dimensions and attributes** • Target Width: 0.59 Meters • Target Height: 0.41 Meters • Target Length: 1.50 Meters • Target Shadow: 1.43 Meters • Description: Small Object

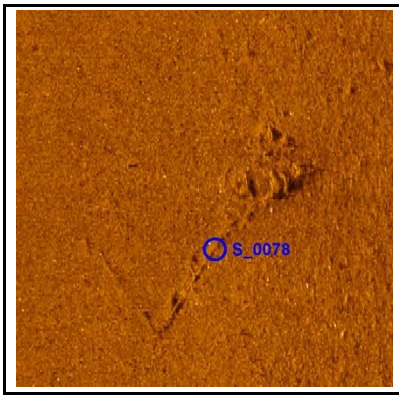
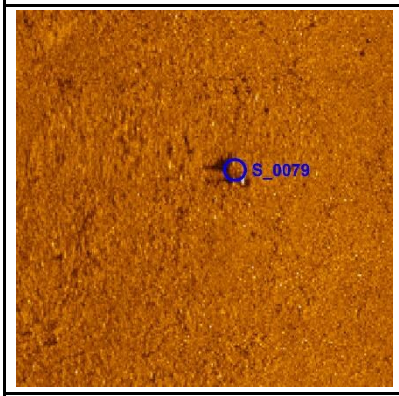
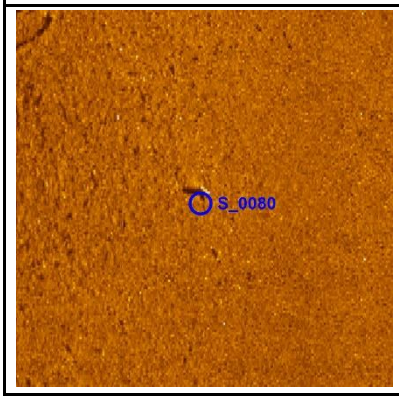
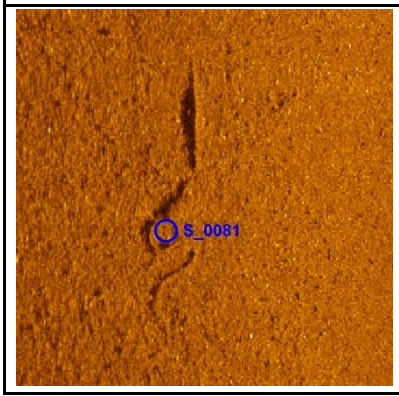
	**S_0060** • Sonar Time at Target: 26/07/2023 14:28:29 • Click Position 55.9957174426 -3.1914920969 (WGS84) (X) 325779.38 (Y) 678725.95 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151123.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726152417.jsf • Range to target: 20.49 Meters • Fish Height: 5.26 Meters • Heading: 328.400 Degrees • Water Depth: 4.28 Meters	**Dimensions and attributes** • Target Width: 0.85 Meters • Target Height: 0.39 Meters • Target Length: 1.70 Meters • Target Shadow: 1.68 Meters • Description: Small Object
	**S_0061** • Sonar Time at Target: 26/07/2023 14:28:29 • Click Position 55.9956439372 -3.1916602646 (WGS84) (X) 325768.75 (Y) 678717.95 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726151123.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726152417.jsf • Range to target: 33.77 Meters • Fish Height: 5.26 Meters • Heading: 330.900 Degrees • Water Depth: 4.28 Meters	**Dimensions and attributes** • Target Width: 0.81 Meters • Target Height: 0.19 Meters • Target Length: 0.94 Meters • Target Shadow: 1.32 Meters • Description: Circular Object
	**S_0062** • Sonar Time at Target: 26/07/2023 14:41:18 • Click Position 55.9995760327 -3.1963349597 (WGS84) (X) 325484.75 (Y) 679160.60 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726152631.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726153925.jsf • Range to target: 9.02 Meters • Fish Height: 5.31 Meters • Heading: 130.400 Degrees • Water Depth: 4.14 Meters	**Dimensions and attributes** • Target Width: 0.89 Meters • Target Height: 0.07 Meters • Target Length: 1.00 Meters • Target Shadow: 0.12 Meters • Description: Tire

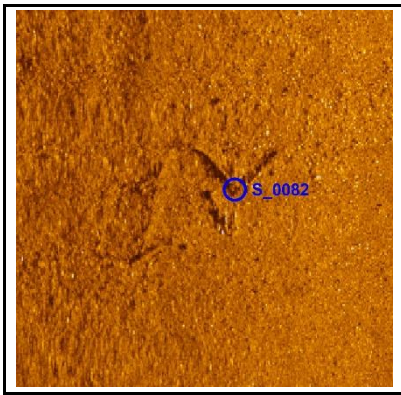
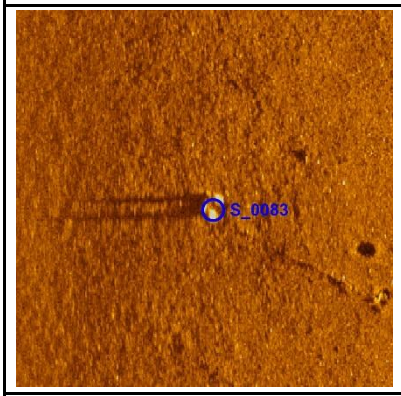
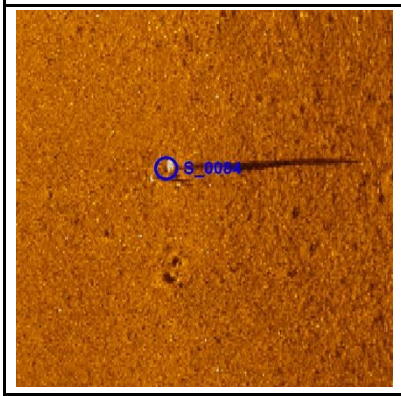
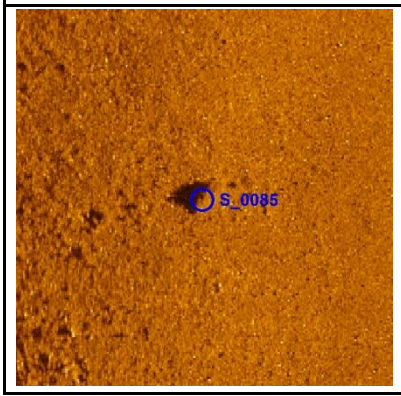
	**S_0063** • Sonar Time at Target: 26/07/2023 13:17:40 • Click Position 55.9950659445 -3.1880505474 (WGS84) (X) 325992.80 (Y) 678649.75 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726135620.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726140914.jsf • Range to target: 14.50 Meters • Fish Height: 3.80 Meters • Heading: 137.800 Degrees • Water Depth: 4.31 Meters	**Dimensions and attributes** • Target Width: 1.36 Meters • Target Height: 0.33 Meters • Target Length: 3.79 Meters • Target Shadow: 1.39 Meters • Description: Unkown Object
	**S_0064** • Sonar Time at Target: 26/07/2023 13:20:12 • Click Position 55.9931052567 -3.1856367484 (WGS84) (X) 326139.62 (Y) 678428.96 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726135620.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726140914.jsf • Range to target: 16.65 Meters • Fish Height: 2.92 Meters • Heading: 128.300 Degrees • Water Depth: 4.13 Meters	**Dimensions and attributes** • Target Width: 1.05 Meters • Target Height: 0.17 Meters • Target Length: 26.21 Meters • Target Shadow: 1.05 Meters • Description: Long Object
	**S_0065** • Sonar Time at Target: 26/07/2023 13:24:56 • Click Position 55.9916479881 -3.1846236941 (WGS84) (X) 326200.03 (Y) 678265.69 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726141310.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726141937.jsf • Range to target: 32.89 Meters • Fish Height: 4.24 Meters • Heading: 318.400 Degrees • Water Depth: 3.61 Meters	**Dimensions and attributes** • Target Width: 1.59 Meters • Target Height: 0.24 Meters • Target Length: 11.98 Meters • Target Shadow: 2.01 Meters • Description: Long Objects

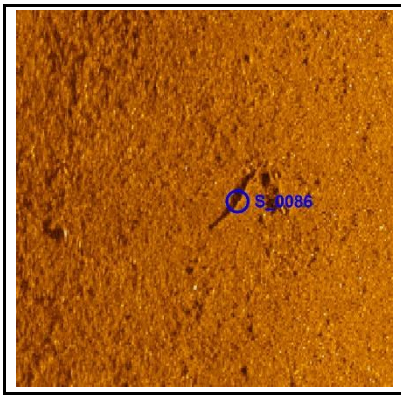
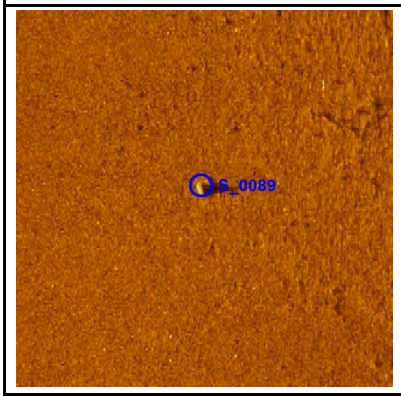
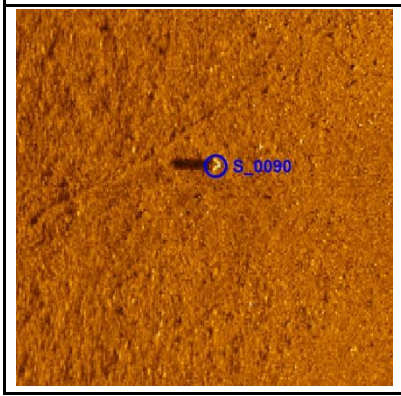
	**S_0066** • Sonar Time at Target: 26/07/2023 13:40:37 • Click Position 56.0005963285 -3.1954204016 (WGS84) (X) 325543.76 (Y) 679273.16 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726142637.jsf-C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230726143931.jsf • Range to target: 20.57 Meters • Fish Height: 5.50 Meters • Heading: 138.800 Degrees • Water Depth: 4.18 Meters	**Dimensions and attributes** • Target Width: 0.53 Meters • Target Height: 0.27 Meters • Target Length: 4.24 Meters • Target Shadow: 1.05 Meters • Description: Small Object
	**S_0067** • Sonar Time at Target: 27/07/2023 09:50:07 • Click Position 55.9990737368 -3.1965014905 (WGS84) (X) 325473.40 (Y) 679104.88 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727103424.jsf • Range to target: 15.37 Meters • Fish Height: 9.01 Meters • Heading: 327.200 Degrees • Water Depth: 2.55 Meters	**Dimensions and attributes** • Target Width: 1.49 Meters • Target Height: 0.13 Meters • Target Length: 1.10 Meters • Target Shadow: 0.22 Meters • Description: Circular Object/Tire
	**S_0068** • Sonar Time at Target: 27/07/2023 07:55:03 • Click Position 55.9890236367 -3.1862583989 (WGS84) (X) 326093.04 (Y) 677975.37 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: C:\SonarWiz-Projects\A8764_Leith Approaches_SideScan\SSS\20230727084309.jsf • Range to target: 17.60 Meters • Fish Height: 3.65 Meters • Heading: 57.700 Degrees • Water Depth: 2.67 Meters	**Dimensions and attributes** • Target Width: 0.41 Meters • Target Height: 0.29 Meters • Target Length: 3.50 Meters • Target Shadow: 1.53 Meters • Description: Possible Rope
	**S_0069** • Sonar Time at Target: 09/08/2023 11:47:24 • Click Position 56.0000934758 -3.2021272880 (WGS84) (X) 325124.50 (Y) 679224.46 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809123548.jsf • Range to target: 4.83 Meters • Fish Height: 2.68 Meters • Heading: 0.000 Degrees • Water Depth: 6.82 Meters	**Dimensions and attributes** • Target Width: 0.64 Meters • Target Height: 0.40 Meters • Target Length: 0.79 Meters • Target Shadow: 0.85 Meters • Description: Object

	**S_0070** • Sonar Time at Target: 09/08/2023 11:50:43 • Click Position 56.0028141371 -3.2049364794 (WGS84) (X) 324954.59 (Y) 679530.30 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809123721.jsf • Range to target: 31.20 Meters • Fish Height: 2.87 Meters • Heading: 0.000 Degrees • Water Depth: 7.10 Meters	**Dimensions and attributes** • Target Width: 0.61 Meters • Target Height: 0.16 Meters • Target Length: 2.28 Meters • Target Shadow: 1.94 Meters • Description: Debris
	**S_0071** • Sonar Time at Target: 09/08/2023 11:53:04 • Click Position 56.0045916828 -3.2072838630 (WGS84) (X) 324811.66 (Y) 679730.68 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809123721.jsf • Range to target: 26.48 Meters • Fish Height: 3.80 Meters • Heading: 0.000 Degrees • Water Depth: 7.04 Meters	**Dimensions and attributes** • Target Width: 0.54 Meters • Target Height: 0.48 Meters • Target Length: 0.96 Meters • Target Shadow: 3.86 Meters • Description: Debris
	**S_0072** • Sonar Time at Target: 09/08/2023 11:53:40 • Click Position 56.0047706721 -3.2084351398 (WGS84) (X) 324740.22 (Y) 679751.86 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809123721.jsf • Range to target: 23.29 Meters • Fish Height: 3.60 Meters • Heading: 0.000 Degrees • Water Depth: 7.72 Meters	**Dimensions and attributes** • Target Width: 1.04 Meters • Target Height: 0.41 Meters • Target Length: 3.84 Meters • Target Shadow: 2.95 Meters • Description: Debris
	**S_0073** • Sonar Time at Target: 09/08/2023 11:57:10 • Click Position 56.0047619734 -3.2071545414 (WGS84) (X) 324820.06 (Y) 679749.49 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809124433.jsf • Range to target: 14.22 Meters • Fish Height: 2.73 Meters • Heading: 0.000 Degrees • Water Depth: 8.28 Meters	**Dimensions and attributes** • Target Width: 0.42 Meters • Target Height: 0.18 Meters • Target Length: 1.38 Meters • Target Shadow: 1.01 Meters • Description: Irregular object

	**S_0074** • Sonar Time at Target: 09/08/2023 11:57:46 • Click Position 56.0044185214 -3.2063375402 (WGS84) (X) 324870.34 (Y) 679710.38 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809124433.jsf • Range to target: 34.12 Meters • Fish Height: 2.00 Meters • Heading: 0.000 Degrees • Water Depth: 8.46 Meters	**Dimensions and attributes** • Target Width: 0.40 Meters • Target Height: 0.02 Meters • Target Length: 24.78 Meters • Target Shadow: 0.43 Meters • Description: Long object
	**S_0075** • Sonar Time at Target: 09/08/2023 12:07:02 • Click Position 56.0049881997 -3.2077777830 (WGS84) (X) 324781.63 (Y) 679775.35 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809125050.jsf • Range to target: 22.18 Meters • Fish Height: 3.56 Meters • Heading: 0.000 Degrees • Water Depth: 8.16 Meters	**Dimensions and attributes** • Target Width: 0.49 Meters • Target Height: 0.32 Meters • Target Length: 1.07 Meters • Target Shadow: 2.23 Meters • Description: Debris
	**S_0076** • Sonar Time at Target: 09/08/2023 12:07:09 • Click Position 56.0050823307 -3.2078356623 (WGS84) (X) 324778.21 (Y) 679785.89 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809125050.jsf • Range to target: 19.15 Meters • Fish Height: 3.46 Meters • Heading: 0.000 Degrees • Water Depth: 8.38 Meters	**Dimensions and attributes** • Target Width: 0.26 Meters • Target Height: 0.22 Meters • Target Length: 0.64 Meters • Target Shadow: 1.32 Meters • Description: Debris
	**S_0077** • Sonar Time at Target: 09/08/2023 12:13:03 • Click Position 56.0025900796 -3.2033056982 (WGS84) (X) 325055.85 (Y) 679503.59 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809125730.jsf • Range to target: 18.52 Meters • Fish Height: 2.97 Meters • Heading: 0.000 Degrees • Water Depth: 6.76 Meters	**Dimensions and attributes** • Target Width: 1.04 Meters • Target Height: 0.03 Meters • Target Length: 1.16 Meters • Target Shadow: 0.21 Meters • Description: Tire

	**S_0078** • Sonar Time at Target: 09/08/2023 12:29:20 • Click Position 56.0018337355 -3.2010133253 (WGS84) (X) 325197.35 (Y) 679416.93 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809131742.jsf • Range to target: 17.88 Meters • Fish Height: 3.51 Meters • Heading: 0.000 Degrees • Water Depth: 6.22 Meters	**Dimensions and attributes** • Target Width: 2.05 Meters • Target Height: 0.08 Meters • Target Length: 14.74 Meters • Target Shadow: 0.40 Meters • Description: Irregular/long object(s)
	**S_0079** • Sonar Time at Target: 09/08/2023 12:33:54 • Click Position 56.0051508597 -3.2059825287 (WGS84) (X) 324893.90 (Y) 679791.50 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809131742.jsf • Range to target: 22.13 Meters • Fish Height: 3.31 Meters • Heading: 0.000 Degrees • Water Depth: 8.45 Meters	**Dimensions and attributes** • Target Width: 0.76 Meters • Target Height: 0.17 Meters • Target Length: 1.42 Meters • Target Shadow: 1.25 Meters • Description: Object
	**S_0080** • Sonar Time at Target: 09/08/2023 13:01:58 • Click Position 56.0044239306 -3.2030647473 (WGS84) (X) 325074.44 (Y) 679707.42 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809134705.jsf • Range to target: 19.42 Meters • Fish Height: 3.46 Meters • Heading: 0.000 Degrees • Water Depth: 6.79 Meters	**Dimensions and attributes** • Target Width: 0.29 Meters • Target Height: 0.14 Meters • Target Length: 0.49 Meters • Target Shadow: 0.87 Meters • Description: Debris
	**S_0081** • Sonar Time at Target: 09/08/2023 13:02:04 • Click Position 56.0044557447 -3.2033006020 (WGS84) (X) 325059.79 (Y) 679711.22 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809134705.jsf • Range to target: 29.08 Meters • Fish Height: 3.31 Meters • Heading: 0.000 Degrees • Water Depth: 7.03 Meters	**Dimensions and attributes** • Target Width: 0.24 Meters • Target Height: 0.03 Meters • Target Length: 16.48 Meters • Target Shadow: 0.33 Meters • Description: Rope?

	**S_0082** • Sonar Time at Target: 09/08/2023 13:06:27 • Click Position 56.0053450779 -3.2027905078 (WGS84) (X) 325093.33 (Y) 679809.64 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809135402.jsf • Range to target: 23.19 Meters • Fish Height: 2.73 Meters • Heading: 0.000 Degrees • Water Depth: 8.38 Meters	**Dimensions and attributes** • Target Width: 5.98 Meters • Target Height: 0.07 Meters • Target Length: 8.43 Meters • Target Shadow: 0.63 Meters • Description: Irregular debris
	**S_0083** • Sonar Time at Target: 09/08/2023 13:09:16 • Click Position 56.0032204745 -3.1999233045 (WGS84) (X) 325268.01 (Y) 679570.08 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809135402.jsf • Range to target: 34.38 Meters • Fish Height: 2.78 Meters • Heading: 0.000 Degrees • Water Depth: 7.02 Meters	**Dimensions and attributes** • Target Width: 1.43 Meters • Target Height: 0.54 Meters • Target Length: 2.13 Meters • Target Shadow: 8.44 Meters • Description: Debris
	**S_0084** • Sonar Time at Target: 09/08/2023 13:16:02 • Click Position 56.0034811188 -3.2001529334 (WGS84) (X) 325254.19 (Y) 679599.34 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809140228.jsf • Range to target: 16.77 Meters • Fish Height: 2.68 Meters • Heading: 0.000 Degrees • Water Depth: 7.12 Meters	**Dimensions and attributes** • Target Width: 0.37 Meters • Target Height: 0.99 Meters • Target Length: 1.41 Meters • Target Shadow: 9.96 Meters • Description: Debris
	**S_0085** • Sonar Time at Target: 09/08/2023 14:08:55 • Click Position 56.0051431029 -3.1986858903 (WGS84) (X) 325348.89 (Y) 679782.71 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809145600.jsf • Range to target: 19.63 Meters • Fish Height: 3.02 Meters • Heading: 0.000 Degrees • Water Depth: 7.58 Meters	**Dimensions and attributes** • Target Width: 0.73 Meters • Target Height: 0.25 Meters • Target Length: 1.99 Meters • Target Shadow: 1.74 Meters • Description: Debris

	**S_0086** • Sonar Time at Target: 09/08/2023 14:16:42 • Click Position 56.0043338167 -3.1980871912 (WGS84) (X) 325384.66 (Y) 679692.00 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809150302.jsf • Range to target: 22.92 Meters • Fish Height: 2.73 Meters • Heading: 0.000 Degrees • Water Depth: 7.42 Meters	**Dimensions and attributes** • Target Width: 0.33 Meters • Target Height: 0.05 Meters • Target Length: 4.32 Meters • Target Shadow: 0.44 Meters • Description: Long object
	**S_0088** • Sonar Time at Target: 09/08/2023 14:24:08 • Click Position 56.0035401209 -3.1955429103 (WGS84) (X) 325541.79 (Y) 679600.91 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809150910.jsf • Range to target: 27.33 Meters • Fish Height: 2.68 Meters • Heading: 0.000 Degrees • Water Depth: 7.35 Meters	**Dimensions and attributes** • Target Width: 0.95 Meters • Target Height: 0.19 Meters • Target Length: 0.85 Meters • Target Shadow: 2.12 Meters • Description: Tire
	**S_0089** • Sonar Time at Target: 09/08/2023 14:27:30 • Click Position 56.0047202839 -3.1968183137 (WGS84) (X) 325464.53 (Y) 679733.63 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809151436.jsf • Range to target: 18.20 Meters • Fish Height: 3.46 Meters • Heading: 0.000 Degrees • Water Depth: 6.99 Meters	**Dimensions and attributes** • Target Width: 0.40 Meters • Target Height: 0.29 Meters • Target Length: 0.89 Meters • Target Shadow: 1.72 Meters • Description: Debris
	**S_0090** • Sonar Time at Target: 09/08/2023 14:42:55 • Click Position 56.0051630298 -3.1956564506 (WGS84) (X) 325537.84 (Y) 679781.65 (Projected Coordinates) • Map Projection: OSGB-GPS-2002 • Acoustic Source File: P:\Hydro Dump\A8751 - A8800\A8764_Leith Extra Area_SSS_20230808\20230809152952.jsf • Range to target: 25.95 Meters • Fish Height: 3.46 Meters • Heading: 0.000 Degrees • Water Depth: 7.51 Meters	**Dimensions and attributes** • Target Width: 0.54 Meters • Target Height: 0.25 Meters • Target Length: 0.81 Meters • Target Shadow: 2.09 Meters • Description: Debris

7. MAGNETOMETER SURVEY

A magnetometer survey was undertaken to detect any significant ferrous objects either at seabed or slightly buried.

The survey was undertaken utilising a single G882 magnetometer, completed at 15m line spacings. The G882 sensor can detect and resolve magnetic anomalies of as little as 0.02nT and can detect items such as wreck debris, buried cables & pipelines.

The system was towed at a distance such that the vessel did not affect the detection range of the G882 or any riverbed object's magnetic signature. The equipment used is listed below.

Survey Vessel	Coastal Sensor II
Positioning System	Trimble Applanix POS MV
GPS Correction Source	Trimble VRS NOW Network RTK
Magnetometer	Geometrics 882
Motion Compensator	Trimble Applanix POS MV

Confidence checks were conducted prior to operation to ensure that the sensor was functioning correctly. At mobilisation, the scale and bias settings were checked and inserted in the logging software. The system was lowered overboard to check that the altimeter and depth sensor were reading correctly prior to commencing data acquisition.

FIGURE 7 - GEOMATRICS G882 MAGNETOMETER

The magnetometer towfish was towed behind the survey vessel using a soft-tow cable with positioning achieved by inputting the offsets from the GPS antenna to the tow point and recording the length of cable out (layback). The layback was inserted into the data gathering software in real time such that the position of the system logged was the most probable position at all times.

It should, however, be noted that there is always an element of uncertainty in the position of a towfish in shallow water such as this when USBL is not feasible to provide accurate positioning. The magnetometer positioning is considered to be accurate to ±2m as a result.

Survey lines were run on 15m line spacings and the fish height (altitude) above the seabed was kept below 4m to achieve higher object sensitivity as per the client's request.

Data was gathered in Hypack proprietary software where navigation and magnetic data sets can be brought together to allow full utilisation of the data available and cross-correlated with the multibeam and side-scan data but is not being used as part of a UXO detection campaign.

It should be noted that the system's Limit of Detection (LoD) are influenced by several factors therefore it is difficult to quantify exact potential results. The influencing factors include,

- Size of Target.
- Surrounding Background 'Noise' In Survey Area.
- State of Target (Solid / Hollow).

As a result, no guarantee can be given on the accuracy or level of detection achievable on-site.

Following assessment of the data sets several significant target locations have been identifed and this information has been supplied in the form of maximum & minimum gratio readings and the resultant Peak to Peak values.

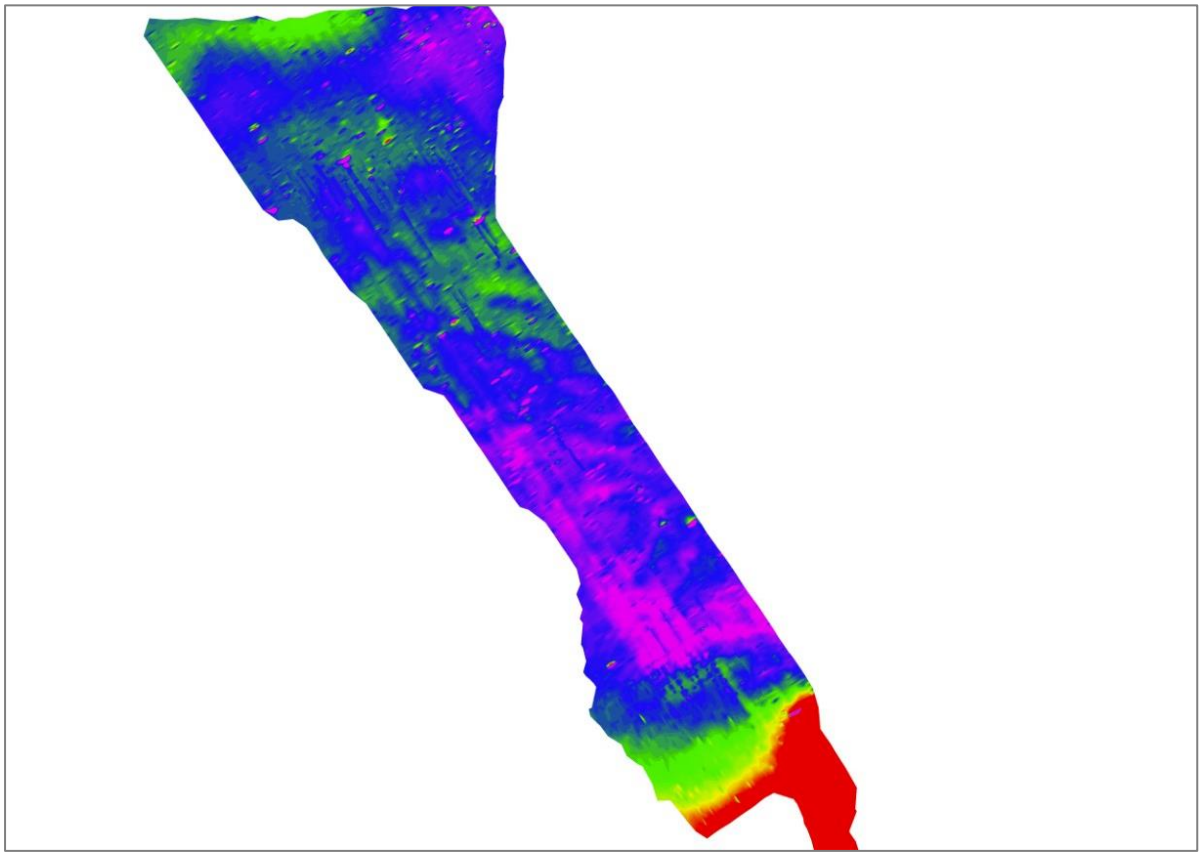


FIGURE 8 - MAGNETOMETER GAMMA

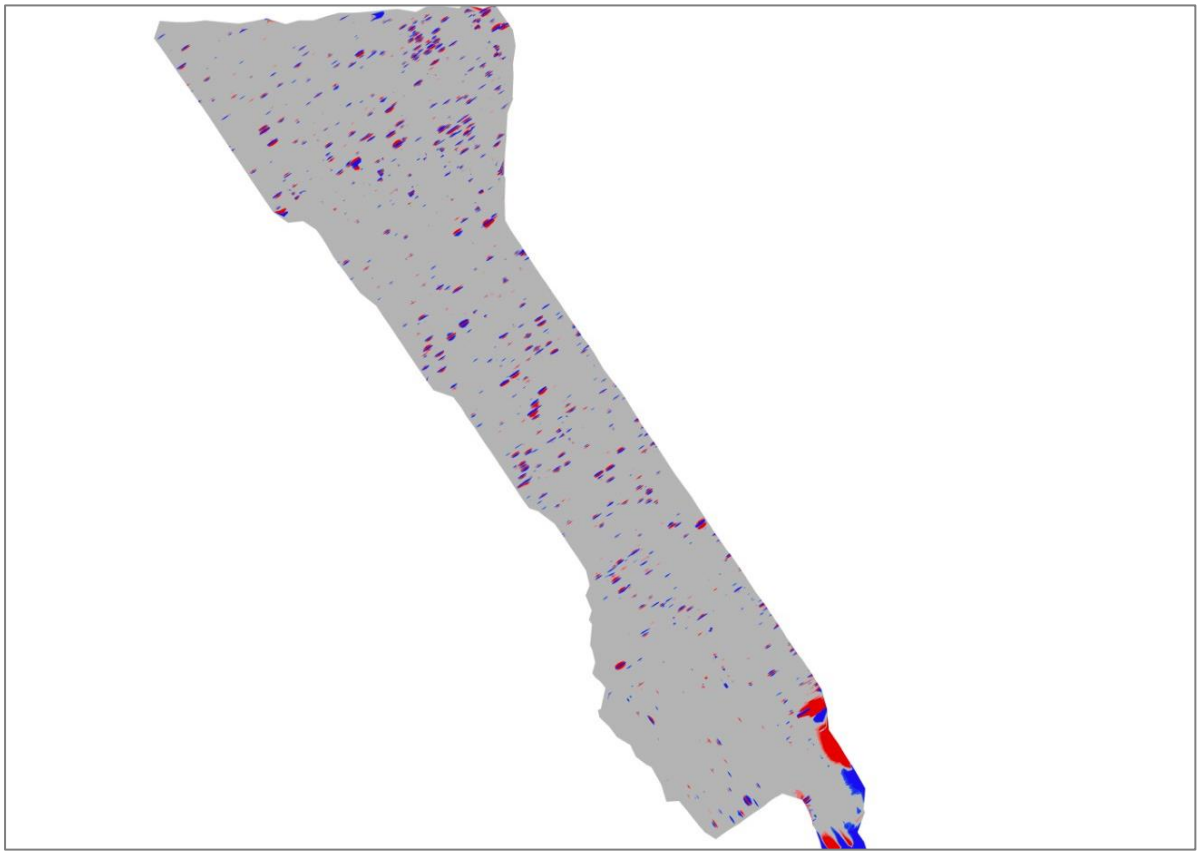


FIGURE 9 - MAGNETOMETER GRATIO

A total of 467 (Gratio) magnetic target were identified. It is not possible to quantify the characteristics of each target that has been identified, but it is to be assumed that the larger the Peak to Peak [PtP] value, the larger the object in terms of ferrous mass.

Name	WGS84 Latitude	WGS84 Longitude	X	Y	Peak Min	Peak Max	Peak Spread
GR1	56 0.259658 N	003 12.475677 W	324770.99	679702	-2.45	0.98	3.43
GR2	56 0.238373 N	003 12.44711 W	324799.99	679662	-1.64	2.2	3.84
GR3	56 0.177657 N	003 12.371133 W	324876.99	679548	-1.45	2.63	4.09
GR4	56 0.100609 N	003 12.256169 W	324993.99	679403	-16.78	16.34	33.13
GR5	56 0.152797 N	003 12.322254 W	324926.99	679501	-2.92	2.2	5.12
GR6	56 0.284336 N	003 12.487993 W	324758.99	679748	-3.24	7.15	10.39
GR7	56 0.321611 N	003 12.535341 W	324711	679818	-1.18	2.97	4.15
GR8	56 0.12369 N	003 12.266508 W	324983.99	679446	-3.4	7.78	11.19
GR9	56 0.220084 N	003 12.38785 W	324860.99	679627	-0.86	3.29	4.15
GR10	56 0.241908 N	003 12.416432 W	324831.99	679668	-1.77	1.63	3.4
GR11	56 0.224499 N	003 12.377404 W	324871.99	679635	-1.2	1.18	2.38
GR12	56 0.268724 N	003 12.430739 W	324817.99	679718	-4.9	2.29	7.19
GR13	56 0.307067 N	003 12.479081 W	324768.99	679790	-6.58	3.95	10.53
GR14	56 0.141069 N	003 12.25358 W	324997.99	679478	-0.79	2.32	3.11
GR15	56 0.119225 N	003 12.226924 W	325024.99	679437	-3.95	7.24	11.19
GR16	56 0.129353 N	003 12.238784 W	325012.99	679456	-1.63	1.75	3.38
GR17	56 0.134827 N	003 12.230296 W	325021.99	679466	-3.31	1.38	4.7
GR18	56 0.14868 N	003 12.247083 W	325004.99	679492	-3.31	4.4	7.72
GR19	56 0.246681 N	003 12.369437 W	324880.99	679676	-3.61	1.16	4.77
GR20	56 0.245253 N	003 12.35015 W	324900.99	679673	-0.89	2.11	3
GR21	56 0.207996 N	003 12.300883 W	324950.99	679603	-6.9	5.06	11.95
GR22	56 0.2048 N	003 12.296935 W	324954.99	679597	-11.29	18.96	30.26
GR23	56 0.18934 N	003 12.279136 W	324972.99	679568	-14.09	21.6	35.69
GR24	56 0.114967 N	003 12.166181 W	325087.99	679428	-1.48	1.4	2.88
GR25	56 0.243314 N	003 12.327961 W	324923.99	679669	-2.06	0.75	2.82
GR26	56 0.275256 N	003 12.369366 W	324881.99	679729	-1.75	0.64	2.39
GR27	56 0.225886 N	003 12.290857 W	324961.99	679636	-1.14	1.84	2.97
GR28	56 0.191455 N	003 12.22821 W	325025.99	679571	-3.27	1.65	4.92
GR29	56 0.218083 N	003 12.261751 W	324991.99	679621	-4.97	2.52	7.49
GR30	56 0.248967 N	003 12.301197 W	324951.99	679679	-3.76	2.99	6.75
GR31	56 0.27185 N	003 12.331736 W	324920.99	679722	-1.82	1.41	3.23
GR32	56 0.289428 N	003 12.353451 W	324898.99	679755	-0.98	1.77	2.75
GR33	56 0.326362 N	003 12.380581 W	324871.99	679824	-1.86	1.54	3.4
GR34	56 0.190017 N	003 12.209885 W	325044.99	679568	-1.9	1.93	3.83
GR35	56 0.217363 N	003 12.225168 W	325029.99	679619	-1.81	1.45	3.27
GR36	56 0.16942 N	003 12.16595 W	325089.99	679529	-1.14	1.25	2.39
GR37	56 0.156115 N	003 12.148219 W	325107.99	679504	-1.52	1.48	3
GR38	56 0.330966 N	003 12.350898 W	324902.99	679832	-1.5	4.36	5.85

GR39	56 0.275044 N	003 12.280843 W	324973.99	679727	-1.39	2.29	3.68
GR40	56 0.262779 N	003 12.266991 W	324987.99	679704	-2.27	2.59	4.85
GR41	56 0.170128 N	003 12.148654 W	325107.99	679530	-2.79	2.52	5.32
GR42	56 0.152549 N	003 12.126942 W	325129.99	679497	-2.81	2.63	5.44
GR43	56 0.14155 N	003 12.093889 W	325163.99	679476	-1.81	2.47	4.29
GR44	56 0.187867 N	003 12.154016 W	325102.99	679563	-4.01	4.02	8.03
GR45	56 0.28587 N	003 12.276369 W	324978.99	679747	-1.72	0.86	2.58
GR46	56 0.266342 N	003 12.233427 W	325022.99	679710	-1.09	1.95	3.04
GR47	56 0.239175 N	003 12.199869 W	325056.99	679659	-1.43	2.17	3.61
GR48	56 0.163544 N	003 12.105155 W	325152.99	679517	-4.13	3.2	7.32
GR49	56 0.167978 N	003 12.092785 W	325165.99	679525	-36.4	25.64	62.04
GR50	56 0.287446 N	003 12.225425 W	325031.99	679749	-2.73	4.02	6.74
GR51	56 0.270415 N	003 12.202765 W	325054.99	679717	-1.73	2.16	3.88
GR52	56 0.250699 N	003 12.179061 W	325078.99	679680	-1.95	5.24	7.19
GR53	56 0.215021 N	003 12.133694 W	325124.99	679613	-1	2.2	3.2
GR54	56 0.178265 N	003 12.088294 W	325170.99	679544	-2.04	1.5	3.54
GR55	56 0.152873 N	003 12.038438 W	325221.99	679496	-13.29	4.11	17.4
GR56	56 0.202944 N	003 12.100606 W	325158.99	679590	-3.06	3.72	6.78
GR57	56 0.310518 N	003 12.236726 W	325020.99	679792	-0.98	1.52	2.49
GR58	56 0.309628 N	003 12.217463 W	325040.98	679790	-1.7	5.01	6.72
GR59	56 0.301628 N	003 12.208547 W	325049.99	679775	-1.7	3.2	4.9
GR60	56 0.196721 N	003 12.075398 W	325184.99	679578	-3.15	5.9	9.05
GR61	56 0.169014 N	003 12.041826 W	325218.99	679526	-3.99	1.86	5.85
GR62	56 0.133334 N	003 11.996461 W	325264.99	679459	-2.04	1.29	3.33
GR63	56 0.129449 N	003 12.007886 W	325252.99	679452	-1.43	0.63	2.07
GR64	56 0.128334 N	003 12.0117 W	325248.99	679450	-1.68	0.82	2.5
GR65	56 0.157836 N	003 12.027047 W	325233.99	679505	-1.06	1.31	2.38
GR66	56 0.207752 N	003 12.160407 W	325096.99	679600	-1.84	1.86	3.7
GR67	56 0.126051 N	003 11.969296 W	325292.99	679445	-15.84	6.5	22.35
GR68	56 0.198488 N	003 12.060059 W	325200.99	679581	-5.47	5.13	10.6
GR69	56 0.238998 N	003 12.107499 W	325152.99	679657	-1.38	2.67	4.06
GR70	56 0.262403 N	003 12.139977 W	325119.99	679701	-2.36	2.07	4.43
GR71	56 0.131544 N	003 11.958883 W	325303.99	679455	-4.42	4.15	8.57
GR72	56 0.125151 N	003 11.950988 W	325311.99	679443	-1.52	3.34	4.86
GR73	56 0.139173 N	003 11.950461 W	325312.99	679469	-2.01	0.72	2.74
GR75	56 0.22813 N	003 12.060979 W	325200.99	679636	-2.32	2.15	4.47
GR76	56 0.243563 N	003 12.081663 W	325179.99	679665	-0.57	1.75	2.32
GR77	56 0.288301 N	003 12.137896 W	325122.99	679749	-2.22	3.06	5.28
GR78	56 0.292565 N	003 12.142839 W	325117.99	679757	-0.97	2.49	3.47
GR79	56 0.300546 N	003 12.153671 W	325106.99	679772	-2.95	1.48	4.42
GR74	56 0.131173 N	003 11.941554 W	325321.99	679454	-1.32	0.57	1.89
GR80	56 0.202729 N	003 12.012084 W	325250.99	679588	-5.86	8.62	14.48
GR81	56 0.190473 N	003 11.997272 W	325265.99	679565	-10.79	23.57	34.36
GR82	56 0.234682 N	003 12.052523 W	325209.99	679648	-0.75	1.36	2.11

GR83	56 0.170962 N	003 11.952409 W	325311.99	679528	-0.77	2.27	3.04
GR84	56 0.195436 N	003 11.98588 W	325277.99	679574	-7.37	2.5	9.87
GR85	56 0.251891 N	003 12.056906 W	325205.99	679680	-1.98	1.65	3.63
GR86	56 0.290246 N	003 12.104281 W	325157.99	679752	-2.34	3.93	6.27
GR87	56 0.233942 N	003 12.017863 W	325245.99	679646	-8.62	12.15	20.77
GR88	56 0.246178 N	003 12.034599 W	325228.99	679669	-2.31	2.65	4.97
GR89	56 0.21692 N	003 11.994243 W	325269.99	679614	-3.56	5.81	9.37
GR90	56 0.171103 N	003 11.937981 W	325326.99	679528	-2.09	3.15	5.24
GR91	56 0.121039 N	003 11.874854 W	325390.99	679434	-3.34	1.57	4.9
GR92	56 0.196842 N	003 11.952249 W	325312.99	679576	-1.43	2.9	4.33
GR93	56 0.241042 N	003 12.008462 W	325255.99	679659	-4.01	1.75	5.76
GR94	56 0.303889 N	003 12.087386 W	325175.99	679777	-7.78	9.12	16.91
GR95	56 0.348256 N	003 12.126289 W	325136.99	679860	-1.29	3.02	4.31
GR96	56 0.299793 N	003 12.065129 W	325198.99	679769	-0.95	2.32	3.26
GR97	56 0.16239 N	003 11.891528 W	325374.99	679511	-0.79	2.63	3.42
GR98	56 0.153869 N	003 11.880681 W	325385.99	679495	-1.04	3.4	4.44
GR99	56 0.111954 N	003 11.811071 W	325457	679416	-6.4	6.53	12.93
GR100	56 0.183334 N	003 11.899874 W	325366.99	679550	-8.21	2.7	10.91
FR101	56 0.192394 N	003 11.910739 W	325355.99	679567	-8.82	4.38	13.2
GR102	56 0.305286 N	003 12.054715 W	325209.99	679779	-2.2	1.93	4.13
GR105	56 0.343111 N	003 12.101112 W	325162.99	679850	-1.41	0.57	1.97
GR106	56 0.345928 N	003 12.088691 W	325175.99	679855	-1.29	0.63	1.93
GR107	56 0.303856 N	003 12.035427 W	325229.99	679776	-1.95	2.38	4.33
GR103	56 0.19468 N	003 11.897339 W	325369.99	679571	-0.59	2.11	2.7
GR104	56 0.161118 N	003 11.855889 W	325411.99	679508	-2.54	4.11	6.65
GR108	56 0.145146 N	003 11.83519 W	325433	679478	-1.9	4.54	6.44
GR109	56 0.133588 N	003 11.804043 W	325465	679456	-8.6	8.48	17.08
GR110	56 0.185269 N	003 11.867221 W	325400.99	679553	-3.04	1.3	4.34
GR111	56 0.21083 N	003 11.899764 W	325367.99	679601	-6.92	4.01	10.93
GR112	56 0.224145 N	003 11.916533 W	325350.99	679626	-1.77	0.8	2.57
GR113	56 0.282747 N	003 11.988588 W	325277.99	679736	-1.2	1.54	2.74
GR114	56 0.301906 N	003 12.014199 W	325251.99	679772	-1.62	1.23	2.85
GR115	56 0.292467 N	003 11.986965 W	325279.99	679754	-2.24	1.86	4.1
GR116	56 0.289271 N	003 11.983018 W	325283.99	679748	-0.91	2.81	3.72
GR117	56 0.267994 N	003 11.953492 W	325313.99	679708	-10.23	5.52	15.75
GR118	56 0.240286 N	003 11.91992 W	325347.99	679656	-1.93	4.03	5.96
GR119	56 0.213117 N	003 11.886364 W	325381.99	679605	-4.56	1.9	6.47
GR120	56 0.207254 N	003 11.879448 W	325388.99	679594	-5.49	5.1	10.59
GR121	56 0.204067 N	003 11.874538 W	325393.99	679588	-2.15	3.92	6.08
GR122	56 0.192889 N	003 11.85976 W	325408.99	679567	-1.91	4.26	6.17
GR123	56 0.182761 N	003 11.8479 W	325421	679548	-4.04	7.03	11.07
GR124	56 0.135893 N	003 11.78872 W	325481	679460	-0.62	1.77	2.38
GR125	56 0.20798 N	003 11.860227 W	325408.99	679595	-0.75	2.43	3.18
GR126	56 0.211706 N	003 11.865153 W	325403.99	679602	-8.66	3.29	11.95

GR127	56 0.305969 N	003 11.984498 W	325282.99	679779	-1.92	2.11	4.03
GR128	56 0.311832 N	003 11.991415 W	325275.99	679790	-2.04	0.73	2.77
GR129	56 0.351777 N	003 12.041726 W	325224.99	679865	-1.92	5.42	7.35
GR130	56 0.351078 N	003 12.058061 W	325207.99	679864	-1.91	2.29	4.2
GR131	56 0.347142 N	003 12.019451 W	325247.99	679856	-2.09	1.37	3.46
GR132	56 0.302923 N	003 11.965159 W	325302.99	679773	-5.11	4.45	9.56
GR133	56 0.299727 N	003 11.961212 W	325306.99	679767	-6.26	2.18	8.44
GR134	56 0.244358 N	003 11.889256 W	325379.99	679663	-2.02	3.84	5.86
GR135	56 0.220385 N	003 11.859649 W	325409.99	679618	-0.77	2.95	3.73
GR137	56 0.206002 N	003 11.841884 W	325428	679591	-7.51	13.02	20.53
GR138	56 0.199089 N	003 11.832049 W	325438	679578	-1.57	4.22	5.78
GR140	56 0.177782 N	003 11.805411 W	325465	679538	-1.57	2.34	3.9
GR141	56 0.157174 N	003 11.762438 W	325509	679499	-6.49	2.45	8.94
GR142	56 0.215239 N	003 11.834473 W	325436	679608	-10.5	3.68	14.18
GR143	56 0.215239 N	003 11.834473 W	325436	679608	-10.5	2.32	12.82
GR144	56 0.221631 N	003 11.842368 W	325428	679620	-6.04	5.56	11.6
GR145	56 0.225887 N	003 11.848273 W	325422	679628	-1.75	4.7	6.45
GR146	56 0.308444 N	003 11.95186 W	325316.99	679783	-1.68	3.13	4.81
GR147	56 0.312708 N	003 11.956803 W	325311.99	679791	-5.78	4.29	10.07
GR148	56 0.322297 N	003 11.968647 W	325299.99	679809	-6.06	3.11	9.16
GR149	56 0.338799 N	003 11.990327 W	325277.99	679840	-5.15	3.95	9.1
GR136	56 0.206541 N	003 11.841901 W	325428	679592	-7.51	13.02	20.53
GR139	56 0.18844 N	003 11.818249 W	325452	679558	-3.23	3.13	6.36
GR150	56 0.336831 N	003 11.971022 W	325297.99	679836	-3.97	4.86	8.82
GR151	56 0.326182 N	003 11.957221 W	325311.99	679816	-5.75	11.45	17.2
GR152	56 0.322457 N	003 11.952294 W	325316.99	679809	-5.75	5.85	11.6
GR153	56 0.308073 N	003 11.934529 W	325334.99	679782	-6.06	6.39	12.45
GR154	56 0.294758 N	003 11.917759 W	325351.99	679757	-7.33	17.23	24.56
GR155	56 0.24842 N	003 11.859555 W	325410.99	679670	-1.66	5.61	7.26
GR156	56 0.192661 N	003 11.772195 W	325500	679565	-5.06	5.03	10.09
GR157	56 0.245383 N	003 11.839255 W	325432	679664	-3.95	3.18	7.13
GR158	56 0.251776 N	003 11.84715 W	325424	679676	-2.69	2.05	4.75
GR159	56 0.314634 N	003 11.92511 W	325344.99	679794	-5.97	6.64	12.61
GR160	56 0.318899 N	003 11.930054 W	325339.99	679802	-2.34	4.22	6.57
GR161	56 0.346049 N	003 11.965535 W	325303.99	679853	-1.88	1.86	3.75
GR162	56 0.344629 N	003 11.945284 W	325324.99	679850	-2.04	1.39	3.43
GR163	56 0.32546 N	003 11.920635 W	325349.99	679814	-2.41	3.45	5.86
GR164	56 0.320666 N	003 11.914713 W	325355.99	679805	-9.6	5.25	14.84
GR165	56 0.31641 N	003 11.908808 W	325361.99	679797	-2.74	3.85	6.6
GR166	56 0.313214 N	003 11.90486 W	325365.99	679791	-1.48	3.99	5.47
GR167	56 0.310017 N	003 11.900912 W	325369.99	679785	-4.13	3.99	8.12
GR168	56 0.270592 N	003 11.852544 W	325419	679711	-1.27	1.22	2.5
GR169	56 0.249296 N	003 11.824943 W	325447	679671	-1.63	1.9	3.54
GR170	56 0.202418 N	003 11.766723 W	325506	679583	-3.2	4.6	7.8

GR171	56 0.334149 N	003 11.914169 W	325356.99	679830	-5.67	3.83	9.51
GR173	56 0.352788 N	003 11.937839 W	325332.99	679865	-3.49	1.29	4.78
GR174	56 0.318336 N	003 11.877115 W	325394.99	679800	-2.04	6.19	8.23
GR175	56 0.301285 N	003 11.856381 W	325415.99	679768	-1.77	2.38	4.15
GR176	56 0.285842 N	003 11.836658 W	325436	679739	-2.04	4.1	6.14
GR177	56 0.264545 N	003 11.809057 W	325464	679699	-1.28	4.22	5.5
GR178	56 0.239151 N	003 11.759199 W	325515	679651	-1.75	2.41	4.15
GR179	56 0.348869 N	003 11.897305 W	325374.99	679857	-3.97	3.84	7.81
GR180	56 0.290964 N	003 11.808913 W	325465	679748	-2.34	3.42	5.76
GR181	56 0.300023 N	003 11.819777 W	325454	679765	-0.95	2.11	3.06
GR182	56 0.280845 N	003 11.796091 W	325478	679729	-6.82	2.13	8.95
GR183	56 0.263274 N	003 11.773416 W	325501	679696	-3.12	3.59	6.71
GR184	56 0.257401 N	003 11.767461 W	325507	679685	-0.96	2.41	3.37
GR185	56 0.341012 N	003 11.818159 W	325457	679841	-11.84	22.21	34.05
GR186	56 0.36072 N	003 11.842825 W	325432	679878	-7.98	3.57	11.56
GR187	56 0.306929 N	003 11.774766 W	325501	679777	-7.33	11.77	19.1
GR188	56 0.300007 N	003 11.765892 W	325510	679764	-2.95	4.22	7.17
GR172	56 0.349071 N	003 11.931951 W	325338.99	679858	-1.66	3.61	5.27
GR189	56 0.306939 N	003 11.773805 W	325502	679777	-3.63	2.07	5.69
GR190	56 0.313341 N	003 11.780738 W	325495	679789	-7.67	2.97	10.64
GR191	56 0.347953 N	003 11.82511 W	325450	679854	-8.47	3.45	11.92
GR192	56 0.354346 N	003 11.833005 W	325442	679866	-2.19	2.31	4.51
GR193	56 0.35786 N	003 11.804247 W	325472	679872	-12.98	20.44	33.42
GR194	56 0.339778 N	003 11.778669 W	325498	679838	-8.96	12.05	21.01
GR195	56 0.361586 N	003 11.809173 W	325467	679879	-4.1	9.76	13.86
GR196	56 0.342074 N	003 11.764306 W	325513	679842	-5.22	17.47	22.69
GR197	56 0.343821 N	003 11.750889 W	325527	679845	-2.99	2.78	5.77
GR198	56 0.368315 N	003 11.782438 W	325495	679891	-2.31	2.09	4.4
GR199	56 0.0569 N	003 11.70642 W	325564	679312	-16.59	11.26	27.85
GR200	55 59.956227 N	003 11.580165 W	325692	679123	-5.76	3.63	9.39
GR201	55 59.965278 N	003 11.591989 W	325680	679140	-2.61	2.36	4.97
GR202	55 59.940262 N	003 11.558508 W	325714	679093	-1.61	4.97	6.58
GR203	55 59.848099 N	003 11.444078 W	325830	678920	-2.97	4.94	7.92
GR204	55 59.828901 N	003 11.422324 W	325852	678884	-1.67	3.7	5.37
GR205	55 59.818809 N	003 11.406622 W	325868	678865	-11.73	4.56	16.29
GR206	55 59.70426 N	003 11.265546 W	326010.99	678650	-1.84	3.5	5.33
GR207	55 59.696798 N	003 11.25666 W	326019.99	678636	-1.75	2.61	4.35
GR208	55 59.678714 N	003 11.231096 W	326045.99	678602	-5.44	5.4	10.84
GR209	55 59.617465 N	003 11.15323 W	326124.99	678487	-7.35	9.76	17.1
GR210	55 59.591361 N	003 11.120689 W	326157.99	678438	-4.17	8.8	12.97
GR211	55 59.560973 N	003 11.085132 W	326193.99	678381	-6.72	7.19	13.91
GR212	55 59.556726 N	003 11.078269 W	326200.99	678373	-1.93	5.85	7.78
GR213	55 59.529042 N	003 11.041834 W	326237.99	678321	-3.2	6.6	9.81
GR214	56 0.162707 N	003 11.858825 W	325408.99	679511	-1.52	2.32	3.84

GR215	56 0.055645 N	003 11.724662 W	325545	679310	-3.29	2.2	5.49
GR216	56 0.054056 N	003 11.721727 W	325548	679307	-3.29	2.2	5.49
GR217	55 59.97469 N	003 11.622103 W	325649	679158	-1.43	2.06	3.49
GR218	55 59.932066 N	003 11.5698 W	325702	679078	-2.59	3.11	5.7
GR219	55 59.895862 N	003 11.522508 W	325750	679010	-1.61	2.11	3.73
GR220	55 59.874016 N	003 11.495861 W	325777	678969	-1.5	2.29	3.78
GR221	55 59.874759 N	003 11.47472 W	325799	678970	-0.5	2	2.5
GR222	55 59.827674 N	003 11.437678 W	325836	678882	-0.57	1.88	2.45
GR223	55 59.717939 N	003 11.300595 W	325974.99	678676	-8.69	17.92	26.61
GR224	55 59.672154 N	003 11.240514 W	326035.99	678590	-1.75	1.5	3.25
GR225	55 59.605023 N	003 11.157658 W	326119.99	678464	-0.99	1.87	2.87
GR226	55 59.520345 N	003 11.049263 W	326229.99	678305	-2.11	1.54	3.66
GR227	56 0.099866 N	003 11.778947 W	325490	679393	-2.5	3.13	5.63
GR228	56 0.176913 N	003 11.894865 W	325371.99	679538	-1.29	3.9	5.2
GR229	56 0.091112 N	003 11.792146 W	325476	679377	-34.23	61.94	96.17
GR230	55 59.987811 N	003 11.659067 W	325611	679183	-1.23	4.86	6.08
GR231	55 59.882908 N	003 11.524033 W	325748	678986	-1.72	4.07	5.79
GR232	55 59.807807 N	003 11.429371 W	325844	678845	-3.51	1.34	4.85
GR233	55 59.634147 N	003 11.212415 W	326063.99	678519	-1.53	3.29	4.82
GR234	55 59.516406 N	003 11.066456 W	326211.99	678298	-1.68	2.27	3.95
GR235	55 59.564172 N	003 11.144864 W	326131.99	678388	-2.74	2.36	5.11
GR237	55 59.947686 N	003 11.627043 W	325643	679108	-2.06	0.7	2.77
GR236	55 59.857707 N	003 11.509789 W	325762	678939	-1.75	1.67	3.42
GR238	56 0.064332 N	003 11.774 W	325494	679327	-2.34	0.89	3.22
GR239	56 0.088863 N	003 11.801698 W	325466	679373	-0.98	1.48	2.45
GR240	56 0.153293 N	003 11.884512 W	325381.99	679494	-1.59	4.2	5.79
GR241	55 59.97258 N	003 11.673029 W	325596	679155	-7.73	8.28	16.02
GR242	55 59.966716 N	003 11.666113 W	325603	679144	-7.07	11.19	18.26
GR243	55 59.838881 N	003 11.505361 W	325766	678904	-1.54	2.18	3.72
GR244	55 59.714752 N	003 11.351479 W	325921.99	678671	-1.81	3.65	5.47
GR245	55 59.701445 N	003 11.333755 W	325939.99	678646	-2.38	3.2	5.58
GR246	55 59.480926 N	003 11.055752 W	326221.99	678232	-238.54	275.5	514.04
GR247	56 0.178165 N	003 11.932427 W	325332.99	679541	-1.9	1.5	3.4
GR248	56 0.176957 N	003 11.945859 W	325318.99	679539	-1.43	0.93	2.36
GR249	56 0.095449 N	003 11.845198 W	325421	679386	-2.72	5.49	8.21
GR250	56 0.048051 N	003 11.785042 W	325482	679297	-2.92	4.67	7.59
GR251	56 0.018753 N	003 11.748538 W	325519	679242	-4.11	2.27	6.37
GR252	56 0.023018 N	003 11.75348 W	325514	679250	-4.11	2.27	6.37
GR253	55 59.990012 N	003 11.710127 W	325558	679188	-3.36	4.06	7.42
GR254	55 59.94263 N	003 11.648052 W	325621	679099	-3.88	4.24	8.12
GR255	55 59.931962 N	003 11.636179 W	325633	679079	-8.74	8.74	17.48
GR256	55 59.860039 N	003 11.547379 W	325723	678944	-0.8	1.62	2.42
GR257	55 59.808903 N	003 11.483275 W	325788	678848	-5.64	5.7	11.34
GR258	55 59.775358 N	003 11.439916 W	325832	678785	-4.02	1.29	5.31

GR259	55 59.757237 N	003 11.418196 W	325854	678751	-10.3	4.25	14.55
GR260	55 59.744999 N	003 11.401467 W	325870.99	678728	-3.11	1.48	4.59
GR261	55 59.714641 N	003 11.363018 W	325909.99	678671	-6.4	3.45	9.85
GR262	55 59.635273 N	003 11.263429 W	326010.99	678522	-2.4	1.02	3.43
GR263	55 59.530319 N	003 11.133248 W	326142.99	678325	-9.09	2.93	12.02
GR264	55 59.480639 N	003 11.08556 W	326190.99	678232	-3.17	1.75	4.92
GR265	55 59.495016 N	003 11.104274 W	326171.99	678259	-2.27	1.88	4.15
GR266	55 59.745389 N	003 11.416869 W	325855	678729	-3.17	2.43	5.6
GR267	55 59.761893 N	003 11.43854 W	325833	678760	-4.6	2.18	6.78
GR268	55 59.86042 N	003 11.563745 W	325706	678945	-2.36	1.07	3.43
GR269	56 0.097995 N	003 11.86067 W	325404.99	679391	-2.31	0.72	3.04
GR270	55 59.469247 N	003 11.092906 W	326182.99	678211	-0.37	2.86	3.22
GR271	55 59.745743 N	003 11.436119 W	325835	678730	-2.69	2.57	5.26
GR272	55 59.875696 N	003 11.600772 W	325668	678974	-0.71	1.68	2.39
GR273	55 59.931636 N	003 11.669841 W	325598	679079	-6.26	7.49	13.75
GR274	55 59.935353 N	003 11.675729 W	325592	679086	-6.26	7.49	13.75
GR275	55 59.951317 N	003 11.697388 W	325570	679116	-6.38	2.22	8.6
GR276	55 59.963565 N	003 11.71316 W	325554	679139	-1.13	2.52	3.65
GR277	56 0.000297 N	003 11.761437 W	325505	679208	-1.75	1.22	2.97
GR278	56 0.079661 N	003 11.861065 W	325403.99	679357	-7.32	4.57	11.89
GR279	55 59.786582 N	003 11.505675 W	325764	678807	-7.06	9.72	16.78
GR280	55 59.858496 N	003 11.595432 W	325673	678942	-6.06	2.72	8.78
GR281	55 59.86435 N	003 11.603308 W	325665	678953	-3.36	1.67	5.03
GR283	55 59.935706 N	003 11.694982 W	325572	679087	-3.59	5.38	8.97
GR282	56 0.03373 N	003 11.816349 W	325449	679271	-1.57	1.57	3.13
GR284	56 0.152488 N	003 11.96723 W	325295.99	679494	-3.27	2.54	5.81
GR285	56 0.164064 N	003 11.996452 W	325265.99	679516	-1.54	1.72	3.26
GR286	56 0.000538 N	003 11.792232 W	325473	679209	-2.14	1.06	3.2
GR287	55 59.921692 N	003 11.694549 W	325572	679061	-2.97	1.32	4.29
GR288	55 59.812489 N	003 11.55842 W	325710	678856	-2.77	1.59	4.36
GR289	55 59.77204 N	003 11.504265 W	325765	678780	-5.07	3.1	8.17
GR290	55 59.742713 N	003 11.470656 W	325799	678725	-3.57	1.72	5.28
GR291	55 59.60104 N	003 11.291235 W	325980.99	678459	-3.15	5.91	9.06
GR292	55 59.585056 N	003 11.271507 W	326000.99	678429	-6.01	5.76	11.77
GR293	55 59.515286 N	003 11.182802 W	326090.99	678298	-2.99	1.97	4.97
GR294	55 59.464156 N	003 11.117757 W	326156.99	678202	-0.79	2.49	3.29
GR295	55 59.447103 N	003 11.097037 W	326177.99	678170	-0.81	2.07	2.88
GR296	55 59.442317 N	003 11.090158 W	326184.99	678161	-2.29	1.48	3.77
GR297	56 0.171282 N	003 12.030351 W	325230.99	679530	-2.11	2.54	4.65
GR298	55 59.950247 N	003 11.752195 W	325513	679115	-3.42	7.94	11.36
GR299	55 59.939598 N	003 11.738396 W	325527	679095	-2.34	1.16	3.5
GR300	55 59.881029 N	003 11.662507 W	325604	678985	-9.22	12.71	21.93
GR301	55 59.847465 N	003 11.621066 W	325646	678922	-0.82	2.2	3.02
GR302	55 59.83203 N	003 11.600388 W	325667	678893	-1.34	2.15	3.49

GR303	55 59.777141 N	003 11.534243 W	325734	678790	-10.11	11.55	21.66
GR304	55 59.650922 N	003 11.373564 W	325896.99	678553	-0.8	2.99	3.79
GR305	55 59.609357 N	003 11.323231 W	325947.99	678475	-3.97	2.86	6.83
GR306	55 59.702059 N	003 11.437661 W	325832	678649	-2.24	1.9	4.15
GR307	55 59.535192 N	003 11.243046 W	326028.99	678336	-3.2	3.52	6.72
GR308	55 59.550646 N	003 11.261794 W	326009.99	678365	-2.36	2.87	5.22
GR309	55 59.609747 N	003 11.338633 W	325931.99	678476	-4.93	3.56	8.48
GR310	55 59.74078 N	003 11.503302 W	325765	678722	-1.72	4.02	5.74
GR311	55 59.815945 N	003 11.591234 W	325676	678863	-2.45	1.25	3.7
GR313	55 59.833461 N	003 11.619672 W	325647	678896	-5.06	2.81	7.88
GR314	55 59.894205 N	003 11.693701 W	325572	679010	-3.09	1.11	4.19
GR315	55 59.897401 N	003 11.697648 W	325568	679016	-3.38	2	5.38
GR316	55 59.912297 N	003 11.718311 W	325547	679044	-3.1	1.07	4.17
GR317	55 59.974639 N	003 11.794318 W	325470	679161	-1.86	2.93	4.79
GR318	56 0.114714 N	003 11.970869 W	325290.99	679424	-2.7	1.18	3.88
GR319	56 0.149845 N	003 12.017178 W	325243.99	679490	-0.91	2.02	2.92
GR320	56 0.146452 N	003 12.033428 W	325226.99	679484	-2.77	6.11	8.87
GR321	56 0.127804 N	003 12.010721 W	325249.99	679449	-1.68	0.82	2.5
GR323	56 0.007439 N	003 11.85883 W	325403.99	679223	-4.61	9.44	14.04
GR324	55 59.978689 N	003 11.821382 W	325442	679169	-2.34	5.26	7.59
GR325	55 59.901982 N	003 11.72569 W	325539	679025	-4.86	10.02	14.88
GR326	55 59.863651 N	003 11.67544 W	325590	678953	-4.2	4.68	8.88
GR327	55 59.727278 N	003 11.505772 W	325762	678697	-0.93	2.72	3.65
GR328	55 59.680389 N	003 11.448537 W	325820	678609	-3.22	4.13	7.35
GR329	55 59.665502 N	003 11.426917 W	325842	678581	-1.34	2.27	3.61
GR330	55 59.673689 N	003 11.416588 W	325853	678596	-1.77	1.15	2.92
GR331	55 59.679664 N	003 11.411962 W	325857.99	678607	-0.84	2.11	2.95
GR332	55 59.654287 N	003 11.415991 W	325853	678560	-2.1	4.17	6.28
GR333	55 59.619672 N	003 11.371642 W	325897.99	678495	-0.74	2.86	3.6
GR334	55 59.515817 N	003 11.239566 W	326031.99	678300	-2.31	3.9	6.22
GR335	55 59.590196 N	003 11.353422 W	325915.99	678440	-1.05	2.24	3.29
GR336	55 59.614701 N	003 11.383993 W	325884.99	678486	-3.49	2.52	6.02
GR337	55 59.675445 N	003 11.458004 W	325810	678600	-0.64	1.7	2.34
GR338	55 59.698881 N	003 11.487583 W	325780	678644	-1.46	1.93	3.39
GR339	55 59.790484 N	003 11.603916 W	325662	678816	-3.59	3.72	7.31
GR340	55 59.801142 N	003 11.616751 W	325649	678836	-4.77	5.04	9.8
GR341	55 59.819252 N	003 11.639436 W	325626	678870	-1.5	6.83	8.33
GR342	55 59.848542 N	003 11.676898 W	325588	678925	-8.13	6.42	14.55
GR343	55 59.853875 N	003 11.682835 W	325582	678935	-8.93	13	21.93
GR344	55 59.911933 N	003 11.755821 W	325508	679044	-1.52	1.5	3.01
GR346	55 59.898608 N	003 11.740017 W	325524	679019	-0.97	1.48	2.45
GR347	56 0.008869 N	003 11.878116 W	325383.99	679226	-1.5	2.24	3.74
GR348	56 0.035499 N	003 11.911651 W	325349.99	679276	-0.95	2.47	3.42
GR349	56 0.163183 N	003 12.086864 W	325171.99	679516	-10.7	18.82	29.52

GR322	56 0.073148 N	003 11.976315 W	325283.99	679347	-2.63	2.34	4.97
GR312	55 59.827607 N	003 11.611795 W	325655	678885	-2.33	6.45	8.78
GR345	55 59.853875 N	003 11.682835 W	325582	678935	-8.93	13	21.93
GR350	56 0.00975 N	003 11.898347 W	325362.99	679228	-2.32	6.4	8.72
GR351	55 59.964461 N	003 11.84307 W	325419	679143	-32.29	12.44	44.72
GR352	55 59.918168 N	003 11.780066 W	325483	679056	-1.56	2.18	3.73
GR353	55 59.890458 N	003 11.746499 W	325517	679004	-22.62	18.44	41.05
GR354	55 59.829223 N	003 11.667643 W	325597	678889	-3.59	1.31	4.9
GR356	55 59.723189 N	003 11.538352 W	325728	678690	-3.22	3.31	6.53
GR355	55 59.713618 N	003 11.52459 W	325742	678672	-3.81	2.11	5.92
GR357	55 59.615119 N	003 11.396511 W	325871.99	678487	-0.85	4.44	5.29
GR358	55 59.623612 N	003 11.410238 W	325857.99	678503	-1.86	1.86	3.73
GR359	55 59.522425 N	003 11.281127 W	325988.99	678313	-3.4	1.16	4.56
GR360	55 59.659137 N	003 11.47193 W	325795	678570	-1.95	0.52	2.48
GR361	55 59.667677 N	003 11.48085 W	325786	678586	-4.35	5.69	10.04
GR362	55 59.782733 N	003 11.624841 W	325640	678802	-4.54	3.13	7.67
GR364	55 59.843978 N	003 11.702733 W	325561	678917	-2.27	0.52	2.79
GR363	55 59.9835 N	003 11.881179 W	325379.99	679179	-1.68	0.72	2.4
GR365	56 0.050104 N	003 11.962132 W	325297.99	679304	-2.38	1.45	3.83
GR366	56 0.111373 N	003 12.03715 W	325221.99	679419	-0.93	2.18	3.11
GR367	56 0.111373 N	003 12.03715 W	325221.99	679419	-0.93	2.18	3.11
GR368	56 0.139582 N	003 12.074586 W	325183.99	679472	-1.72	0.53	2.25
GR369	55 59.612127 N	003 11.427199 W	325840	678482	-3.4	2.32	5.72
GR370	55 59.624885 N	003 11.445867 W	325821	678506	-2.65	1.61	4.26
GR371	55 59.636073 N	003 11.459678 W	325807	678527	-1.72	2.03	3.75
GR372	55 59.662714 N	003 11.49224 W	325774	678577	-3.01	1.2	4.21
GR373	55 59.782017 N	003 11.643097 W	325621	678801	-1.82	0.89	2.7
GR374	55 59.806502 N	003 11.6756 W	325588	678847	-0.99	2.27	3.27
GR375	55 59.919458 N	003 11.813778 W	325448	679059	-1	1.93	2.93
GR376	56 0.013196 N	003 11.932126 W	325327.99	679235	-2.2	1.27	3.48
GR377	56 0.025433 N	003 11.94886 W	325310.99	679258	-1.93	0.7	2.63
GR378	56 0.0462 N	003 11.97548 W	325283.99	679297	-1.68	1.16	2.84
GR379	56 0.079762 N	003 12.016928 W	325241.99	679360	-6.17	2.07	8.24
GR380	55 59.632161 N	003 11.473986 W	325792	678520	-6.17	5.47	11.64
GR381	55 59.644418 N	003 11.488791 W	325777	678543	-3.96	4.44	8.41
GR382	55 59.656154 N	003 11.501658 W	325764	678565	-1	2.22	3.22
GR383	55 59.743501 N	003 11.612087 W	325652	678729	-2.15	0.37	2.52
GR384	55 59.787165 N	003 11.668268 W	325595	678811	-2.29	2.09	4.38
GR385	55 59.805285 N	003 11.689993 W	325573	678845	-6.09	3.65	9.74
GR386	55 59.948002 N	003 11.872384 W	325387.99	679113	-12.68	4.65	17.33
GR387	56 0.093296 N	003 11.789327 W	325479	679381	-20.24	34.88	55.11
GR388	56 0.085137 N	003 11.796772 W	325471	679366	-1.82	0.66	2.48
GR389	56 0.018043 N	003 12.098712 W	325154.99	679247	-0.81	2	2.81
GR390	56 0.03932 N	003 12.128234 W	325124.99	679287	-0.38	1.7	2.08

GR391	55 59.892512 N	003 11.923579 W	325332.99	679011	-1.52	3.47	4.99
GR392	56 0.040028 N	003 12.110939 W	325142.99	679288	-2.65	3.13	5.78
GR393	56 0.125796 N	003 12.216546 W	325035.99	679449	-1.68	3.58	5.26
GR394	56 0.129152 N	003 12.204143 W	325048.99	679455	-0.88	1.95	2.83
GR395	55 59.908124 N	003 11.925987 W	325330.99	679040	-2.22	3.34	5.56
GR396	55 59.923735 N	003 11.928394 W	325328.99	679069	-2.32	1.46	3.77
GR397	55 59.962631 N	003 11.975777 W	325280.99	679142	-1.34	1.86	3.2
GR398	56 0.00949 N	003 12.035914 W	325219.99	679230	-1.79	1.11	2.9
GR399	56 0.032932 N	003 12.06454 W	325190.99	679274	-3.38	1.13	4.51
GR400	56 0.041631 N	003 12.057114 W	325198.99	679290	-0.75	1.95	2.7
GR401	55 59.932963 N	003 11.921946 W	325335.99	679086	-4.24	10.36	14.61
GR402	55 59.906314 N	003 11.890335 W	325367.99	679036	-3.86	9	12.86
GR403	55 59.885017 N	003 11.862739 W	325395.99	678996	-1.84	3.09	4.93
GR404	55 59.849875 N	003 11.817399 W	325442	678930	-2.04	1.95	4
GR405	55 59.83708 N	003 11.802572 W	325457	678906	-0.98	2.24	3.22
GR406	55 59.760913 N	003 11.706901 W	325554	678763	-6.33	4.66	10.99
GR407	56 0.014092 N	003 12.006233 W	325250.99	679238	-1.32	1.86	3.18
GR408	55 59.94484 N	003 11.920389 W	325337.99	679108	-3.68	6.32	10
GR409	55 59.92567 N	003 11.895745 W	325362.99	679072	-6.56	9.71	16.26
GR410	55 59.920876 N	003 11.889824 W	325368.99	679063	-1.77	2.97	4.74
GR411	55 59.800507 N	003 11.737948 W	325523	678837	-0.77	1.81	2.59
GR412	55 59.773346 N	003 11.703437 W	325558	678786	-3.97	4.1	8.06
GR413	55 59.765355 N	003 11.69357 W	325568	678771	-2.93	3.39	6.32
GR414	55 59.740852 N	003 11.66299 W	325599	678725	-1.05	1.98	3.02
GR415	55 59.699316 N	003 11.609762 W	325653	678647	-1.52	1.9	3.43
GR416	55 59.621558 N	003 11.511173 W	325753	678501	-0.86	1.84	2.7
GR417	55 59.648348 N	003 11.52835 W	325736	678551	-2.41	3.18	5.59
GR418	55 59.749549 N	003 11.655563 W	325607	678741	-2.26	5.51	7.77
GR419	55 59.78472 N	003 11.698016 W	325564	678807	-7.25	5.76	13.01
GR420	55 59.788976 N	003 11.70392 W	325558	678815	-7.25	5.76	13.01
GR421	55 59.801223 N	003 11.719691 W	325542	678838	-5.51	4.23	9.74
GR422	55 59.972178 N	003 11.936628 W	325321.99	679159	-4.54	4.65	9.19
GR423	55 59.990306 N	003 11.957393 W	325300.99	679193	-2.22	1.25	3.47
GR424	56 0.093109 N	003 12.08565 W	325170.99	679386	-1.84	1.38	3.22
GR425	55 59.879156 N	003 11.800025 W	325461	678984	-0.81	1.88	2.7
GR426	55 59.839721 N	003 11.752628 W	325509	678910	-1.73	1.67	3.4
GR427	55 59.810423 N	003 11.716127 W	325546	678855	-0.77	2.11	2.88
GR428	55 59.736931 N	003 11.622466 W	325641	678717	-2.31	2.5	4.81
GR429	55 59.715624 N	003 11.595835 W	325668	678677	-3.27	1.52	4.8
GR430	55 59.576592 N	003 11.422258 W	325843.99	678416	-2.71	3.34	6.05
GR431	55 59.57872 N	003 11.425209 W	325841	678420	-2.71	3.34	6.05
GR432	55 59.541978 N	003 11.377911 W	325888.99	678351	-1.8	2.74	4.54
GR433	55 59.503608 N	003 11.331526 W	325935.99	678279	-1.43	1.79	3.23
GR434	55 59.500366 N	003 11.499746 W	325761	678276	-1.05	2.29	3.34

GR435	55 59.494298 N	003 11.458201 W	325804	678264	-0.64	3.67	4.31
GR436	55 59.536179 N	003 11.475841 W	325787	678342	-13.39	37.52	50.91
GR437	55 59.534758 N	003 11.455598 W	325808	678339	-0.95	2.18	3.13
GR438	55 59.512911 N	003 11.428956 W	325835	678298	-3.59	1.45	5.04
GR439	55 59.544171 N	003 11.429918 W	325835	678356	-1.27	1.88	3.16
GR440	55 59.596627 N	003 11.357467 W	325911.99	678452	-1.39	2.15	3.54
GR441	55 59.547578 N	003 11.188601 W	326085.99	678358	-1.79	0.23	2.02
GR442	55 59.467648 N	003 11.090933 W	326184.99	678208	-1.29	1.04	2.34
GR443	55 59.463383 N	003 11.085994 W	326189.99	678200	-2.27	1.04	3.31
GR444	55 59.367174 N	003 11.05516 W	326218.99	678021	-14.36	19	33.36
GR445	55 59.36933 N	003 11.055226 W	326218.99	678025	-18.52	13.53	32.05
GR446	55 59.582891 N	003 11.272402 W	325999.99	678425	-2.79	2.47	5.26
GR447	55 59.503581 N	003 11.390196 W	325874.99	678280	-2.04	0.77	2.82
GR448	55 59.476735 N	003 11.434577 W	325828	678231	-2.2	1.3	3.5
GR449	55 59.483639 N	003 11.389584 W	325874.99	678243	-1.16	1.61	2.76
GR450	55 59.468409 N	003 11.403543 W	325859.99	678215	-5.81	9.3	15.11
GR451	55 59.470868 N	003 11.204525 W	326066.99	678216	-2.57	0.95	3.52
GR452	55 59.4438 N	003 11.271982 W	325995.99	678167	-2.31	1.23	3.54
GR453	55 59.440779 N	003 11.249769 W	326018.99	678161	-2.65	2.56	5.22
GR454	55 59.460579 N	003 11.153234 W	326119.99	678196	-1.68	0.79	2.47
GR455	55 59.418281 N	003 11.234652 W	326033.99	678119	-2.38	0.93	3.31
GR456	55 59.406127 N	003 11.265056 W	326001.99	678097	-2.25	1.2	3.45
GR457	55 59.384597 N	003 11.317294 W	325946.99	678058	-2.22	0.88	3.11
GR458	55 59.373288 N	003 11.315985 W	325947.99	678037	-1.72	1.23	2.95
GR459	55 59.401656 N	003 11.225487 W	326042.99	678088	-0.77	2.4	3.18
GR460	55 59.381714 N	003 11.224876 W	326042.99	678051	-1.72	1.72	3.45
GR461	55 59.354032 N	003 11.244224 W	326021.99	678000	-1.32	2.02	3.33
GR462	55 59.387734 N	003 11.15966 W	326110.99	678061	-1.88	2.2	4.08
GR463	55 59.36809 N	003 11.184064 W	326084.99	678025	-25.68	7.73	33.41
GR464	55 59.33829 N	003 11.255282 W	326009.99	677971	-5.08	2.07	7.14
GR465	55 59.366128 N	003 11.163807 W	326105.99	678021	-1.16	3.69	4.86
GR466	55 59.35286 N	003 11.198024 W	326069.99	677997	-2.79	2.5	5.29
GR467	55 59.344581 N	003 11.217967 W	326048.99	677982	-1.13	3.95	5.08

8. SUB-BOTTOM PROFILE SURVEY

The SBP survey consists of several lines arranged in a perpendicular pattern with a line spacing of approximately 15m in the NW-SE direction and 50 m in the NE-SW direction. The image below shows the SBP lines.

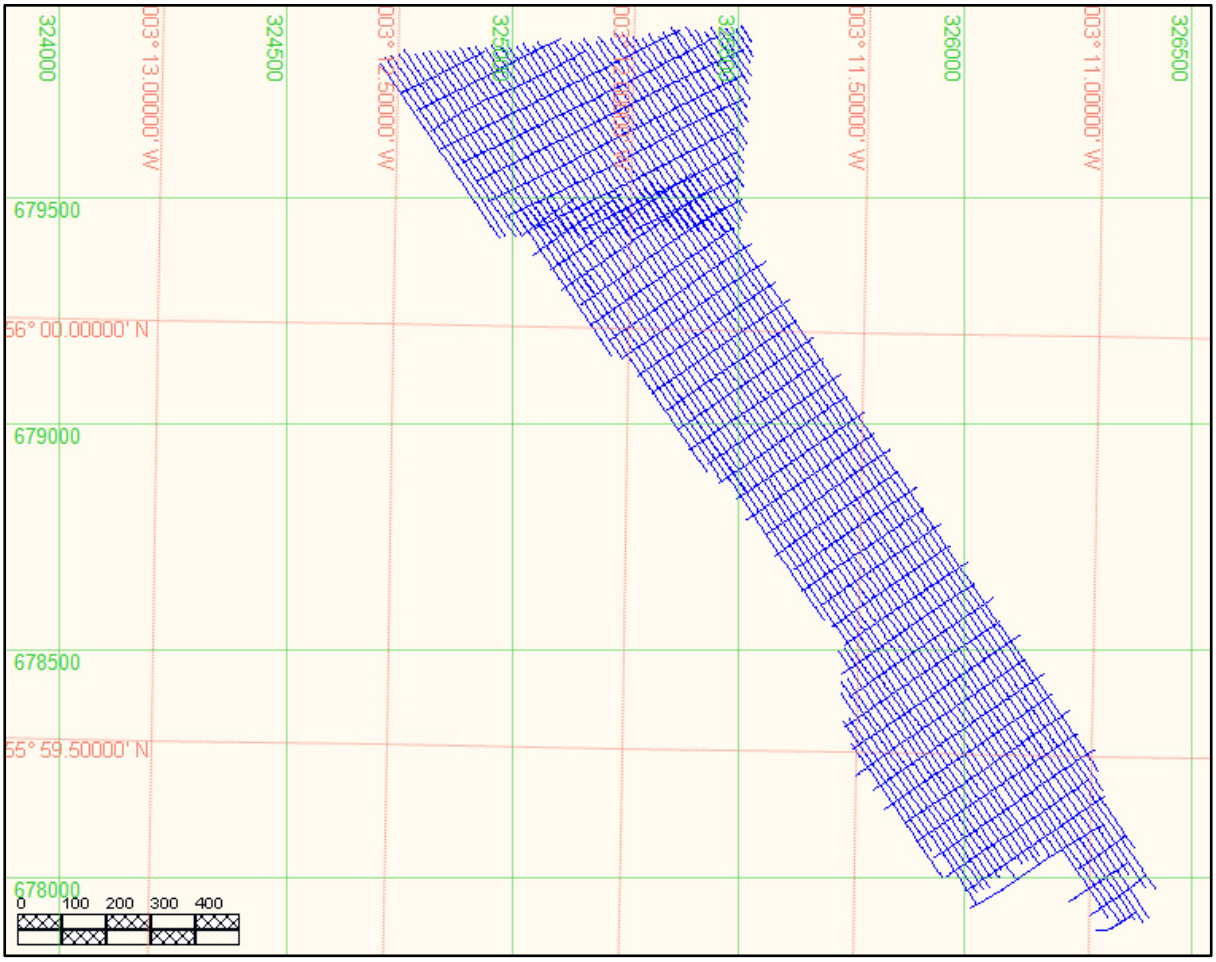


FIGURE 10 - SBP SURVEY

Note that in all presented Sub-bottom Profiler (SBP) images and the figures below the levels are not aligned to Chart Datum. For assessment of the true CD level of the digitised horizons refer to the rendered DWG and XYZ files.

The SBP information has been presented as images with the digitised horizons overlain and additionally with an interactive Web viewer able to be opened within any Internet Browser application. To activate the web viewer double click on the Index.htm file within the Web Viewer folder. Any line run can be selected in the left pane and the line in question will highlight in the plan view while the geophysical data will be presented in the right pane. This allows some low-level interaction with the geophysical data.

The geology around Leith Harbour in Edinburgh is dominated by Carboniferous sedimentary rocks of the Gullane Formation, and the Strathclyde Group which is located few kilometres to the North of the Harbour. The Gullane Formation consists of mainly pale sandstones interbedded with grey to dark grey mudstones and siltstones and occasional coal seams deposited in a shallow marine environment. In contrast, the

Strathclyde Group in the area consists of mudstones, siltstones and sandstones, with thin beds of limestones, and algal-rich black to grey oil-shales with some lapilli-tuff beds of lacustrine and fluvial origins. These rocks (Gullane Formation and Strathclyde Group), that were deposited around 340 million years ago during the Early Carboniferous period and were subsequently deformed, constitute rockhead in the survey area. Note that although Silurian to Carboniferous igneous intrusive and extrusive rocks are present on-shore, none have been mapped in the vicinity of the survey area.

Despite the large number of boreholes been drilled at Leith Harbour listed in the BGS website, the amount of useful information is quite limited. Of the available data, cores and cross sections of boreholes drilled in 1962 appear to be the most relevant as they are close to the dredged entrance channel. The cores offered a lithological description but unfortunately it does not differentiate between unconsolidated and recently deposited sediments and rockhead. It is possible that what is referred as soft silts and clay are Quaternary unconsolidated sediments. However, it is unclear if the very stiff lithologies mainly made of silt and clay with boulders are part of Gullane Formation. Given the uncertainty no attempt has been made to incorporate this information into the interpretation of the Sub-bottom profiles.

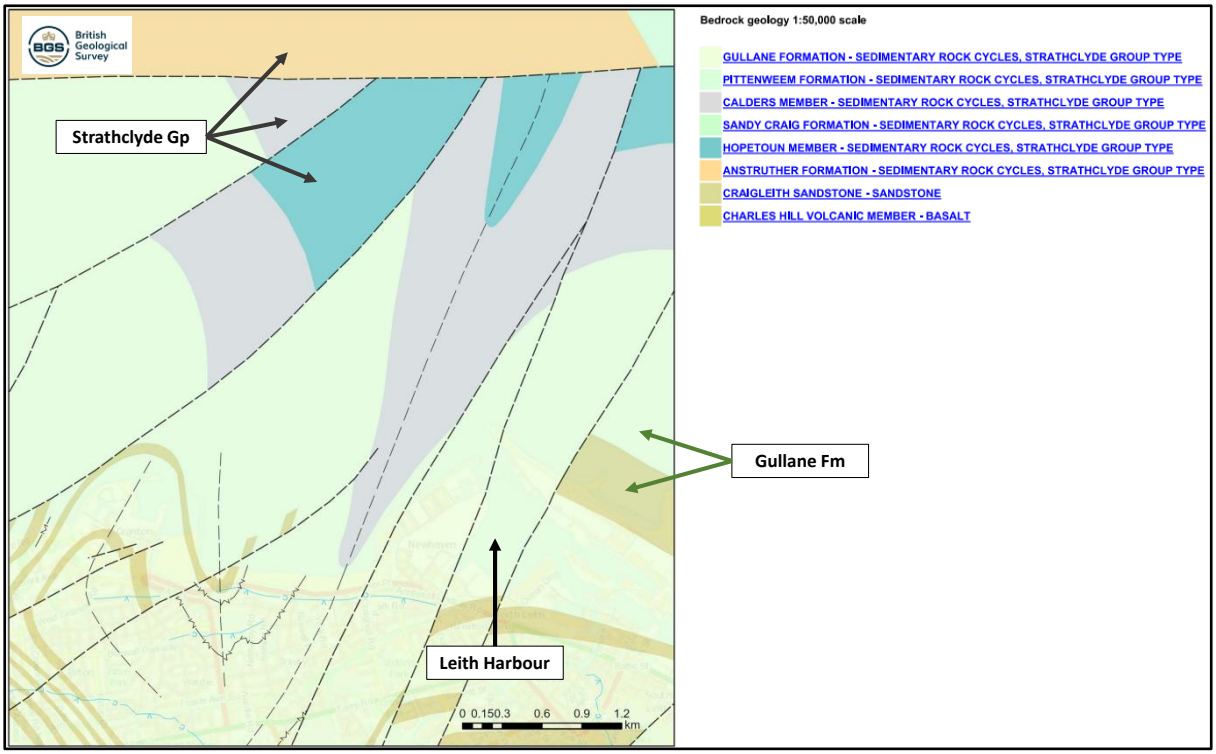


FIGURE 11 - BGS GEOLOGICAL MAP

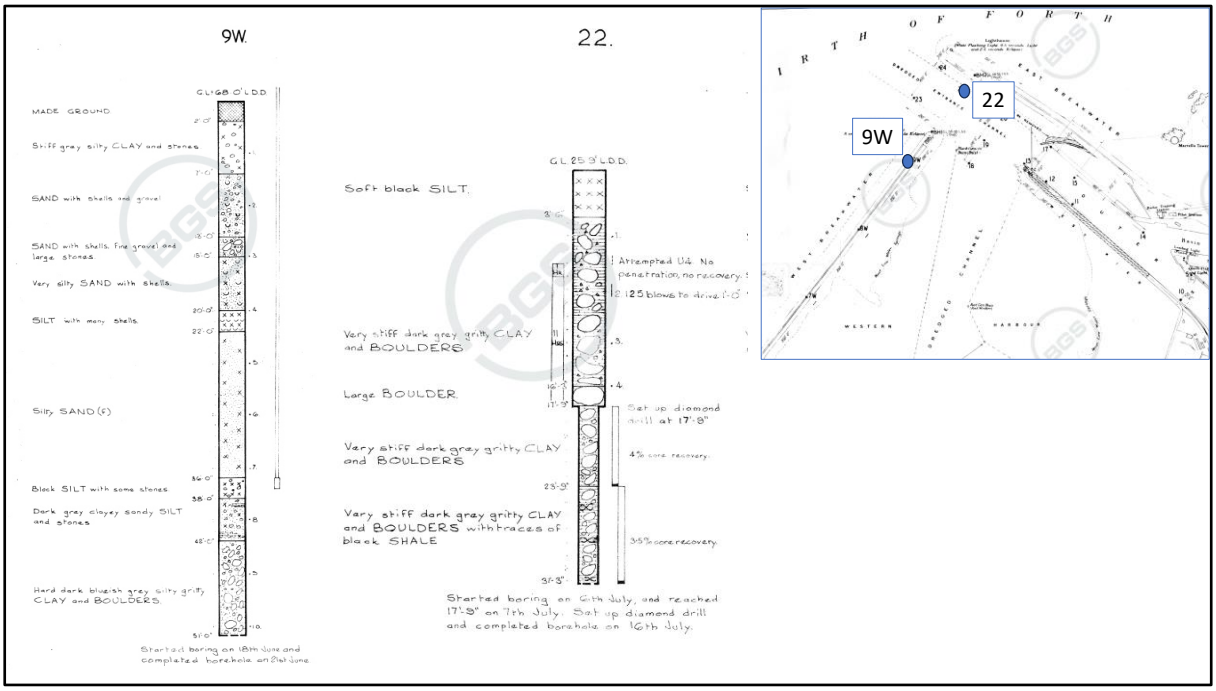


FIGURE 12 - BGS BOREHOLE

In addition to the BGS website a report of a ground investigation carried out by Fugro in 2013 was made available. That ground investigation consists of 45 boreholes located to the Nort-east of the dredged channel approach and next to the SBP survey. The lithological description of the boreholes indicated that rockhead is mainly mudstones of the Gullane Formation and the overlaying unconsolidated sediments made of gravely sand/silt/clay.

For this project a spreadsheet with water levels and rockhead levels of the 45 boreholes drilled by Fugro in 2013 was created. That data was used to create a digital terrain model of rockhead, where the levels were transformed form OD (as reported by Fugro) to CD which is the datum used to report result on this report. The Fugro rockhead levels are included in the SBP drawings delivered with this report.

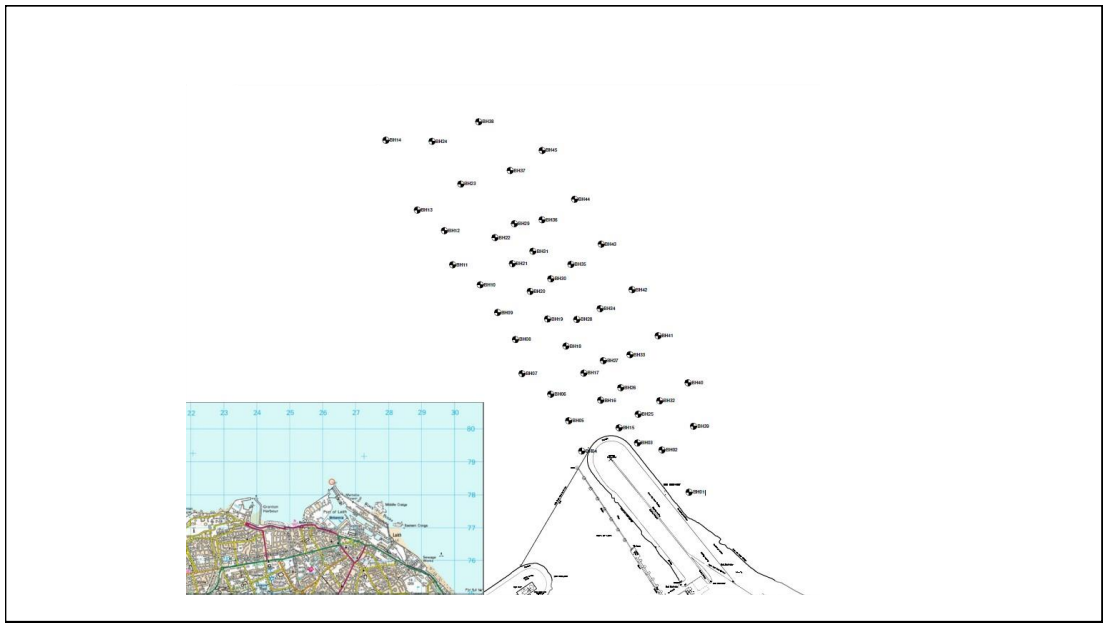


FIGURE 13 - FUGRO BOREHOLE MAP

On the SBP, four horizons have been interpreted. The first horizon (blue) is the seabed. The second horizon, called H1 (yellow horizon), is thought to represent a recent sedimentary package. The third horizon H2 (pink) it is thought to represent the top of rockhead as it is characterised by irregular surface likely to be an erosion surface and with no coherent acoustic signal underneath. Based on the geological data that erosional surface is the interface between rocks and unconsolidated sediments. The four horizon represents what is considered shallow gas (red horizon), which areal extended is limited to the Northern side of the survey area.

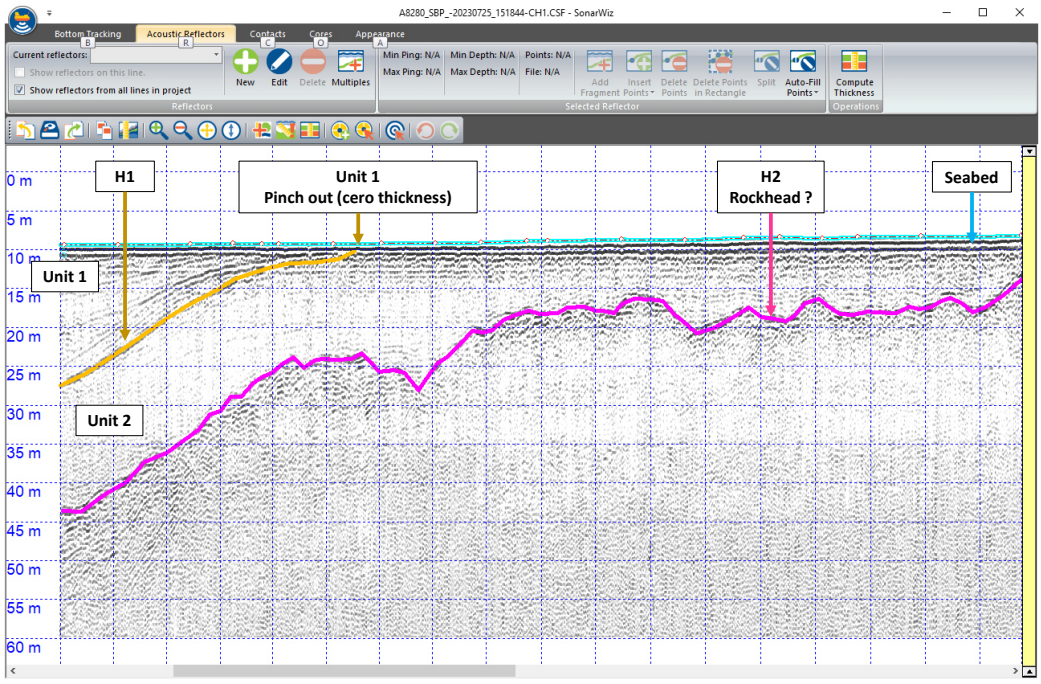


FIGURE 14 - SBP PROFILE

The interpreted horizons (H1 and H2) defined two units. Unit 1 is demarcated between seabed and H1. The unit is located in the North-west part of the survey area and is likely to represent the youngest unconsolidated sediments in the survey area. It reaches a maximum of 24 m and it pinches out towards the South-east possibly reaching zero metres thick. The Northern limit of Unit 1 is not clearly defined due to the presence of shallow gas which is causing acoustic blanking in the area. The SBP data suggest that Unit 1 extend underneath the shallow gas zone. Unit 1 has not been penetrated by any of the borehole data mentioned throughout this report.

Horizon H2, which is thought to represent rockhead, could not be trace close to the harbour. The SBP profiles show a consistent change on the acoustic signal near seabed. That change seems to indicate a lack of acoustic signal penetration and therefore poor imaging. On the dredged channels itself there is a complete lack of coherent acoustic signal and a seabed multiples become more pronounced. Consequently, H2 is only observed 500 metres away from the harbour and towards the North-west.

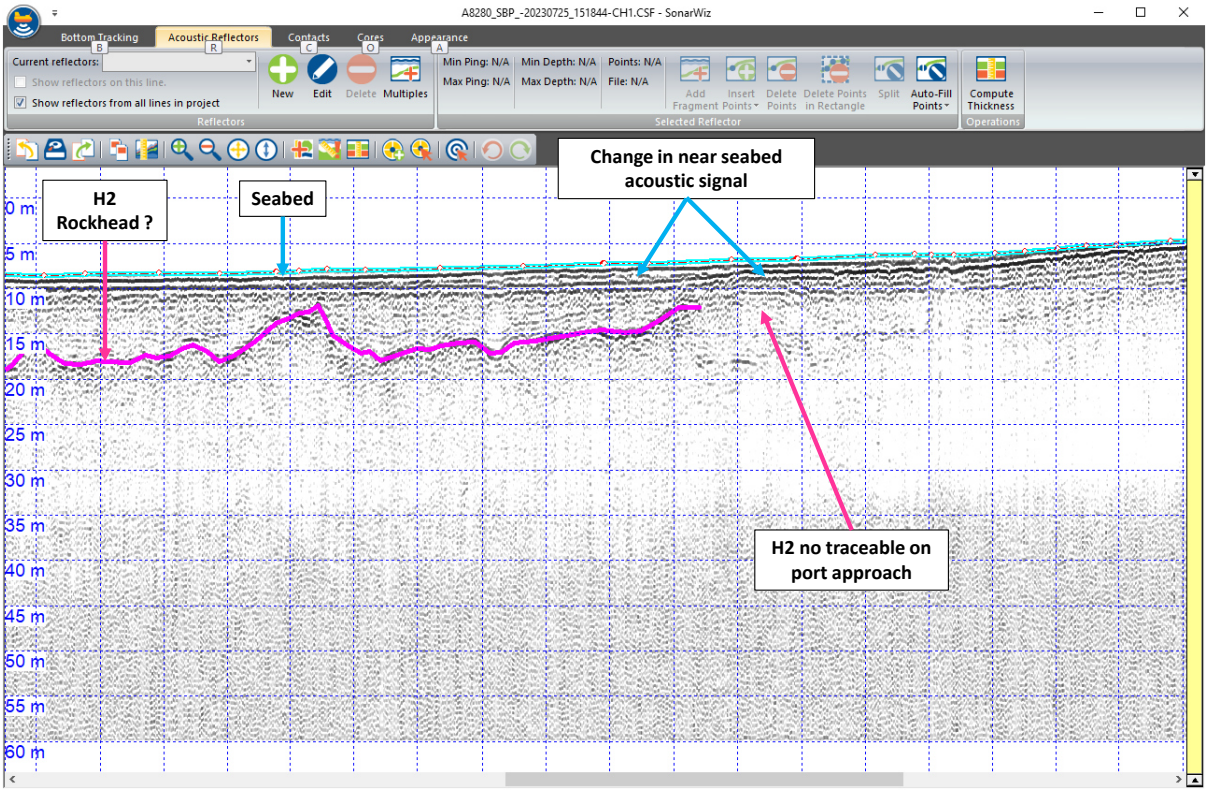


FIGURE 15 - SBP PROFILE CLOSE TO HARBOUR

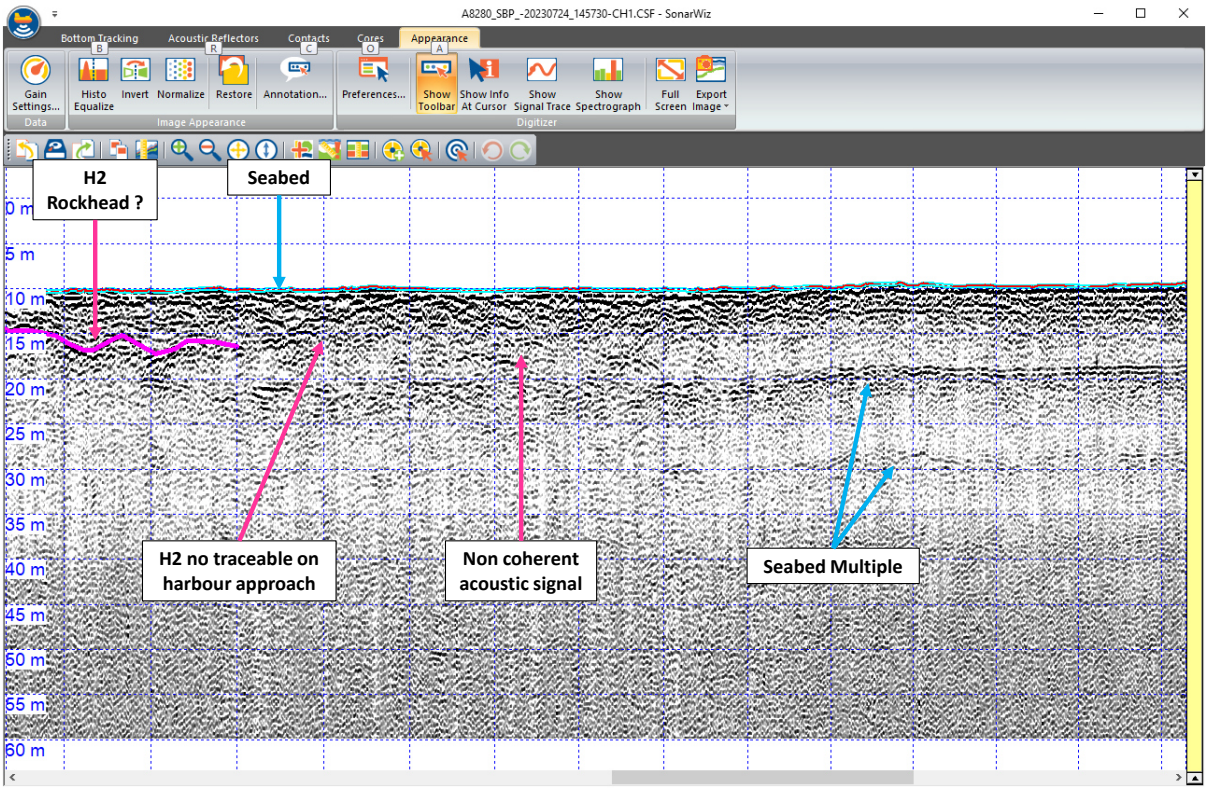


FIGURE 16 - SBP PROFILE ON DREGED CHANNEL

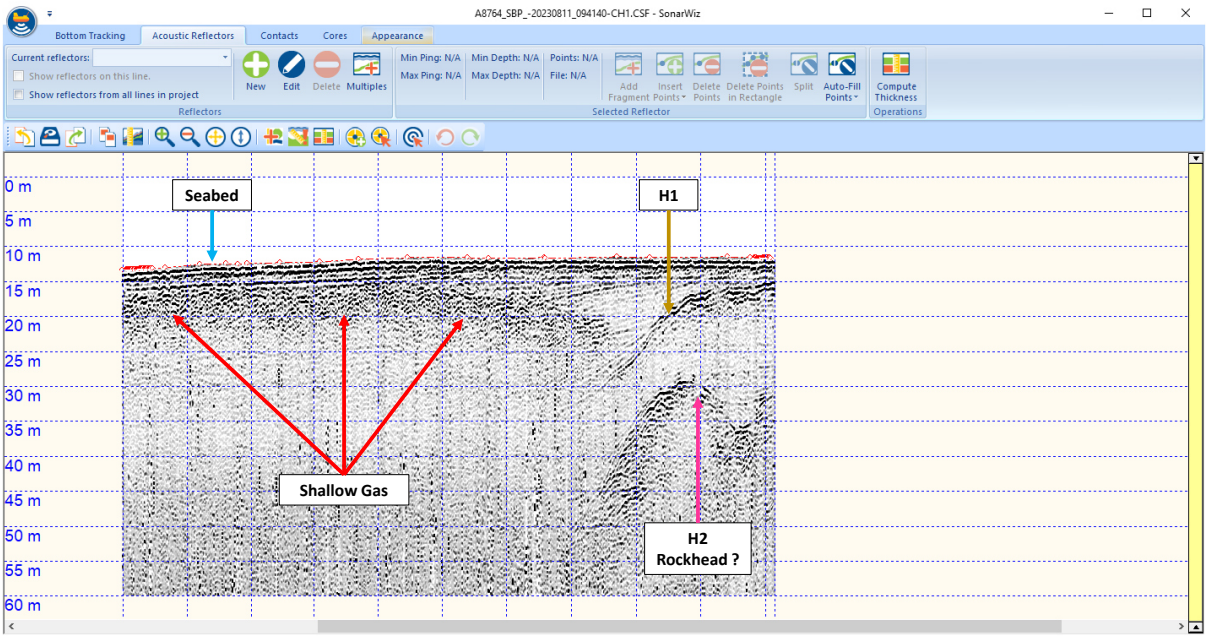


FIGURE 17 - SBP PROFILE SHOWING SHALLOW GAS IN THE NORTH

Unit 2 is demarcated between H1 and H2. It is also likely to represent unconsolidated sediments, but probably slightly older than Unit 1. It reaches a maximum thickness of 38 m in the middle of the survey area. It gets thinner towards the South where H2 progressively becomes shallower. As with Unit 1, the Northern limit of Unit 2 is not clearly defined due to the presence of shallow gas (acoustic blanking) in the

area. The SBP data suggest that Unit 2 extend underneath the shallow gas zone. Unit 2 is likely to have been penetrated by the Fugro borehole data mentioned in this report.

The map of the H2 horizon shows a very irregular surface most likely an erosion surface. H2 get deeper in the Northwest and get shallower towards the port. There are a few structural lows and highs showing a WNE-ESE orientation.

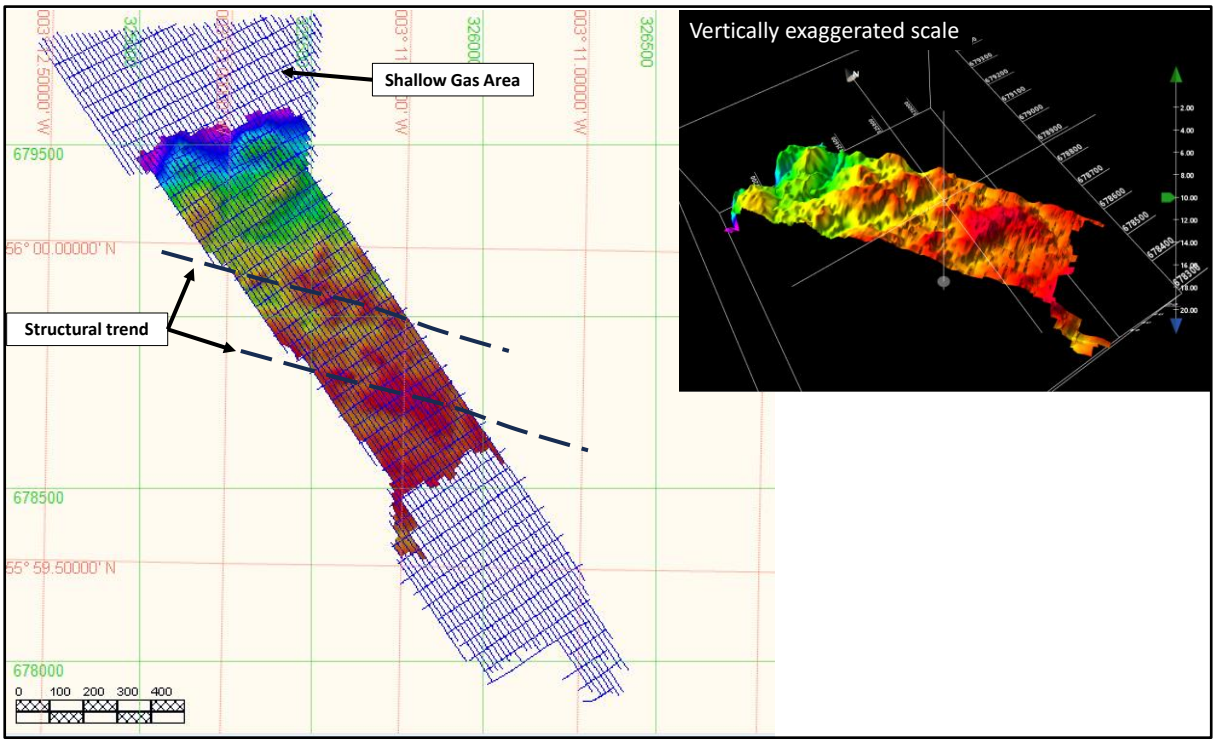


FIGURE 18 - H2 STRUCTURAL TRENDS

Only one of Fugro boreholes, BH13, is located over one of the SBP lines. At that location the rockhead level reported by the Fugro borehole data appears to be 4 metres deeper than levels suggested by the SBP. It is unclear why the difference. However, despite the discrepancy in rockhead levels between the two datasets, a map of the Fugro borehole data shows a similar structural pattern to the H2 horizon - WNE-ESE orientation of structural highs and lows. In particular, on the approach to harbour, where the SBP does not provide a good and coherent acoustic signal that could be accurately traced as rockhead, the Fugro data shows a small depression before rockhead levels get shallower on the approach to the harbour area.

Finally, the image below shows the total magnetic map of the survey area. In the South, close to the harbour, the gamma values are low, and the profiles shows high levels of noise probably caused by the nearby harbour infrastructure (high ambient noise). Where rockhead is relative shallow, the gamma values are high; and as rockhead gets progressively deeper towards the North gamma values decreases. On the most northernly part of the survey, where shallow gas masked the acoustic response of rockhead, the gamma value increases suggesting rockhead is getting shallower (no image of this on the SBP) before getting deeper at the Northen edge of the magnetic survey.

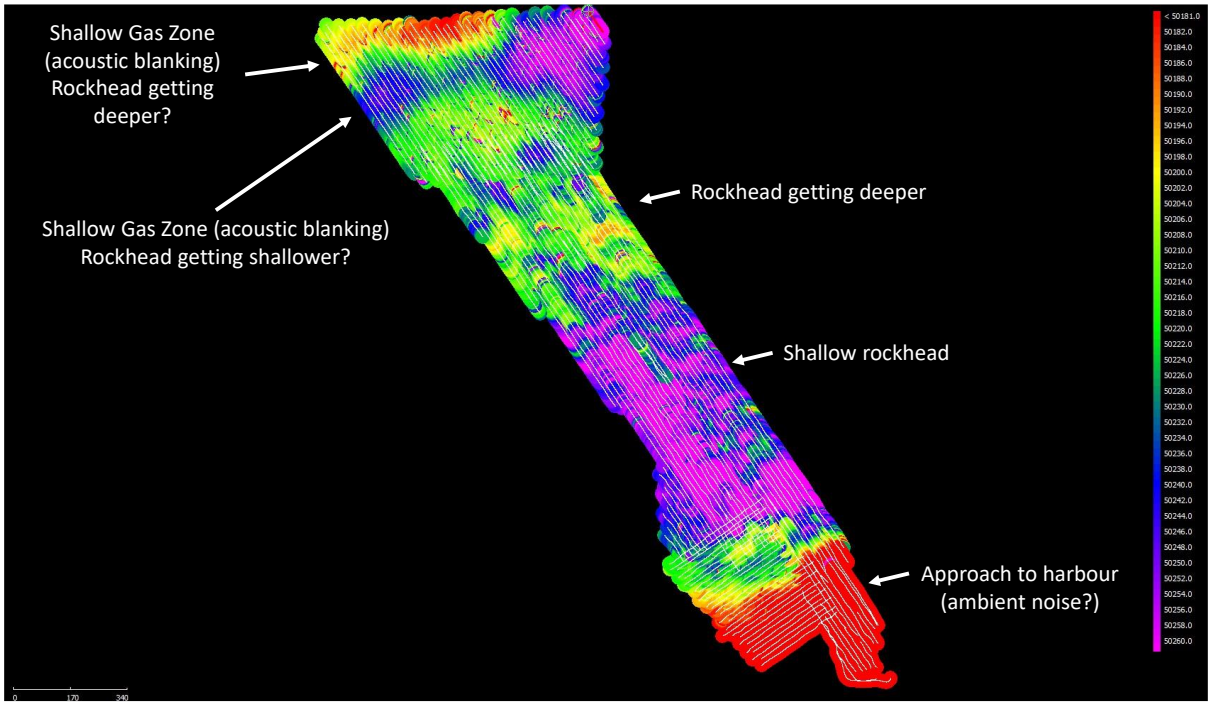


FIGURE 19 - MAGNETIC MAP

The interpretation of the sub-bottom profiler data is the informed opinion of the geophysicist.

It is highly recommended that the nature of all sub-bottom horizons is verified using intrusive methods.

9. MARINE MAMMAL OBSERVATIONS

Prior to undertaking the geophysical survey, application was made by Forth Ports Ltd for an EPS [European Protected Species] License. This was subsequently granted by Marine Scotland, under license number EPS/BS-00010405.

The application process included submission of a risk assessment, detailing the likely presence of harbour porpoise (Phocoena phocoena); bottlenose dolphin (Tursiops truncatus); minke whale (Balaenoptera acutorostrata); white-beaked dolphin (Lagenorhynchus albirostris); humpback whale (Megaptera novaeangliae) at Port of Leith Approaches and the mitigation measures required to limit disturbance to these mammals during the works.

The license covered an area at the Port of Leith Approaches, survey area of the following points:

55° 59.258’ N 03° 11.400’ W
56° 00.290’ N 03° 12.533’ W
56° 00.290’ N 03° 11.239’ W
55° 59.258’ N 03° 10.448’ W

To ensure compliance with the Joint Nature Conservation Committee (JNCC) guidelines for minimising the risk of injury and disturbance to marine mammals from geophysical surveys dated August 2017, a JNCC qualified MMO was present during all overwater survey operations.

The primary function of the MMO was to observe and monitor for marine mammals and ensure that the survey was conducted in compliance with the JNCC guidelines for minimising the risk of injury and disturbance to any sea life present.

ALHS personnel undertook the MMO function during the data capture phase and completed all required documentation and published their findings directly to JNCC separate to this report.

All equipment was operated in a manner to ensure compliance with the client's EPS licence conditions.

10. SURVEY VESSEL

ALHS' survey vessel Coastal Sensor II (MCA Cat III classification) was used to carry out the multibeam bathymetric survey.

Coastal Sensor II is a Cat III vessel capable of working up to 20nm from a safe haven. The vessel is road transportable and was launched and recovered at Port Edgar Marina Slipway.

The vessel was fitted with all necessary life-saving equipment, oil spill booms and safety features to ensure there were minimal risks associated with working over water.

The vessel was piloted by an RYA qualified coxswain and a full set of RAMS documents were prepared, approved and disseminated to all survey personnel prior to boarding the vessel.

FIGURE 20 - SURVEY VESSEL COASTAL SENSOR II

11. SURVEY PERSONNEL

The following personnel were involved during the survey and data processing phases of the project:

NAME	POSITION
C. Stephenson	QA Assurance & Data Release
A. Julyan	Hydrographic Surveyor
C. Masters	Hydrographic Surveyor
E. Reilly	Hydrographic Surveyor
R. Doyle	MMO
P. Cassap	Coxswain
O. Miron	Geophysicist

12. SURVEY STANDARDS

The Hydrographic survey is considered complete to International Hydrographic Organisation Special Order standard, with a Full Sea Floor Search being achieved as per IHO publication S44, Table 1. A representation of the section of interest within that document is shown below:

Order	Examples of Typical Areas	Horizontal Accuracy (95% Confidence Level)	Depth Accuracy for Reduced Depths (95% Confidence Level)	Bottom Search	System Detection Capability	Maximum Line Spacing
Exclusive	Harbours, berthing area and associated critical channels with strict minimum under keel clearances and manoeuvrability	1m	a = 0.15m b = 0.0075	200%	Cubic features > 0.5m	Not applicable as 200% search compulsory
Special	Harbours, berthing area and associated critical channels with minimum under keel clearances	2m	a = 0.25m b = 0.0075	100%	Cubic features > 1m	Not applicable as 100% search compulsory

Taken from IHO Publication S44, Table 1, Showing Requirements of Exclusive & Special Order Survey

The error limits for depth accuracy are calculated by introducing the values listed in the above table for a and b into the formula $\pm\sqrt{[a^2+(b*d)^2]}$, where:

a constant depth error, i.e. the sum of all constant errors

b*d depth dependent error, i.e. the sum of all depth dependent errors

b factor of depth dependent error

d depth[1]

The multibeam system has shown during this survey to be capable of detecting objects far smaller than the 1m cubic features specified for a Special-Order survey.

[1] *IHO Standards for Hydrographic Surveys (Edition 6.1.0).*

13. QUALITY ASSURANCE STATEMENT

Aspect Land & Hydrographic Surveys Ltd is an ISO PAS 99 accredited company offering a full range of topographic, hydrographic, geophysical, oceanographic and marine environmental survey services, with expertise in combining multiple disciplines into single projects.

ALHS produce work to the highest quality, certified by our accreditation to numerous organisations including the Royal Institute of Chartered Surveyors, the Institute of Civil Engineering Surveyors and The Scottish Hydrographic Society.

Our administrative procedures are fully audited to ISO9001:2015 standard and vigorously maintained via stringent quality control procedures. We are also accredited to Category B1 with Achilles via the UVDB scheme.

These standards are audited annually by external consultants to ensure continued, on-going compliance and copies of these certificates can be submitted if required.

Annex A

Horizontal & Vertical Positioning System Precision

A8764

Trimble Applanix POS MV using RTK corrections.

	HORIZONTAL ACCURACY	VERTICAL ACCURACY
REAL TIME KINEMATIC	±10mm + 1ppm RMS	±20mm + 1ppm RMS

All horizontal positions in the survey are referred to OSGB.

Annex B

Data Processing Procedures

A8764

Multibeam Processing Stages

Sonar Control 2000 software was used to control the MBES system during the data gathering phase.

Data was logged in HYPACK HYSWEEP software.

After data gathering the data was post processed in HYPACK MBMax where the following stages of processing were undertaken:

- Navigation data was processed.
- Motion Sensor data was examined and edited as required.
- Tidal data was examined and edited as required
- Automatic filtering of the data was carried out.
- Individual lines of MBES sounding data were manually edited.
- The data was gridded at an appropriate post spacing for the scale of plot requested by the client. This was exported to AutoCAD for presentation.
- The data was contoured at 0.5m intervals in Hypack and exported to AutoCAD.

Annex C

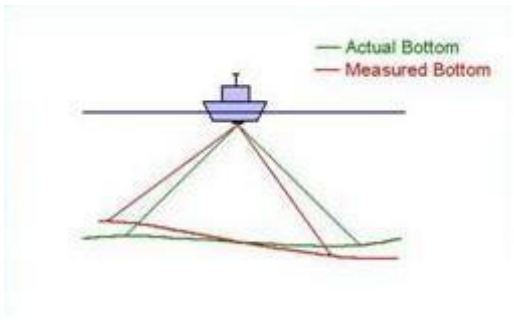
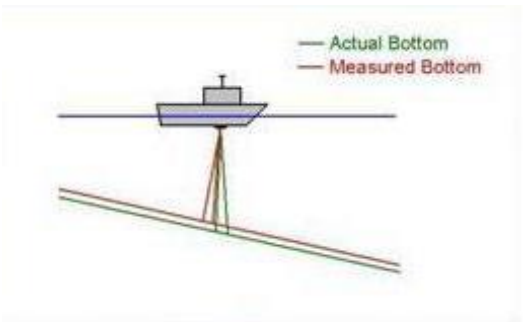
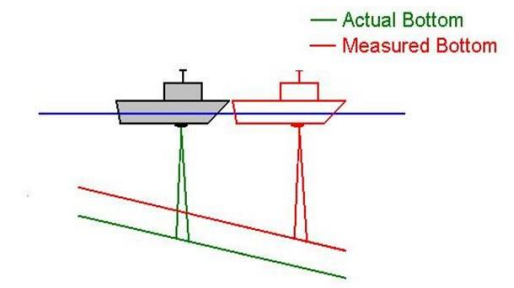
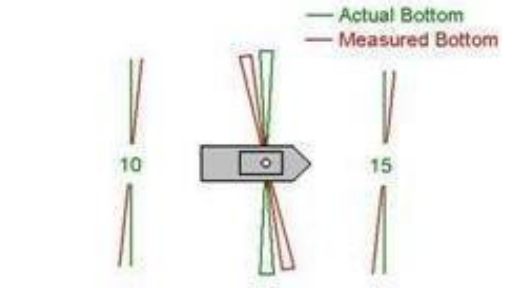
Multibeam Echosounder Calibration

A8764

Patch tests are tests which are performed after initial equipment installation, and periodically thereafter as well as if sensors are modified, to quantify any residual biases from the initial system alignment.

During this calibration series, four separate tests must be performed to determine residual alignment biases for:

- Roll offset
- Position Time Delay (Latency)
- Pitch Offset
- Yaw (Heading) Offset

ROLL	**PITCH**
	
Sonar and Motion Reference Unit (MRU) alignment relative to vertical. *Can cause large depth and position errors at outer beams.*	*Sonar and MRU alignment relative to vertical.* *Can cause depth and position errors across the swath.*
LATENCY	**YAW (HEADING)**
	
The delay between position and fix transmission. *Will cause positional errors.* *Error is independent of multibeam system.*	*Sonar and MRU alignment relative to vertical* *Can cause depth and position errors across the swath.*

Annex D

Standard Disclaimer

A8764

1. All client-supplied data is taken on trust as being accurate and correct, and the sub-contractor cannot be held responsible for the quality and accuracy of that data set.
2. The limits of this survey are defined by the data set; out with the survey limits are not covered at any level by the sub-contractor.
3. The data is accurate at the time of data acquisition, the sub-contractor cannot be held responsible for environmental changes, and the client by accepting this report accepts that the geological environment is subject to continuous change, that items of debris, hard contacts etc. may move, appear, be relocated or removed, thickness of surficial sediment change out with the knowledge of the sub-contractor and they will not be held responsible for such actions at any level.
4. Geophysical interpretation of data is based on an informed opinion of the supplied data, and is subject to inherent errors out with the control of the interpretational geophysicist, which include but are not limited to GPS positioning errors, navigation busts, data quality, assumed speed velocity sediment profiles in the absence of geotechnical data, profile pulse width, and induced scaling errors therein associated with seismic signature.
5. No liability of any kind is accepted by Aspect Land & Hydrographic Surveys Ltd for any error or omission.

Appendix 8-1: Sediment Sampling Plan and MD-LOT's Approval

Note

HaskoningDHV UK Ltd.
Water & Maritime

To:	Marine Scotland Licensing Operations Team
From:	Ben Hughes
Date:	09 May 2023
Copy:	Forth Ports Limited
Our reference:	PC4514-RHD-XX-YY-FN-EV-0009
Classification:	Project Related
Checked by	Jamie Gardiner

Subject: **Sediment Sampling Plan: Port of Leith Approaches and Outer Berth**

This note has been issued to Marine Scotland's Licensing Operations Team (MS-LOT) to confirm sediment sampling requirements within the proposed dredge footprint. The sediment sampling will inform the Marine Licence application.

1 Requirement for Dredging

Forth Ports Limited is proposing to undertake a capital dredge of the approaches to the Port of Leith for the purpose of accommodating large-drafted vessels through a wider tidal window, notably those associated with the construction and operation of offshore renewable energy installations. While capital dredging within the Leith harbour limits falls within Forth Ports Limited's jurisdiction as Statutory Harbour Authority, disposal of the material at sea is classed as a licensable activity under the Marine (Scotland) Act 2010.

A number of large-drafted vessels utilise the Port of Leith and will continue to do so once the newly-consented Outer Berth has been constructed and commissioned. To accommodate vessels with a draft up to 10.5m across a wider tidal window (thereby increasing vessel size and efficiency of port operations), Forth Ports Limited is proposing to undertake a capital dredge campaign to deepen the approach channel and Outer Berth's berth pocket, which is being moved slightly northwards.

Currently, the approach channel to the Port of Leith is dredged to a depth of c. -6.7m to -7.0m Chart Datum (CD). The proposed deepening would increase the depth to -8.0m CD and extend the offshore extent of the approach channel to the -8m CD contour. The berth pocket, most of which will have been deepened to -9.0m CD as part of the Outer Berth development, will be deepened to -12.0m CD. The total dredge volume, including 1:4 side slopes and an over-dredge allowance of 0.25m, would be approximately 700,000m^3.

Coordinates of the dredge area are provided in **Appendix 1**.

It is anticipated that all of the dredged material would be disposed of at Narrow Deep B Spoil Disposal Ground (FO038; 'Narrow Deep B'); however, a Best Practicable Environmental Option (BPEO) assessment will be undertaken to determine the most appropriate disposal option prior to submission of the marine licence application.

2 Proposed Sampling

Sampling already undertaken within the dredge footprint

A sediment sampling vibrocore campaign was undertaken in May 2022 at a number of stations adjacent to the Outer Berth, of which nine are located within the footprint of the proposed dredge (see **Figure 1** and **Table 1**). The May 2022 sampling campaign was undertaken for the purpose of supporting an earlier proposed dredge design which has since been discounted. Sampling was carried out in accordance with MS-LOT's guidance[1]. In all cases, cores penetrated to the depth of refusal, which was limited by the depth of the underlying glacial till layer.

Table 1 Coordinates for existing sediment sample locations

Sample station	Latitude	Longitude	Recovery depth (m)	Recovery level (m CD)	Subsample depths (m)
NVC01B	55.991439 N	3.1848566 W	1.20	-8.60	0.00, 0.50, 1.00
NVC02	55.990508 N	3.1853571 W	3.60	-5.30	0.00, 2.00, 3.50
NVC03A	55.989952 N	3.1833683 W	0.73	-8.03	0.0, 0.50
NVC04	55.989395 N	3.1834154 W	3.60	-4.50	0.00, 1.50, 2.00, 3.50
NVC05	55.989011 N	3.1830991 W	2.33	-2.63	0.00, 1.00, 2.00
VCN03A	55.991176 N	3.1841271 W	0.45	-8.20	0.00, 0.30
VCN04A	55.990776 N	3.1836981 W	0.50	-8.00	0.00, 0.35
VCN05A	55.990235 N	3.1828961 W	0.82	-8.52	0.00, 0.30, 0.65
VCN16	55.990547 N	3.1832102 W	0.45	-8.25	0.00, 0.30

In accordance with MS-LOT's guidance[1], where recovered cores exceeded 0.75m in length, undisturbed subsamples were taken at the surface, full recovery depth and at least one mid-depth layer; where cores were less than 0.75m in length, subsamples were taken at the surface and at full-depth.

The subsamples extracted in May 2022 were analysed for the required contaminants and by an MCERTS-accredited laboratory to specifications approved by MS-LOT[1] (as described in the Sediment Analysis section). As such, up-to-date contaminant and particle size data are available for these nine stations.

[1] Marine Scotland Pre-disposal Sampling Guidance V.2, November 2017

Further sample requirements and approach

For a dredge volume of up to 700,000m^3, MS-LOT's guidance[1] requires that 17 stations are sampled within the dredge footprint; however, to be conservative it is proposed that 18 stations are sampled. Given the existing up-to-date sediment samples that are available in and adjacent to the Outer Berth, as outlined above, it is proposed that a further nine sampling stations from the proposed dredge footprint are required (see **Figure 1**). Sampling stations have been located across the proposed dredge footprint. The coordinates for the proposed nine sampling locations are presented in **Table 2**.

Table 2 Coordinates for proposed sediment sample locations

Sample station	Latitude	Longitude
1	55.993173	3.1885969
2	55.995420	3.1903654
3	55.997273	3.1939017
4	55.999076	3.1960417
5	56.000851	3.1964173
6	56.001271	3.1994609
7	56.002649	3.1982368
8	56.004088	3.1999331
9	56.003949	3.2031361

Undisturbed samples will be collected using a vibro-core (or similar equipment). In accordance with the MS-LOT's guidance[1], subsamples will be taken from each station at the surface layer (0-150mm), full-depth (limited by the glacial till level) and at 500mm intervals between. All subsamples will be retained. Initially, surface, full-depth and one mid-layer subsample from each station will be sent for sediment analysis.

It is anticipated that sample collection will be undertaken during Spring/Summer 2023.

Given that Narrow Deep B is a licensed spoil ground that has historically received capital material, it is proposed that no sediment samples are required from the disposal site.

Sediment analysis

Sediment subsamples collected from the nine stations will be sent for analysis to a laboratory (as yet unspecified) that meets the standard requirements set out within the MS-LOT guidance. The laboratory will:

- Have ISO 17025 accreditation for marine sediment analysis;

- Employ analytical methods that meet the limit of detection and sensitivity requirements set out in the Clean Seas Environment Monitoring Programme green book; and
- Take part in intercomparison exercises (e.g. Quality Assurance of Information on Marine Environmental Monitoring in Europe).

The sediment samples will be sent for analysis following MS-LOT's guidance[1], including testing for:

- Particle size analysis
- Metals, including
    - Arsenic
    - Cadmium
    - Chromium
    - Copper
    - Mercury
    - Nickel
    - Lead
    - Zinc
- Polyaromatic hydrocarbons (PAHs), including
    - Acenaphthene
    - Acenaphthylene
    - Anthracene
    - Fluorene
    - Naphthalene
    - Phenanthrene
    - Benzo[a]anthracene
    - Benzo[b]fluoranthene
    - Benzo[k]fluoranthene
    - Benzo[a]pyrene
    - Benzo[g,h,i]perylene
    - Dibenzo[a,h]anthracene
    - Chrysene
    - Fluoranthene
    - Pyrene
    - Indeno(1,2,3cd)pyrene
- Total hydrocarbons
- Polychlorinated Biphenyls (PCBs)
- Organotins

In addition, total organic carbon will be included in the analysis.

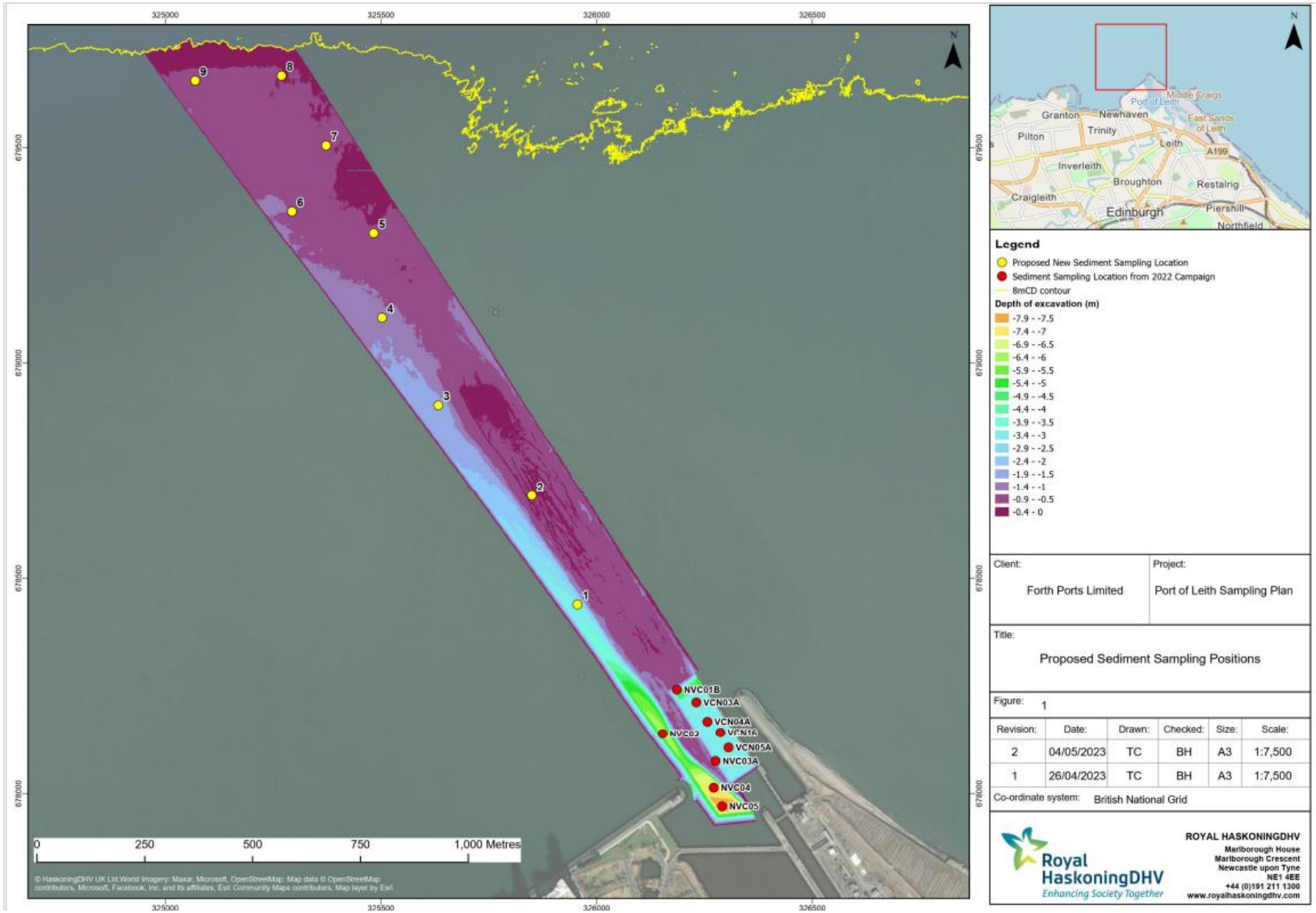


Figure 1 Proposed sediment sampling positions

Appendix 1 Dredge footprint coordinates

Note that the coordinates at the seaward end of the channel have been simplified; in reality, the seaward end would follow the 8m contour.

Lat.	Long.
55.99184	-3.18404
55.99179	-3.18419
55.99124	-3.18355
55.99061	-3.18277
55.98920	-3.18106
55.98920	-3.18113
55.98920	-3.18122
55.98909	-3.18148
55.98907	-3.18154
55.98905	-3.18154
55.98900	-3.18152
55.98899	-3.18155
55.98900	-3.18162
55.98903	-3.18165
55.98904	-3.18171
55.98901	-3.18175
55.98897	-3.18170
55.98877	-3.18159
55.98871	-3.18167
55.98860	-3.18337
55.98910	-3.18404
55.98909	-3.18410
55.98910	-3.18415
55.98929	-3.18419
55.98943	-3.18431
55.98950	-3.18437
55.98951	-3.18442
55.98956	-3.18455
55.98954	-3.18466
55.98953	-3.18474
55.98961	-3.18468
55.98978	-3.18488
55.99003	-3.18524
55.99060	-3.18604
55.99103	-3.18662
55.99211	-3.18798
55.99545	-3.19252
55.99659	-3.19408
56.00012	-3.19899
56.00173	-3.20123
56.00218	-3.20184
56.00296	-3.20294
56.00367	-3.20394
56.00420	-3.20466
56.00451	-3.20507
56.00460	-3.20474
56.00465	-3.20407
56.00472	-3.20369
56.00482	-3.20336
56.00478	-3.20268
56.00478	-3.20244
56.00480	-3.20217
56.00474	-3.20195
56.00468	-3.20152
56.00466	-3.20134
56.00462	-3.20107
56.00472	-3.20075
56.00471	-3.20031
56.00467	-3.19998
56.00464	-3.19982
56.00464	-3.19963
56.00465	-3.19945
56.00379	-3.19838
56.00326	-3.19775
56.00205	-3.19634
56.00112	-3.19518
55.99809	-3.19153
55.99743	-3.19079
55.99676	-3.18999
55.99646	-3.18962
55.99644	-3.18954
55.99639	-3.18954
55.99634	-3.18946
55.99586	-3.18890
55.99578	-3.18883
55.99573	-3.18875
55.99564	-3.18863
55.99555	-3.18850
55.99549	-3.18842
55.99547	-3.18844
55.99545	-3.18844
55.99544	-3.18840
55.99542	-3.18837
55.99538	-3.18831
55.99530	-3.18822
55.99509	-3.18796
55.99492	-3.18776
55.99457	-3.18733
55.99444	-3.18719
55.99356	-3.18613
55.99349	-3.18602
55.99343	-3.18594
55.99337	-3.18585
55.99315	-3.18561
55.99297	-3.18541
55.99284	-3.18523
55.99267	-3.18503
55.99262	-3.18500
55.99256	-3.18493
55.99252	-3.18487
55.99240	-3.18474
55.99230	-3.18459
55.99216	-3.18441
55.99184	-3.18404

Ben Hughes

From: Judith.Horrill@gov.scot
Sent: 03 July 2023 12:15
To: Ben Hughes
Subject: RE: Pre-disposal sediment sampling plan request

Good afternoon,

Please accept this email as approval of the sampling plan referenced below. Prior to sampling going ahead you are required to submit a completed Notification of Exempted Activities form accompanied by confirmation emails from the relevant organisations as detailed in the form. I look forward to receiving these from you.

Kind regards,

Judith

From: Ben Hughes <benjamin.hughes@rhdhv.com>
Sent: Tuesday, May 9, 2023 5:09 PM
To: MS Marine Licensing <MS.MarineLicensing@gov.scot>
Cc: Horrill J (Judith) <Judith.Horrill@gov.scot>; Jamie Gardiner <jamie.gardiner@rhdhv.com>
Subject: Pre-disposal sediment sampling plan request

Dear MS-LOT team,
Please find attached, on behalf of Forth Ports Limited, request for a sediment sampling plan in advance of a proposed capital dredge / disposal of the Port of Leith approaches and Outer Berth pocket.

The total dredge volume is predicted to be in the region of 700,000m^3 (inclusive of side slope and over-dredge). It is anticipated that material would be discharged to Narrow Deep B Spoil Disposal Ground (FO038), pending results of the sampling and undertaking of Best Practicable Environmental Option assessment.

Kind regards,

Ben Hughes MSc
Senior Environmental Consultant (Marine) | Resilience & Maritime (NL & UK)

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Appendix 8-2: Revised Sediment Sampling Plan and MD-LOT's Approval

Note

HaskoningDHV UK Ltd.
Water & Maritime

To:	Marine Scotland's Licensing Operations Team
From:	Emily Foster
Date:	31 October 2023
Copy:	Forth Ports Limited
Our reference:	PC4514-RHD-YY-XX-FN-EV-0019
Classification:	Project related
Checked by	Jamie Gardiner

Subject: **Port of Leith Outer Berth Development Approach Channel Deepening: Revised dredge depth**

---

1 Purpose of this Note

This note has been issued to Marine Scotland's Licensing Operations Team (MS-LOT) to:

1. inform them of changes to the proposed dredge depths to the Port of Leith Approaches and Outer Berth, and subsequent disposal volume (**Section 2**);
2. seek confirmation that the revised sediment sampling plan is suitable to inform an assessment of potential effects of the dredge and sea disposal operations (**Section 3**); and
3. provide details of the implications of the proposed changes on the findings of the environmental scoping exercise, as presented in the Environmental Scoping Report (PC4514-RHD-YY-XX-RP-EV-0013) issued in June 2023 (**Section 4**).

2 Revised dredge depth

Currently, the approach channel to the Port of Leith is dredged to a depth of *c.* -6.7m to -7.0m Chart Datum (CD), and which was originally planned to be dredged to a depth of -8.0m CD and to be extended to the -8m CD contour. The berth pocket, most of which will have been deepened to -9.0m CD as part of the Outer Berth development, will be deepened to -12m CD.

Further consideration of the types of vessels being used by the offshore renewables industry has identified that the approach channel to the Port of Leith needs to be deepened by an additional 1m to provide safe under-keel clearance for the required access the Outer Berth.

This additional metre would deepen the approach channel to -9m CD, and the berth pocket to -13m CD. This extends the approach channel seawards to the -9m CD contour, an increase in the dredge area of approximately 37,900m^2, and increases the width of the channel slightly, as a result of the required side slopes, in particular towards the entrance to the port (see **Figure 1**).

The total dredge volume to -9m CD, including side slopes, would be approximately 1,270,750m^3, and approximately 1,380,000m^3 when including a uniform over-dredge allowance of 0.25m. There is no change to the anticipated offshore disposal at Narrow Deep B Spoil Disposal Ground (FO038; 'Narrow Deep B') and a Best Practicable Environmental Option (BPEO) assessment will be undertaken to determine the most appropriate disposal option.

The revised dredge footprint can be seen in **Figure 1**. The extent of the dredge footprint falls within the points set out in **Table 1**.

NOTES

1. ALL DIMENSIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE RELATIVE TO CHART DATUM (mCD) UNLESS NOTED OTHERWISE.

LEGEND

- -13.0m BERTH POCKET
- -8.0m DREDGE APPROACH CHANNEL
- EXTENT OF SLOPES
- ADDITIONAL SAMPLING LOCATIONS
- PREVIOUSLY AGREED SAMPLING LOCATIONS
- -8m CONTOUR LINE
- -9m CONTOUR LINE

REV	DATE	DESCRIPTION	BY	CHK	APP
P01	XX.XX.23	FOR INFORMATION	BM	BC	BC

REVISIONS

CLIENT

Forth Ports Limited

PROJECT

Port of Leith Outer Berth Development
Approach Channel Deepening

TITLE

Revised dredge footprint and additional sediment sampling positions

Marlborough House, Marlborough Crescent
Newcastle upon Tyne, NE1 4EE
Tel +44 (0)191 211 1320
Email info@newcastle.royalhaskoning.com
Website www.royalhaskoning.com

Royal HaskoningDHV
Enhancing Society Together

DRAWN	CHECKED	APPROVED
BM	BC	BC
DATE	SCALE	REF.
OCT 2023	AS SHOWN	

DRAWING No.	SUITABILITY	REVISION
PC4514-RHD-YY-XX-DG-GE-0025	S0	P01

Table 1 Dredge footprint coordinates

Latitude	Longitude
55.991598	-3.1836148
55.98920	-3.18106
55.988931	-3.1814976
55.988259	-3.1808968
55.988176	-3.1836214
55.989538	-3.1850306
56.005184	-3.2064299
56.005648	-3.2002862
55.991598	-3.1836148

3 Implications of Increased Dredge Volume on the Approved Sampling Plan

The previously approved sampling plan (**Appendix A**) included 18 stations. For a dredge volume of up to 1.4milion m^3, MS-LOT's guidance[1] requires that 24 stations are sampled within the dredge footprint, meaning a further six stations are required to meet the requirements of MS-LOT's guidance.

Given the slight increase in channel width, due to the increased side slopes, there are five samples from the previous survey, from which samples were included as part of the approved sampling plan (**Appendix A**), that now fall within the dredge footprint (see **Figure 1**). In order to ensure suitable coverage of the revised dredge footprint, a further five stations have also been included. This provides an overall total of 28 sample stations, which is considered sufficient to inform an assessment of potential effects of the dredge and sea disposal operations. The additional stations are presented in **Table 2** and shown on **Figure 1**.

Table 2 Additional sediment sample locations

Sample Station Reference	Latitude	Longitude
VCN06A	55.989163	-3.182318
NVC06	55.98898	-3.18233
VCN11A	55.98917	-3.181583
VCN14	55.98945	-3.182018
VCN15	55.98944	-3.182279
10	56.005012	-3.203312
11	56.005303	-3.199510
12	56.002652	-3.199385
13	55.999215	-3.192255
14	55.992450	-3.184598

[1] Pre-disposal+sampling+guidance.pdf (www.gov.scot)

4 Implications of Increased Dredge Depth on Environmental Scoping Exercise

An environmental scoping exercise was carried out on the proposed deepening of the approach channel to -8m CD and the berth pocket to -12m CD, as presented in the Environmental Scoping Report (PC4514-RHD-YY-XX-RP-EV-0013) issued to MS-LOT, along with a request for a Scoping Opinion, in June 2023. The subsequent Scoping Opinion was issued in September 2023.

The proposed increase in dredge depth to -9m CD and berth pocket to -13m CD would extend the approach channel to the -9m CD contour, an increase of approximately 37,600m^2, and increase the width of the channel slightly as a result of the required side slopes, in particular towards the entrance to the port. The increased depth of the channel and berth pocket would also increase the dredge and disposal volume from approximately 575,000m^3 of material, inclusive of side slopes (approximately 695,000m^3 inclusive of a uniform 0.25m over-dredge), to approximately 1,270,750m^3 of material, inclusive of side slopes (approximately 1,380,000m^3 inclusive of a uniform 0.25m over-dredge). It is anticipated that the capital dredge would now take approximately four months to complete, compared to the previously anticipated approximately three months.

As the proposed changes in dredge depth do not introduce any new activities to that considered by the environmental scoping exercise, there are no changes to the required surveys/studies and assessments set out in the Environmental Scoping Report and confirmed by the Scoping Opinion. The proposed changes do however affect the scope of the following surveys, the specifications of which were presented in the Environmental Scoping Report:

- Sediment sampling survey (Appendix C of the Environmental Scoping Report)
- Benthic ecology survey (Appendix D of the Environmental Scoping Report)

The implications on the sediment sampling survey have been described in **Section 3** above, with more than sufficient stations being sampled to meet the requires of MS-LOT's guidance.

The proposed scope of the benthic ecology survey included samples near to the -8m CD contour as well as further into the Firth of Forth, outside of the dredge footprint; however, within the expected Zone of Influence of potential effects as a result of the deepening of the approach channel (see **Figure 2**). The extension to the proposed dredge footprint is therefore within the envelope of sample sites, as shown on **Figure 2**.

Given this, the very small increase in dredge footprint and the ubiquitous nature of the benthic habitats throughout the local area within the Firth of Forth, as determined from the 2021 EUSeaMap benthic mapping project (see Section 4.6.1 of the Environmental Scoping Report), the benthic ecology survey is considered to remain suitable to assess the potential effects of the increased dredge depth on benthic ecology.

Figure 2 Benthic ecology survey station and transect locations

From: Jamie Gardiner
Sent: 07 November 2023 09:54
To: 'Judith.Horrill@gov.scot'
Subject: RE: Port of Leith Outer Berth Development Approach Channel Deepening: Revised Dredge Depth

Morning Judith,

Many thanks for your prompt response and all understood.

Thanks,

Jamie

Jamie V. Gardiner B.Sc. (Hons) M.Sc.
Associate Director
Environment | Resilience | Renewables

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E jamie.gardiner@rhdhv.com | **W** www.royalhaskoningdhv.com
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From: Judith.Horrill@gov.scot <Judith.Horrill@gov.scot>
Sent: 06 November 2023 15:08
To: Jamie Gardiner <jamie.gardiner@rhdhv.com>
Subject: RE: Port of Leith Outer Berth Development Approach Channel Deepening: Revised Dredge Depth

Good afternoon Jamie,

Thank you for your email. I am well thanks. I hope the same for you.

With regards to the new dredge volume proposed for the above project please accept this email as MD-LOT's approval of the updated sample plan. Please submit a Notice of Intention to Carry out an Exempted Activity form and relevant consultation emails before proceeding with sampling.

It is noted that it is not intended to scope this change, which is not obligatory, but you should be aware that this may increase the risk of additional information being requested during the EIA process.

If you require further information please do get in touch.

Kind regards,

Judith

Judith Horrill
Marine Licensing Casework Officer, Licensing Operations Team, Marine Directorate
Scottish Government | Marine Laboratory | Aberdeen | AB11 9DB
M: [Redacted] E: Judith.Horrill@gov.scot

The Scottish Government

I am working from home but available via email (preferred), MS Teams or mobile

MD-LOT Email addresses are MD.MarineLicensing@gov.scot for all licensing queries and MD.MarineRenewables@gov.scot for marine renewables/consenting correspondence.

Guidance on marine licensing and marine licence application forms can be found at:
https://www.gov.scot/publications/marine-licensing-applications-and-guidance/

From: Jamie Gardiner <jamie.gardiner@rhdhv.com>
Sent: Monday, November 6, 2023 9:17 AM
To: Judith Horrill <Judith.Horrill@gov.scot>
Cc: Emily Foster <emily.foster@rhdhv.com>; Neil MacLeod <Neil.MacLeod3@gov.scot>
Subject: Port of Leith Outer Berth Development Approach Channel Deepening: Revised Dredge Depth

Morning Judith,

Hope this finds you well.

I would like to inform you of a change to the proposed deepening of the Leith approach channel.

Further consideration of the types of vessels being used by the offshore renewables industry has identified that the approach channel to the Port of Leith needs to be deepened by an additional 1m, to that previously proposed, to provide safe under-keel clearance for the required access to the Outer Berth. This additional metre would deepen the approach channel to -9m CD, and the berth pocket to -13m CD. This extends the approach channel seawards to the -9m CD contour.

I have attached a note that:

- provides further details on the change to the proposed deepening project;
- seeks confirmation that the revised sediment sampling plan is suitable to inform an assessment of potential effects of the dredge and sea disposal operations; and
- provides details of the implications of the proposed changes on the findings of the environmental scoping exercise, as presented in the Environmental Scoping Report (PC4514-RHD-YY-XX-RPEV- 0013).

Please let me know if there is anything that you would like to discuss.

Thanks,

Jamie

Jamie V. Gardiner B.Sc. (Hons) M.Sc.
Associate Director
Environment | **Resilience** | **Renewables**

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Appendix 8-3: Sediment Analyses Results

Pre-disposal Sampling Results Form

Version 2 - June 2017

This form should be used to submit the results from your pre-disposal sampling plan.
Full information must be provided in all relevant sheets of this workbook. The blue cells in each worksheet indicate where information can be entered.
Where information cannot be provided, or where there are more than 30 samples required, please contact the Marine Scotland - Licensing Operations Team (MS-LOT) using the contact details below.

Once you have completed this form, send it (including any reference number for the dredging and sea disposal marine licence application in the subject header of your email) to the following email address:
ms.marinelicensing@gov.scot

If you have any questions in relation to this form contact MS-LOT:

Marine Scotland - Licensing Operations Team
Marine Laboratory
375 Victoria Road
Aberdeen, AB11 9DB

01224 295579
ms.marinelicensing@gov.scot

Applicant Information

Applicant:	
Description of dredging:	
Total amount to be dredged (wet tonnes)	

Sample Details & Physical Properties

Explanatory Notes:
An example of a 'Dredge area' is: 'Dock A, Harbour X'
Provide description of the dredge area and the latitude and longitude co-oridnates (WGS84) for each sample location. Co-ordinates taken from GPS equipment should be set to WGS84.
Note for sample depth that the seabed is 0 metres.
Gravel is defined as >2mm, **Sand** is defined as >63um<2mm, **Silt** is deinfed as <63um).

Sample information:

Sample ID	Dredge area	Latitude	Longitude	Type of sample	Sample depth (m)	Total solids (%)	Gravel (%)	Sand (%)	Silt (%)	TOC (%)	Specific gravity	Asbestos
MAR02010.00	VC01 (0.00m)	° . 'N	° . 'W			79.4	0.83	36.72	62.45	5		
MAR02010.00	VC01 (1.00m)	° . 'N	° . 'W			87.2	30.84	12.4	56.75	1.68		
MAR02010.00	VC01 (1.50m)	° . 'N	° . 'W			80.2	18.02	3.48	78.5	1.92		
MAR02010.00	VC02 (0.00m)	° . 'N	° . 'W			74.2	0	2.29	97.71	1.87		
MAR02010.00	VC02 (3.00m)	° . 'N	° . 'W			74.5	0	1.59	98.41	2.74		
MAR02010.00	VC02 (4.50m)	° . 'N	° . 'W			40	0	3.35	96.65	7.86		
MAR02010.00	VC03 (0.00m)	° . 'N	° . 'W			73.1	10.57	29.86	59.57	1.18		
MAR02010.00	VC03 (1.00m)	° . 'N	° . 'W			67.3	4.74	30.4	64.85	1.63		
MAR02010.00	VC03 (2.00m)	° . 'N	° . 'W			86.7	35.88	29.42	34.7	1.27		
MAR02010.01	VC04 (0.00m)	° . 'N	° . 'W			71.2	12.35	33.4	54.26	1.86		
MAR02010.01	VC04 (2.00m)	° . 'N	° . 'W			75	0	1.59	98.41	1.56		
MAR02010.01	VC04 (3.00m)	° . 'N	° . 'W			72.8	0	3.42	96.58	1.84		
MAR02010.01	VC05 (0.00m)	° . 'N	° . 'W			59.9	8.72	35.09	56.19	1.1		
MAR02010.01	VC05 (1.00m)	° . 'N	° . 'W			85.8	0	92.89	7.11	0.44		
MAR02010.01	VC05 (2.00m)	° . 'N	° . 'W			81.7	0	92.79	7.21	0.6		
MAR02010.01	VC06 (0.00m)	° . 'N	° . 'W			63.7	15.43	25.97	58.6	4.62		
MAR02010.01	VC06 (2.00m)	° . 'N	° . 'W			70.1	0	20.44	79.56	0.78		
MAR02010.01	VC06 (3.00m)	° . 'N	° . 'W			85.7	0	53.12	46.88	0.75		
MAR02010.01	VC07 (0.00m)	° . 'N	° . 'W			66.2	6.79	27.49	65.72	1.87		
MAR02010.02	VC07 (2.00m)	° . 'N	° . 'W			70	0	22.55	77.45	1.05		
MAR02010.02	VC07 (3.00m)	° . 'N	° . 'W			83.6	13.12	44.03	42.84	0.6		
MAR02010.02	VC08 (0.00m)	° . 'N	° . 'W			71.4	1.74	17.94	80.32	0.77		
MAR02010.02	VC08 (2.00m)	° . 'N	° . 'W			74.4	0	3.22	96.78	2.05		
MAR02010.02	VC08 (3.50m)	° . 'N	° . 'W			71.8	0	6.2	93.8	1.09		
MAR02010.02	VC09 (0.00m)	° . 'N	° . 'W			60.5	3.85	22.56	73.59	2.15		
MAR02010.02	VC09 (2.00m)	° . 'N	° . 'W			69.9	0	17.58	82.42	0.56		
MAR02010.02	VC09 (3.00m)	° . 'N	° . 'W			71.4	1.02	17.24	81.75	0.83		
MAR02010.02	VC10 (0.00m)	° . 'N	° . 'W			73.4	26.28	30.7	43.02	2.97		
MAR02010.02	VC10 (2.00m)	° . 'N	° . 'W			89.3	13.53	53.09	33.39	0.08		
MAR02010.03	VC10 (3.50m)	° . 'N	° . 'W			86	7.44	45.68	46.88	0.93		
MAR02010.03	VC11 (0.00m)	° . 'N	° . 'W			65.8	21.58	33.18	45.25	4.19		
MAR02010.03	VC11 (2.00m)	° . 'N	° . 'W			70.1	0	17.17	82.83	0.78		
MAR02010.03	VC11 (3.50m)	° . 'N	° . 'W			69.1	0	10.71	89.29	0.75		
MAR02010.03	VC12 (0.00m)	° . 'N	° . 'W			64.7	10.12	29.69	60.19	4.11		
MAR02010.03	VC12 (2.00m)	° . 'N	° . 'W			70	3.62	18.94	77.44	1.17		
MAR02010.03	VC12 (4.50m)	° . 'N	° . 'W			66.3	0	15.24	84.76	0.95		
MAR02010.03	VC13 (0.00m)	° . 'N	° . 'W			73.5	4.22	21.37	74.41	1.44		
MAR02010.03	VC13 (1.00m)	° . 'N	° . 'W			82.8	11.66	45.38	42.97	0.64		
MAR02010.03	VC13 (2.00m)	° . 'N	° . 'W			87.6	8.87	50.77	40.36	0.7		
MAR02010.04	VC14 (0.00m)	° . 'N	° . 'W			75.5	22.33	40.2	37.47	0.75		
MAR02010.04	VC14 (1.00m)	° . 'N	° . 'W			84.9	33.23	40.59	26.18	1.36		
MAR02010.04	VC14 (1.50m)	° . 'N	° . 'W			88.6	20.69	41.91	37.4	0.98		
MAR1438.00	NVC01B 0.00	° . 'N	° . 'W			55.7	3.56	35.01	61.43	5.55	2.57	
MAR1438.00	NVC01B 0.50	° . 'N	° . 'W			85.3	26.41	19.94	53.65	1.62	2.7	
MAR1438.00	NVC01B 1.00	° . 'N	° . 'W			79.5	9.69	27.87	62.44	1.68		
MAR1438.00	NVC02 0.00	° . 'N	° . 'W			46.6	0	30.13	69.87	4.64	2.58	
MAR1438.00	NVC02 2.00	° . 'N	° . 'W			58.1	0	22.31	77.69	8.28	2.44	
MAR1438.00	NVC02 3.50	° . 'N	° . 'W			75.3	0	1.02	98.98	2.15	2.65	
MAR1438.00	NVC03A 0.00	° . 'N	° . 'W			47.5	0	21.68	78.32	4.99	2.58	
MAR1438.00	NVC03A 0.50	° . 'N	° . 'W			79.3	13.02	25.54	61.43	1.78	2.71	
MAR1438.00	NVC04 0.00	° . 'N	° . 'W			43.2	0	23.06	76.94	4.75	2.61	
MAR1438.01	NVC04 1.50	° . 'N	° . 'W			56.5	0	21.94	78.06	5.14	2.64	
MAR1438.01	NVC04 2.00	° . 'N	° . 'W			54	0	15.45	84.55	5.43	2.55	
MAR1438.01	NVC04 3.50	° . 'N	° . 'W			47.8	0	9.87	90.13	7.63	2.43	
MAR1438.01	NVC05 0.00	° . 'N	° . 'W			47.6	0	19.07	80.93	4.67	2.58	
MAR1438.01	NVC05 1.00	° . 'N	° . 'W			55.5	0	15.7	84.3	5.74	2.53	
MAR1438.01	NVC05 2.00	° . 'N	° . 'W			45.9	0	14.4	85.6	7.43	2.48	
MAR1438.01	NVC06 0.00	° . 'N	° . 'W			50	0	16.49	83.51	4.92	2.33	
MAR1438.01	NVC06 1.00	° . 'N	° . 'W			57.1	0	35.33	64.67	4.19	2.59	
MAR1438.01	NVC06 1.50	° . 'N	° . 'W			54.7	0	13.91	86.09	5.64	2.58	
MAR1438.01	VCN03A 0.00	° . 'N	° . 'W			41.4	0	20.46	79.54	5.43	2.55	
MAR1438.02	VCN03A 0.30	° . 'N	° . 'W			85.2	16.48	4.87	78.66	1.69	2.7	
MAR1438.02	VCN04A 0.00	° . 'N	° . 'W			42.5	0	20.41	79.59	5.22	2.64	
MAR1438.02	VCN04A 0.35	° . 'N	° . 'W			89.1	12.39	25.11	62.5	1.86	2.69	
MAR1438.02	VCN05A 0.00	° . 'N	° . 'W			52.4	14.24	19.51	66.25	3.14	2.66	
MAR1438.02	VCN05A 0.30	° . 'N	° . 'W			88.6	12.85	25.08	62.06	1.66	2.68	
MAR1438.02	VCN05A 0.65	° . 'N	° . 'W			89.3	21.31	23.09	55.6	1.52	2.67	
MAR1438.02	VCN06A 0.00	° . 'N	° . 'W			38.8	0	21.42	78.58	4.51	2.59	
MAR1438.02	VCN06A 0.20	° . 'N	° . 'W			37.5	0	14.54	85.46	5.41	2.6	
MAR1438.02	VCN06A 0.50	° . 'N	° . 'W			86.5	17.01	24.82	58.16	1.83	2.69	
MAR1438.03	VCN14 0.00	° . 'N	° . 'W			40.6	0	13.83	86.17	4.42	2.59	
MAR1438.03	VCN14 0.50	° . 'N	° . 'W			83	23.92	24.58	51.5	1.81	2.67	
MAR1438.04	VCN15 0.00	° . 'N	° . 'W			35.9	0	11.96	88.04	4.96	2.55	
MAR1438.04	VCN15 0.50	° . 'N	° . 'W			80.6	14.46	29.48	56.06	2.48	2.7	
MAR1438.04	VCN16 0.00	° . 'N	° . 'W			40.1	0	18.18	81.82	3.12	2.56	
MAR1438.04	VCN16 0.30	° . 'N	° . 'W			85.3	23.6	25.89	50.51	1.66	2.69	
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Trace Metals & Organotins

Explanatory Notes:
Results above Action Level 1 will be highlighted in blue and above Action Level 2 in red.

Sample information:

Sample ID	Dredge area	Type of sample	Sample depth (m)	mg/kg dry weight									
				Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Copper (Cu)	Mercury (Hg)	Nickel (Ni)	Lead (Pb)	Zinc (Zn)	Dibutyltin (DBT)	Tributyltin (TBT)
MAR02010.00	VC01 (0.00m)	0	0	12.5	1.16	60.4	60.8	1.29	32.5	105	195	<0.005	<0.005
MAR02010.00	VC01 (1.00m)	0	0	3.4	0.28	46.4	23.5	0.06	51	13.9	78.7	<0.005	<0.005
MAR02010.00	VC01 (1.50m)	0	0	3.7	0.23	30.4	23.7	0.04	37.7	21.8	68	<0.005	<0.005
MAR02010.00	VC02 (0.00m)	0	0	5	0.25	116	27.5	0.04	90.5	15.7	73.9	<0.005	<0.005
MAR02010.00	VC02 (3.00m)	0	0	3.8	0.21	340	30.4	0.04	215	16	79.9	<0.005	<0.005
MAR02010.00	VC02 (4.50m)	0	0	16.5	0.3	72.8	31	0.63	46.2	66.6	129	<0.005	<0.005
MAR02010.00	VC03 (0.00m)	0	0	12.1	0.13	31.8	10.9	0.18	23.7	19.5	55.9	<0.005	<0.005
MAR02010.00	VC03 (1.00m)	0	0	12.6	0.14	31.5	10.1	0.17	22.8	17.8	75.5	<0.005	<0.005
MAR02010.00	VC03 (2.00m)	0	0	8.3	0.14	30.5	20.3	0.05	34.8	10.3	58.6	<0.005	<0.005
MAR02010.01	VC04 (0.00m)	0	0	12.2	0.19	34.8	13.4	0.28	28.4	94.1	75.9	<0.005	<0.005
MAR02010.01	VC04 (2.00m)	0	0	5.6	0.21	42.5	29.1	0.01	54.4	15.5	73.3	<0.005	<0.005
MAR02010.01	VC04 (3.00m)	0	0	5.2	0.18	42.5	29.8	<0.01	49.2	15.6	71.8	<0.005	<0.005
MAR02010.01	VC05 (0.00m)	0	0	9.4	0.14	29.4	13.3	0.19	22.2	36.4	65.6	<0.005	<0.005
MAR02010.01	VC05 (1.00m)	0	0	4.5	0.06	8.3	6	<0.01	11.7	5.8	25.3	<0.001	<0.001
MAR02010.01	VC05 (2.00m)	0	0	4.4	0.06	8.5	6.2	<0.01	15.6	5.6	24.7	<0.001	<0.001
MAR02010.01	VC06 (0.00m)	0	0	12.6	0.16	37.5	110	0.66	32.1	68.7	89.7	<0.005	<0.005
MAR02010.01	VC06 (2.00m)	0	0	7.1	0.11	33.2	6.6	<0.01	24.7	9	48.3	<0.005	<0.005
MAR02010.01	VC06 (3.00m)	0	0	7.4	0.14	25.1	13.4	0.04	25.3	8.7	42.9	<0.005	<0.005
MAR02010.01	VC07 (0.00m)	0	0	11.7	0.24	41.2	15.1	0.3	28.4	40.7	76.8	<0.005	<0.005
MAR02010.02	VC07 (2.00m)	0	0	6.9	0.15	34.5	6.3	<0.01	25.1	9.2	49.4	<0.005	<0.005
MAR02010.02	VC07 (3.00m)	0	0	8.6	0.13	21.2	12	0.07	20.7	10.5	45.2	<0.005	<0.005
MAR02010.02	VC08 (0.00m)	0	0	8.6	0.14	21.6	12.7	0.03	20.8	10.5	52.9	<0.005	<0.005
MAR02010.02	VC08 (2.00m)	0	0	7.3	0.14	37.4	8.3	<0.01	27.8	10.7	56.6	<0.005	<0.005
MAR02010.02	VC08 (3.50m)	0	0	7	0.2	38.4	20.8	0.14	38.7	20.8	67.5	<0.005	<0.005
MAR02010.02	VC09 (0.00m)	0	0	7.5	0.2	35.3	20.1	<0.01	40.7	12.5	62.9	<0.005	<0.005
MAR02010.02	VC09 (2.00m)	0	0	9.9	0.22	37.8	15.6	0.41	23.9	36.4	68.7	<0.005	<0.005
MAR02010.02	VC09 (3.00m)	0	0	7.4	0.16	47	7.3	0.01	35.5	9.9	54.7	<0.005	<0.005
MAR02010.02	VC10 (0.00m)	0	0	9.9	0.26	34.3	20.2	0.55	22.3	59	84.4	<0.005	<0.005
MAR02010.02	VC10 (2.00m)	0	0	9.1	0.15	25.6	16.9	<0.01	26.3	9.9	49.4	<0.005	<0.005
MAR02010.03	VC10 (3.50m)	0	0	6.1	0.18	25.6	15.8	<0.01	30.1	9.8	52.9	<0.005	<0.005
MAR02010.03	VC11 (0.00m)	0	0	9.5	0.18	32.8	11.9	0.23	22.4	30.2	61.5	<0.005	<0.005
MAR02010.03	VC11 (2.00m)	0	0	6.5	0.13	32.2	5.9	<0.01	25.3	8.4	47.9	<0.005	<0.005
MAR02010.03	VC11 (3.50m)	0	0	6.5	0.13	31.7	6	0.03	24.7	8.7	46.1	<0.005	<0.005
MAR02010.03	VC12 (0.00m)	0	0	12.5	0.32	44.4	26.2	0.77	26.4	62.9	100	<0.005	<0.005
MAR02010.03	VC12 (2.00m)	0	0	7.1	0.17	36.1	7	<0.01	27.3	10	59.1	<0.005	<0.005
MAR02010.03	VC12 (4.50m)	0	0	6.7	0.12	34.2	6.5	<0.01	25.3	9.2	50.1	<0.005	<0.005
MAR02010.03	VC13 (0.00m)	0	0	8.6	0.15	30.7	10.8	0.18	23.8	24.1	60	<0.005	<0.005
MAR02010.03	VC13 (1.00m)	0	0	7.2	0.13	25.2	12.6	<0.01	25.9	8.8	46.8	<0.005	<0.005
MAR02010.03	VC13 (2.00m)	0	0	7.9	0.15	29.1	15	<0.01	35	9.5	51.9	<0.005	<0.005
MAR02010.04	VC14 (0.00m)	0	0	7.2	0.12	21.6	7.1	<0.01	18.6	9.1	40.7	<0.005	<0.005
MAR02010.04	VC14 (1.00m)	0	0	9.2	0.14	23.7	13.3	<0.01	29.1	9.9	51.4	<0.005	<0.005
MAR02010.04	VC14 (1.50m)	0	0	4.5	0.2	25.1	21.8	<0.01	32.4	9.9	62	<0.005	<0.005
MAR1438.001	NVC01B 0.00	0	0	13.3	0.39	50.2	33.8	0.55	33.1	60.8	122	<0.005	0.0108
MAR1438.002	NVC01B 0.50	0	0	4.4	0.29	43.1	32.8	0.05	56.9	19.5	82.7	<0.005	<0.005
MAR1438.003	NVC01B 1.00	0	0	4.1	0.34	41.2	33	0.04	56.7	20	81.5	<0.005	0.00658
MAR1438.004	NVC02 0.00	0	0	16.4	2.45	91.5	78.9	1.42	41.3	105	190	0.0192	0.0239
MAR1438.005	NVC02 2.00	0	0	14.8	5.5	84.2	127	2.26	58.7	233	355	<0.005	0.0146
MAR1438.006	NVC02 3.50	0	0	4.8	0.49	41.1	32.3	0.14	42	25.6	81.2	<0.005	<0.005
MAR1438.007	NVC03A 0.00	0	0	15.3	0.34	59.1	33.5	0.62	36.2	65.4	132	<0.005	0.0114
MAR1438.008	NVC03A 0.50	0	0	5.6	0.23	41.6	32.3	0.07	56.7	24.5	83.8	<0.005	<0.005
MAR1438.009	NVC04 0.00	0	0	16	0.29	61.7	38.3	0.71	38.4	73.1	142	<0.005	<0.005
MAR1438.010	NVC04 1.50	0	0	16.3	1.01	75.6	63.1	1.19	40.7	115	189	0.0129	0.0119
MAR1438.011	NVC04 2.00	0	0	16.2	1.06	77.7	59.6	1.21	39.4	110	185	0.0112	0.0111
MAR1438.012	NVC04 3.50	0	0	14	3.06	77.6	115	2.05	38.7	178	267	<0.005	<0.005
MAR1438.013	NVC05 0.00	0	0	15.2	0.62	59.8	44.9	0.87	34.2	82.8	148	<0.005	0.0189
MAR1438.014	NVC05 1.00	0	0	15.5	1.48	77	64.4	1.35	37.9	114	185	0.0126	0.0336
MAR1438.015	NVC05 2.00	0	0	16.8	4.35	112	108	1.95	38.6	152	243	0.0141	0.0295
MAR1438.016	NVC06 0.00	0	0	15	0.7	65.3	48	0.91	36.8	87.3	156	<0.005	0.018
MAR1438.017	NVC06 1.00	0	0	16.6	0.82	71.6	56.4	1.17	40.4	106	176	0.0109	0.0127
MAR1438.018	NVC06 1.50	0	0	17.2	0.89	79.7	58.6	1.1	48.3	110	182	0.0227	0.149
MAR1438.019	VCN03A 0.00	0	0	17.6	0.57	66.4	43.6	0.85	39.3	86	155	<0.005	0.014
MAR1438.020	VCN03A 0.30	0	0	5.4	0.32	41.4	33.8	0.08	55.1	23.4	89.8	<0.005	<0.005
MAR1438.021	VCN04A 0.00	0	0	14.5	0.34	55.4	37	0.69	35.7	71.3	135	<0.005	0.0291
MAR1438.022	VCN04A 0.35	0	0	3.4	0.22	36.5	31.6	0.05	53.1	20.4	81.7	<0.005	0.00979
MAR1438.023	VCN05A 0.00	0	0	8.9	0.24	45.9	34.4	0.33	45.7	44.5	127	<0.005	0.0182
MAR1438.024	VCN05A 0.30	0	0	3.9	0.28	39.9	31.9	0.04	56.5	20.1	94.9	<0.005	<0.005
MAR1438.025	VCN05A 0.65	0	0	3.2	0.21	50.4	33.3	0.02	92.6	16.6	78.4	<0.005	<0.005
MAR1438.026	VCN06A 0.00	0	0	13.5	0.26	56.4	35.6	0.62	37.3	66.7	125	<0.005	<0.005
MAR1438.027	VCN06A 0.20	0	0	16.4	0.45	61.8	40.7	0.73	36	78	149	<0.005	0.0137
MAR1438.028	VCN06A 0.50	0	0	5	0.26	41.6	32.8	0.08	55.5	22.6	84.3	<0.005	<0.005
MAR1438.038	VCN14 0.00	0	0	14	0.26	50.8	33.3	0.58	33.7	67.6	124	<0.005	<0.005
MAR1438.039	VCN14 0.50	0	0	5.5	0.23	39.1	31.3	0.09	54.1	24.2	93	<0.005	<0.005
MAR1438.040	VCN15 0.00	0	0	14.8	0.22	51.6	30.8	0.57	33.5	60.3	117	<0.005	<0.005
MAR1438.041	VCN15 0.50	0	0	5.5	0.18	39	33.1	0.03	51.5	23.5	88.9	<0.005	<0.005
MAR1438.042	VCN16 0.00	0	0	11.1	0.18	48.5	37.8	0.36	42.3	50.7	120	<0.005	<0.005
MAR1438.043	VCN16 0.30	0	0	4.5	0.17	39.1	31.8	0.05	52.4	24.8	87.2	<0.005	<0.005
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Polyaromatic Hydrocarbons (PAH)

Explanatory Notes:
Results above Action Level 1 will be highlighted in blue

Definitions:

ACENAPTH	Acenaphthene
ACENAPHY	Acenaphthylene
ANTHRACN	Anthracene
BAA	Benz(a)anthracene
BAP	Benzo(a)pyrene
BBF	Benzo(b)fluoranthene
BEP	Benzo(e)pyrene
BENZGHIP	Benzo(ghi)perylene
BKF	Benzo(K)fluoranthene
C1N	C1-naphthalenes
C1PHEN	C1-phenanthrene
C2N	C2-naphthalenes
C3N	C3-naphthalenes
CHRYSENE	Chrysene
DBENZAH	Diben(ah)anthracene
FLUORANT	Fluoranthene
FLUORENE	Fluorene
INDPYR	Indeno(1,2,3-cd)pyrene
NAPTH	Naphthalene
PERYLENE	Perylene
PHENANT	Phenanthrene
PYRENE	Pyrene
THC	Total Hydrocarbon Content

Sample information:

		Type of	Sample depth												µg/kg											
Sample ID	Dredge area	sample	(m)	ACENAPTH	ACENAPHY	ANTHRACN	BAA	BAP	BBF	BEP	BENZGHIP	BKF	C1N	C1PHEN	C2N	C3N	CHRYSENE	DBENZAH	FLUORANT	FLUORENE	INDPYR	NAPTH	PERYLENE	PHENANT	PYRENE	THC
MAR02010.001	VC01 (0.00m)	0	0	24.1	10.2	38.8	65.4	101	111		226	75.7					134	21.5	122	108	44.3	129		422	164	157000
MAR02010.002	VC01 (1.00m)	0	0	6.59	<5	12.6	17.8	21.9	25.1		47.5	14.5					42.7	<5	31.7	18.7	10.9	21.1		97.5	48	68000
MAR02010.003	VC01 (1.50m)	0	0	43	8.2	46.1	72.4	92.3	115		244	52.5					136	21.1	125	113	51.2	97.7		400	167	149000
MAR02010.004	VC02 (0.00m)	0	0	33.7	9.88	39.8	74.8	110	140		251	72.6					145	23.6	128	159	61.1	249		484	179	153000
MAR02010.005	VC02 (3.00m)	0	0	29.8	16.4	50.1	66.9	103	119		224	47.5					129	19.7	122	156	50	169		429	168	152000
MAR02010.006	VC02 (4.50m)	0	0	49.3	47.9	194	352	414	426		403	365					375	66.1	654	100	350	216		410	770	456000
MAR02010.007	VC03 (0.00m)	0	0	<5	<5	<5	<5	7.75	10.3		15.5	8.47					10.4	<5	10.2	<5	<5	8.8		20.2	15	34300
MAR02010.008	VC03 (1.00m)	0	0	26.7	53.8	134	295	490	377		370	444					344	71.9	489	55.1	325	109		272	628	233000
MAR02010.009	VC03 (2.00m)	0	0	12.8	5.87	24	43.7	59.9	67.3		124	38					75.3	9.83	78.8	46.5	29.3	40.6		195	99.3	90800
MAR02010.010	VC04 (0.00m)	0	0	33.1	34.2	137	351	486	401		353	394					370	56.6	650	52.6	325	69.5		345	815	162000
MAR02010.011	VC04 (2.00m)	0	0	36.9	8.33	52.6	108	160	165		369	97.2					181	33.1	172	178	85.2	151		568	232	172000
MAR02010.012	VC04 (3.00m)	0	0	32.5	11.4	56.3	87.7	120	145		292	56.8					156	27.3	153	155	68.6	127		490	207	177000
MAR02010.013	VC05 (0.00m)	0	0	54	40.4	190	322	384	338		390	350					341	64	606	113	317	198		490	739	330000
MAR02010.014	VC05 (1.00m)	0	0	<5	<5	<5	7.41	7.33	11.1		15.3	<5					11.5	<5	11.8	<5	<5	<5		20.6	15.3	32000
MAR02010.015	VC05 (2.00m)	0	0	6.57	<5	16.7	21.1	22.3	23		35.3	11.9					22.3	<5	35.8	<5	8.58	6.87		39.3	39.8	29500
MAR02010.016	VC06 (0.00m)	0	0	50.6	51.1	227	499	681	639		502	520					528	83.5	849	97.7	470	139		502	1230	280000
MAR02010.017	VC06 (2.00m)	0	0	<5	<5	<5	9.63	12.5	19.3		22.2	10.1					15.2	<5	14.6	<5	8.86	9.96		32.1	23	34400
MAR02010.018	VC06 (3.00m)	0	0	6.36	<5	13	28.9	42.2	47		87.3	30.4					49.4	8.86	43.6	18.8	25.3	27.8		98.3	63.6	50100
MAR02010.019	VC07 (0.00m)	0	0	32.2	21.6	162	332	340	290		223	296					338	38.5	790	57.7	220	78.2		405	885	177000
MAR02010.020	VC07 (2.00m)	0	0	<5	<5	3.63	7.55	10.1	16.1		12.6	8.76					11.8	<5	12.1	<5	7.16	8.73		26.5	18.4	18500
MAR02010.021	VC07 (3.00m)	0	0	2.31	1.44	7.41	18.9	25.2	35.4		34.8	15.7					33	4.98	26.9	12.7	13.5	14.5		62.9	40	42600
MAR02010.022	VC08 (0.00m)	0	0	<1	<1	2.39	6.35	8.31	12.3		11	8.03					8.24	1.8	8.29	3.16	6.14	5.16		19	14.3	12300
MAR02010.023	VC08 (2.00m)	0	0	34.4	11	55.6	73.5	106	108		139	85.4					128	26.3	125	109	52.4	87.1		339	161	165000
MAR02010.024	VC08 (3.50m)	0	0	<1	<1	2.44	5.69	7.03	11.5		9.45	4.04					7.6	1.93	7.84	6.19	5.49	5.76		17.9	14.4	20200
MAR02010.025	VC09 (0.00m)	0	0	60.7	65.6	241	339	444	428		347	385					391	71.3	552	96.5	285	219		471	925	472000
MAR02010.026	VC09 (2.00m)	0	0	1.76	<1	3.04	7.69	9.67	16.6		13.5	7.94					9.62	2.35	9.42	6.11	8.85	6.77		24.7	14.5	31700
MAR02010.027	VC09 (3.00m)	0	0	2.06	<1	4.9	12.3	15.5	23.3		21	11.1					15.9	3.64	15.2	5.9	12.7	9.73		37.3	26.8	17500
MAR02010.028	VC10 (0.00m)	0	0	3.7	3.62	13.8	28.2	40.4	39.5		33.7	33.7					32.1	5.91	40.8	8.73	31	12.8		42.4	65.3	30600
MAR02010.029	VC10 (2.00m)	0	0	8.25	3.86	10	23.6	26.8	36.8		39.9	16.1					43.5	5.39	35.8	25.4	13.7	17		139	54.5	53900
MAR02010.030	VC10 (3.50m)	0	0	7.15	2.45	15.7	39.3	47.7	64.7		61.1	28.7					59.9	9.42	66.6	26	31.2	23.9		132	92.4	59600
MAR02010.031	VC11 (0.00m)	0	0	3	1.96	8.97	18.2	24	27.8		21.4	18					20.9	4.33	28	6.96	18.7	11.1		35.6	46.3	25900
MAR02010.032	VC11 (2.00m)	0	0	1.71	<1	4.16	8.77	11.6	17.4		15	8.29					12.1	2.72	13.1	5.5	9.74	8.67		30.7	18.7	17800
MAR02010.033	VC11 (3.50m)	0	0	1.76	<1	4.12	8.07	10.8	15.4		14.1	9.09					11.8	2.46	13.9	6.25	8.7	8.9		28.4	19	20700
MAR02010.034	VC12 (0.00m)	0	0	98	89.2	389	711	946	852		658	789					800	123	1150	154	595	267		733	1750	585000
MAR02010.035	VC12 (2.00m)	0	0	1.51	<1	3.22	6.68	9.06	15.6		11.5	6.62					8.72	2.04	9.07	4.53	7.68	7.07		21.2	14.9	32600
MAR02010.036	VC12 (4.50m)	0	0	<1	<1	3.77	7.71	9.94	18.4		13.4	6.38					11.4	2.26	11.4	5.81	9.79	9.56		27.9	17.6	22200
MAR02010.037	VC13 (0.00m)	0	0	3.59	2.52	9.85	18.9	25.9	25.4		23.4	19.7					22.4	4.18	30.1	8.69	17.4	9.82		33.3	50.9	26000
MAR02010.038	VC13 (1.00m)	0	0	2.36	1.42	5.23	9.46	12	17.3		21.3	6.62					20.3	3.15	15.2	9.2	7.16	11		42.6	20.5	36500
MAR02010.039	VC13 (2.00m)	0	0	4.24	2.27	7.38	16.9	21.2	27		41.7	14.5					30	3.95	26.5	17.3	13	19.4		75.5	37.9	71500
MAR02010.040	VC14 (0.00m)	0	0	1.39	<1	3.27	8.15	13.1	13		19.4	10.7					11.5	2.21	11.3	3.59	7.6	6.21		22.4	15.3	12600
MAR02010.041	VC14 (1.00m)	0	0	9.67	2.82	18.2	37.4	42	63.1		96.7	26.7					84.8	8.82	73.3	31.2	22.6	23.8		164	105	86300
MAR02010.042	VC14 (1.50m)	0	0	19.4	5.29	28.3	37.5	43.6	62.4		115	32.4					84.3	9.9	63.5	59	24.6	47.6		201	104	130000
MAR1438.001	NVC01B 0.00	0	0	191	33.4	370	649	601	577		458	264					659	77.9	1400	176	376	232		1100	1390	329000
MAR1438.002	NVC01B 0.50	0	0	12.7	6.93	17.3	40.3	48.1	88.4		143	16.9					130	16.6	68.7	63.6	31.5	104		302	101	187000
MAR1438.003	NVC01B 1.00	0	0	16.7	7.91	23.9	48.2	57.4	105		163	19.7					162	18.5	85.6	76	38.3	118		369	132	233000
MAR1438.004	NVC02 0.00	0	0	117	42.9	367	761	714	751		608	301					787	118	1580	174	557	219		839	1640	283000
MAR1438.005	NVC02 2.00	0	0	1700	235	2350	5430	5210	4780		3680	2310					5750	619	11800	1480	3460	1130		7250	11100	2190000
MAR1438.006	NVC02 3.50	0	0	31.3	10.6	38.1	98.2	136	155		362	40.5					156	29.1	149	136	86.6	219		457	193	221000
MAR1438.007	NVC03A 0.00	0	0	56.5	38.6	205	461	476	488		460	200					489	72.2	838	95	412	195		518	961	594000
MAR1438.008	NVC03A 0.50	0	0	10.6	7.9	19.4	44.8	47.4	57.7		94.6	15					92.2	10.3	65.6	44.5	28.1	56.2		186	100	166000
MAR1438.009	NVC04 0.00	0	0	72.8	55.4	256	551	611	650		585	346					569	103	967	120	531	243		612	1140	605000
MAR1438.010	NVC04 1.50	0	0	212	68.6	589	1120	999	1070		786	550					1130	158	2530	245	692	300		1210	2310	862000
MAR1438.011	NVC04 2.00	0	0	163	66.9	596	1020	928	1030		777	453					1070	155	2130	290	756	328		1120	2050	993000
MAR1438.012	NVC04 3.50	0	0	269	92.6	747	1590	1550	1680		1260	907					1660	205	3030	449	1170	550		1630	3110	2250000
MAR1438.013	NVC05 0.00	0	0	67.7	37.6	200	431	457	517		455	251					456	72.2	797	98.6	399	194		489	975	577000
MAR1438.014	NVC05 1.00	0	0	237	70.1	1050	1860	1520	1660		1070	726					1940	207	4290	419	1110	310		1620	3790	1190000
MAR1438.015	NVC05 2.00	0	0	154	84.3	528	931	908	1110		858	446					1050	143	1890	350	825	485		1260	2090	3900000
MAR1438.016	NVC06 0.00	0	0	124	55.4	283	589	615	634		565	310					606	90.9	1080	148	499	233		661	1180	729000
MAR1438.017	NVC06 1.00	0	0	266	68.3	591	995	912	986		762	430					1040	145	2340	285	724	320		1460	2210	856000
MAR1438.018	NVC06 1.50	0	0	176	83.5	579	1400	1200	1260		869	496					1390	166	2880	235	882	301		1420	2760	855000
MAR1438.019	VCN03A 0.00	0	0	86.8	54.2	227	469	501	467		486	300					480	83.2	826	109	436	189		531	938	563000
MAR1438.020	VCN03A 0.30	0	0	16.8	7.9	23.1	49	55.5	98.7		144	26.6					148	17.8	88.4	82.5	36.6	124		346	126	252000
MAR1438.021	VCN04A 0.00	0	0	69.5	39.4	195	423	459	484		458	207					448	83.4	708	119	396	229		479	858	522000
MAR1438.022	VCN04A 0.35	0	0	16.3	7.42	20.6	44.8	54.7	94		164	16					147	16.2	80.1	71.7	39.7	74.5		328	119	248000
MAR1438.023	VCN05A 0.00	0	0	50.8	34.9	168	342	350	411		410	202					379	71.4	642	97	323	179		503	730	490000
MAR1438.024	VCN05A 0.30	0	0	16.1	6.84	20	43.8	53.6	94.8		160	22.8					132	15.4	74.5	79.3	34.2	78.8		315	117	229000
MAR1438.025	VCN05A 0.65	0	0	21.3	7.89	35	63	64.9	106		186	26.6					148	20.3	93.5	87.9	52.3	142		376	140	235000
MAR1438.026	VCN06A 0.00	0	0	59.4	34.8	157	356	400	432		416	224					370	66.8	583	73.4	359	176		364	739	464000
MAR1438.027	VCN06A 0.20	0	0	95.8	58.1	282	587	639	712		662	305					625	113	1040	147	580	279		672	1250	804000
MAR1438.028	VCN06A 0.50	0	0	17.5	7.96	22	48.3	57.3	97.3		165	25.9					146	16.1	80.1	90	39.3	184		371	119	243000
MAR1438.038	VCN14 0.00	0	0	48.2	36.2	174	375	424	453		418	212					397	74.5	657	81.1	382	177		429	761	463000
MAR1438.039	VCN14 0.50	0	0	13.6	7.31	18.2	42.1	53	87.8		154	19.5					132	18.1	72.9	70.8	42.2	110		308	105	234000
MAR1438.040	VCN15 0.00	0	0	43.4	51.2	147	333	380	433		405	184					359	71.6	561	74.8	368	161		359	706	498000
MAR1438.041	VCN15 0.50	0	0	8.7	4.54	12.5	23.2	26	46.1		67.2	9.61					67.5	7.88	41.9	45.2	14.6	64.2		183	60.8	111000
MAR1438.042	VCN16 0.00	0	0	57.1	36.1	147	294	329	377		356	180					317	51.4	511	77.9	315	177		346	635	444000
MAR1438.043	VCN16 0.30	0	0	14.9	6.69	18.7	39.9	46.9	81.4		141	19.3					135	15.3	68.6	76.3	31.3	74.4		317	107	231000
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Organohalogens

Explanatory Notes:
Results above Action Level 1 will be highlighted in blue and above Action Level 2 in red.
ICES7 is the sum of PCB 28,52,101,138,153,180 and 118.

Definitions:

AHCH	alpha-Hexachlorcyclohexane
BHCH	beta-Hexachlorcyclohexane
GHCH	gamma-Hexachlorcyclohexane
DIELDRIN	Dieldrin
HCB	Hexachlorobenzene
PPDDE	p,p'-Dichorodiphenyldicloroethylene
PPDDT	p,p'-Dichorodiphenyltrichloroethane
PPTDE	p,p'-Dichorodiphenyldicloroethan

Sample information:

µg/kg

Sample ID	Dredge area	Type of sample	Sample depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB18	PCB105	PCB110	PCB128	PCB141	PCB149	PCB151	PCB156	PCB158	PCB170	PCB180	PCB183	PCB187	PCB194	PCB31	PCB44	PCB47	PCB49	PCB66	ICES7	AHCH	BHCH	GHCH	DIELDRIN	HCB	DDE	DDT	TDE	BDE100	BDE138	BDE153	BDE154	BDE17	BDE183	BDE209	BDE28	BDE47	BDE66	BDE85	BDE99
MAR02010.00	VC01 (0.00m)	0	0	3.42	3.52	3.67	3.49	7.18	8.36											6.12									35.8																				
MAR02010.00	VC01 (1.00m)	0	0	0.1	<0.08	<0.08	<0.08	<0.08	0.13											<0.08									0.52																				
MAR02010.00	VC01 (1.50m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.08																				
MAR02010.00	VC02 (0.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.00	VC02 (3.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.00	VC02 (4.50m)	0	0	1.36	1.29	1.46	1.51	2.17	2.82											2.14									12.7																				
MAR02010.00	VC03 (0.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.00	VC03 (1.00m)	0	0	<0.08	<0.08	<0.08	<0.08	0.1	0.14											0.12									0.6																				
MAR02010.00	VC03 (2.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.01	VC04 (0.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.01	VC04 (2.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.01	VC04 (3.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.01	VC05 (0.00m)	0	0	0.39	0.29	0.35	0.47	0.41	0.68											0.42									3.02																				
MAR02010.01	VC05 (1.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.01	VC05 (2.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.01	VC06 (0.00m)	0	0	0.36	0.37	0.47	0.6	0.53	0.79											0.5									3.61																				
MAR02010.01	VC06 (2.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									0.08																				
MAR02010.01	VC06 (3.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.01	VC07 (0.00m)	0	0	0.62	0.59	0.74	0.74	0.92	1.49											1.04									6.14																				
MAR02010.02	VC07 (2.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.02	VC07 (3.00m)	0	0	0.11	<0.08	0.12	0.13	0.11	0.24											0.12									0.9																				
MAR02010.02	VC08 (0.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.02	VC08 (2.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.02	VC08 (3.50m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.02	VC09 (0.00m)	0	0	0.95	4.98	29.8	10.3	51.2	84.4											81.9									263																				
MAR02010.02	VC09 (2.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.02	VC09 (3.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.02	VC10 (0.00m)	0	0	0.66	0.66	0.8	0.94	1.01	1.38											1.03									6.48																				
MAR02010.02	VC10 (2.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.03	VC10 (3.50m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.03	VC11 (0.00m)	0	0	0.22	0.22	0.35	0.2	0.45	0.67											0.53									2.63																				
MAR02010.03	VC11 (2.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.03	VC11 (3.50m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.03	VC12 (0.00m)	0	0	1.43	1.13	1.37	1.35	1.88	2.75											1.81									11.7																				
MAR02010.03	VC12 (2.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.03	VC12 (4.50m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.03	VC13 (0.00m)	0	0	0.09	<0.08	<0.08	0.09	0.13	0.1											<0.08									0.62																				
MAR02010.03	VC13 (1.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.03	VC13 (2.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.04	VC14 (0.00m)	0	0	<0.08	<0.08	<0.08	0.08	0.09	0.09											<0.08									<0.56																				
MAR02010.04	VC14 (1.00m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR02010.04	VC14 (1.50m)	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									<0.56																				
MAR1438.00	NVC01B 0.00	0	0	1.16	1.32	1.39	1.41	2.02	2.12											1.53									10.95																				
MAR1438.00	NVC01B 0.50	0	0	0.1	0.09	<0.08	<0.08	<0.08	<0.08											<0.08									0.59																				
MAR1438.00	NVC01B 1.00	0	0	0.18	0.18	0.14	0.11	0.11	0.24											0.22									1.18																				
MAR1438.00	NVC02 0.00	0	0	11.1	7.77	4.95	4.47	9.94	10.5											9.37									58.1																				
MAR1438.00	NVC02 2.00	0	0	2.01	4.89	4.84	4.13	7.83	7.45											5.05									36.2																				
MAR1438.00	NVC02 3.50	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									0.56																				
MAR1438.00	NVC03A 0.00	0	0	1.15	0.99	1.04	1.11	1.44	1.83											1.3									8.86																				
MAR1438.00	NVC03A 0.50	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									0.56																				
MAR1438.00	NVC04 0.00	0	0	1.39	1.47	1.71	1.77	3.19	3.17											1.97									14.67																				
MAR1438.01	NVC04 1.50	0	0	1.57	2.07	1.74	1.52	2.92	3.28											2.37									15.47																				
MAR1438.01	NVC04 2.00	0	0	3.95	4.4	3.88	3.61	4.71	6.17											3.89									30.61																				
MAR1438.01	NVC04 3.50	0	0	21.9	30.5	29	16.6	49.7	88.2											71.1									307																				
MAR1438.01	NVC05 0.00	0	0	1.92	1.98	2.07	2.11	3.13	3.33											2.89									17.43																				
MAR1438.01	NVC05 1.00	0	0	5.81	6.04	5.47	4.99	7.58	10.7											6.63									47.42																				
MAR1438.01	NVC05 2.00	0	0	45.2	38.3	11.9	9.44	16.8	21.9											16.3									159.84																				
MAR1438.01	NVC06 0.00	0	0	4.01	3.55	2.78	2.26	3.52	4.57											2.87									23.56																				
MAR1438.01	NVC06 1.00	0	0	2.89	2.95	2.81	2.58	3.58	4.8											3.05									22.66																				
MAR1438.01	NVC06 1.50	0	0	3.18	4.09	3.18	2.7	3.88	4.53											3.46									25.02																				
MAR1438.01	VCN03A 0.00	0	0	1.82	1.88	1.83	1.66	2.51	3.24											2.27									15.21																				
MAR1438.02	VCN03A 0.30	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									0.56																				
MAR1438.02	VCN04A 0.00	0	0	1.53	1.5	1.51	1.38	2.2	2.95											2.19									13.26																				
MAR1438.02	VCN04A 0.35	0	0	0.1	<0.08	<0.08	<0.08	<0.08	0.12											<0.08									0.62																				
MAR1438.02	VCN05A 0.00	0	0	0.82	1.14	1.18	1.19	1.42	1.47											1.08									8.3																				
MAR1438.02	VCN05A 0.30	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									0.56																				
MAR1438.02	VCN05A 0.65	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									0.56																				
MAR1438.02	VCN06A 0.00	0	0	1.39	1.35	1.38	1.53	2.28	2.75											1.82									12.5																				
MAR1438.02	VCN06A 0.20	0	0	1.8	1.9	1.82	1.83	3.63	3.54											2.63									17.15																				
MAR1438.02	VCN06A 0.50	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									0.56																				
MAR1438.03	VCN14 0.00	0	0	1.38	1.37	1.55	1.4	2.06	2.8											1.73									12.09																				
MAR1438.03	VCN14 0.50	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									0.56																				
MAR1438.04	VCN15 0.00	0	0	1.39	1.56	2.45	2.87	2.13	2.62											1.75									14.77																				
MAR1438.04	VCN15 0.50	0	0	0.09	0.1	<0.08	<0.08	<0.08	<0.08											<0.08									0.59																				
MAR1438.04	VCN16 0.00	0	0	0.65	0.69	0.6	0.61	1.04	0.92											0.73									5.24																				
MAR1438.04	VCN16 0.30	0	0	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08											<0.08									0.56																				
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PR Details

Total amount to be dredged (wet tonnes)	

Explanatory Notes:
The values entered for each determinand should be an average wet weight concentration from all the samples representing the material to be disposed to sea. They should be entered in the units stated in the Unit of measurement column in the table below.
Results above Action Level 1 will be highlighted in blue and above Action Level 2 in red.

Average for the total dredge area:

Sample ID	Unit of measurement	
Total Solids	%	68.05
Gravel	%	7.32
Sand	%	24.65
Silt	%	68.03
Arsenic (As)	mg/kg	6.1
Cadmium (Cd)		0.31
Chromium (Cr)		32.3
Copper (Cu)		21
Mercury (Hg)		0.23
Nickel (Ni)		28.3
Lead (Pb)		27.5
Zinc (Zn)		64.8
Dibutyltin (DBT)		0.006
Tributyltin (TBT)		0.007
Acenapth	µg/kg	43.1
Acenapthylene		16.1
Anthracn		100
BAA		203
BAP		208
BBF		218
BEP		
Benzghip		205
BKF		113
C1N		
C1PHEN		
C2N		
C3N		
Chrysene		233
Debenzah		32
Flurant		407
Fluorene		70.7
Indypr		153
napth		89.1
perylene		
phenant		314
pyrene		433
THC		219342
PCB28		0.97
PCB52		1.03
PCB101		1
PCB118		0.72
PCB138		1.56
PCB153		2.26
PCB18		
PCB105		
PCB110		
PCB128		
PCB141		
PCB149		
PCB151		
PCB156		
PCB158		
PCB170		
PCB180		1.85
PCB183		
PCB187		
PCB194		
PCB31		
PCB44		
PCB47		
PCB49		
PCB66		
ICES7		9.36
AHCH		
BHCH		
GHCH		
DIELDRIN		
HCB		
DDE		
DDT		
TDE		
BDE100		
BDE138		
BDE153		
BDE154		
BDE17		
BDE183		
BDE209		
BDE28		
BDE47		
BDE66		
BDE85		
BDE99		

Comments:

Laboratory Details

Explanatory Notes:
Please complete a separate worksheet for each laboratory (e.g. complete 'Laboartory_1' worksheet for 1 laboratory and complete 'Laboartory_2' worksheet for a second laboratory). If there are more than 3 laboratories then please contact MS-LOT.

Laboratory 1 Details:

Laboratory name:	SOCOTEC
Year:	2023

LabRefMat	**Q1**	Does the laboratory carrying out the analyses undertake the analysis of blank samples and laboratory reference materials with each batch of samples of waste and other material dumped in the maritime area that is analysed by that laboratory?	Yes
CompAnal	**Q2**	Does the laboratory carrying out the analyses undertake periodic comparative analysis of laboratory reference materials and certified reference materials?	Yes
QAQC	**Q3**	Does the laboratory carrying out the analyses undertake the compilation of quality control charts based upon the data resulting from the analyses of the laboratory reference materials and certified reference materials, and the use of those quality control charts to monitor analytical performance in relation to all samples of dumped wastes or other materials?	Yes
InterlabCaleb	**Q4**	Does the laboratory carrying out the analyses undertake periodic participation in interlaboratory comparison exercises, including, where possible, international comparison exercises?	Yes
InternatCaleb	**Q5**	Does the laboratory carrying out the analyses undertake periodic participation in national and, where possible, international laboratory proficiency schemes?	Yes
SpikedSamples	**Q6**	If the answer to questions 4 or 5 is 'Yes' then does the laboratory analyse samples of substances which are provided by the organisers of the scheme?	Yes
BlindSamples	**Q7**	If the answer to questions 4 or 5 is 'Yes' then does the laboratory confirm that the composition of those samples is not disclosed in advance?	Yes
Ranking	**Q8**	If the answer to questions 4 or 5 is 'Yes' then does the laboratory confirm that the results of the scheme for each participating laboratory are made available to all participating laboratories?	Yes
FracAnal	**Q9**	Enter the size fraction that is analysed i.e. Whole or less than 63µm etc.	<63um(metals)
GranMeth	**Q10**	PSA method	Distribution by wet & dry sieving and laser detraction
OCMeth	**Q11**	Organic Carbon method	Carbonate removal and sulfurous acid/combustion at 1600°C/NDIR,
MetExtrType	**Q12**	Method of extraction used for metal analysis	Aquaregia
MethOfDetMetals	**Q13**	Method of detection used for metal analysis	ICP-MS
PAHExtrType	**Q14**	Method of extraction used for poly aromatic hydrocarbon analysis	Methanol/DCM solvent extraction with silica clean up and copper clean up stages
MethOfDetPAH	**Q15**	Method of detection used for poly aromatic hydrocarbons analysis	GCMS
OHExtrType	**Q16**	Method of extraction used for organohalogens inc PCBs, pesticides, flame retardants etc analysis	Ultrasonic acetone/hexane solvent extraction
MethOfDetOH	**Q17**	Method of detection used for organohalogens inc PCBs, pesticides, flame retardants etc analysis	GCMSMS
OTExtrType	**Q18**	Method of extraction used for organotin analysis	Derivatisation and solvent extraction
MethOfDetOT	**Q19**	Method of detection used for organotin analysis	GCMS

		LOD/LOQ	Precision (%)	Recovery (%)
mg/kg	Hg	0.01	4.2	105
	As	0.5	2.7	102
	Cd	0.04	3.6	102
	Cu	0.5	2.9	104
	Pb	0.5	3	105
	Zn	2	2.6	105
	Cr	0.5	3.1	104
	Ni	0.5	3.6	103
	TBT	0.001	12.62	88
	DBT	0.001	12.62	90
µg/kg	PCB28	0.08	12.56	72
	PCB31	0.08	5.3	105
	PCB44	0.08	5.7	83
	PCB47	0.08	5.7	103
	PCB49	0.08	5.2	100
	PCB52	0.08	6.999	91
	PCB66	0.08	10.7	93
	PCB101	0.08	8.43	88
	PCB105	0.08	8.6	85
	PCB110	0.08	5.2	96
	PCB118	0.08	14.61	104
	PCB128	0.08	7.6	103
	PCB138+163	0.08	12.93	94
	PCB141	0.08	7.6	98
	PCB149	0.08	6.7	80
	PCB151	0.08	7.6	101
	PCB153	0.08	7.41	94
	PCB156	0.08	8.4	125
	PCB158	0.08	7.6	89
	PCB170	0.08	6	93
	PCB180	0.08	9.85	96
	PCB183	0.08	6.2	86
	PCB187	0.08	6.6	90
	PCB194	0.08	6.5	89
	DDE			
	DDT			
	DDD			
	Dieldrin			
	Lindane			
	HCB			
	BDE17			
	BDE28			
	BDE47			
	BDE66			
	BDE85			
	BDE99			
	BDE100			
	BDE138			
	BDE153			
	BDE154			
	BDE183			
	BDE209			
	ACENAPTH	1	6.68	73
	ACENAPHY	1	7.74	109
	ANTHRACN	1	4.95	69
	BAA	1	9.8	73
	BAP	1	9.07	58
	BBF	1	8.44	93
	BENZGHIP	1	13.46	41
	BEP	1	7.9	83
	BKF	1	8.9	86
	C1N	1	8.27	78
	C1PHEN	1	N/A	92
	C2N	1	N/A	112
	C3N	1	N/A	116
	CHRYSENE	1	7.87	92
	DBENZAH	1	19.23	113
	FLUORENE	1	5.25	52
	FLUORANT	1	4.36	91
	INDPYR	1	17.1	63
	NAPTH	1	3.02	64
	PERYLENE	1	N/A	50
	PHENANT	1	5.41	84
	PYRENE	1	4.29	81
	THC	100	N/A	87

Laboratory Details

Explanatory Notes:
Please complete a separate worksheet for each laboratory (e.g. complete 'Laboartory_1' worksheet for 1 laboratory and complete 'Laboartory_2' worksheet for a second laboratory). If there are more than 3 laboratories then please contact MS-LOT.

Laboratory 2 Details:

Laboratory name:	
Year:	

LabRefMat	**Q1**	Does the laboratory carrying out the analyses undertake the analysis of blank samples and laboratory reference materials with each batch of samples of waste and other material dumped in the maritime area that is analysed by that laboratory?	
CompAnal	**Q2**	Does the laboratory carrying out the analyses undertake periodic comparative analysis of laboratory reference materials and certified reference materials?	
QAQC	**Q3**	Does the laboratory carrying out the analyses undertake the compilation of quality control charts based upon the data resulting from the analyses of the laboratory reference materials and certified reference materials, and the use of those quality control charts to monitor analytical performance in relation to all samples of dumped wastes or other materials?	
InterlabCaleb	**Q4**	Does the laboratory carrying out the analyses undertake periodic participation in interlaboratory comparison exercises, including, where possible, international comparison exercises?	
InternatCaleb	**Q5**	Does the laboratory carrying out the analyses undertake periodic participation in national and, where possible, international laboratory proficiency schemes	
SpikedSamples	**Q6**	If the answer to questions 4 or 5 is 'Yes' then does the laboratory analyse samples of substances which are provided by the organisers of the scheme?	
BlindSamples	**Q7**	If the answer to questions 4 or 5 is 'Yes' then does the laboratory confirm that the composition of those samples is not disclosed in advance?	
Ranking	**Q8**	If the answer to questions 4 or 5 is 'Yes' then does the laboratory confirm that the results of the scheme for each participating laboratory are made available to all participating laboratories?	
FracAnal	**Q9**	Enter the size fraction that is analysed i.e. Whole or less than 63µm etc.	
GranMeth	**Q10**	PSA method	
OCMeth	**Q11**	Organic Carbon method	
MetExtrType	**Q12**	Method of extraction used for metal analysis	
MethOfDetMetals	**Q13**	Method of detection used for metal analysis	
PAHExtrType	**Q14**	Method of extraction used for poly aromatic hydrocarbon analysis	
MethOfDetPAH	**Q15**	Method of detection used for poly aromatic hydrocarbons analysis	
OHExtrType	**Q16**	Method of extraction used for organohalogens inc PCBs, pesticides, flame retardants etc analysis	
MethOfDetOH	**Q17**	Method of detection used for organohalogens inc PCBs, pesticides, flame retardants etc analysis	
OTExtrType	**Q18**	Method of extraction used for organotin analysis	
MethOfDetOT	**Q19**	Method of detection used for organotin analysis	

		LOD/LOQ	Precision (%)	Recovery (%)
mg/kg	Hg			
	As			
	Cd			
	Cu			
	Pb			
	Zn			
	Cr			
	Ni			
	TBT			
	DBT			
µg/kg	PCB28			
	PCB31			
	PCB44			
	PCB47			
	PCB49			
	PCB52			
	PCB66			
	PCB101			
	PCB105			
	PCB110			
	PCB118			
	PCB128			
	PCB138+163			
	PCB141			
	PCB149			
	PCB151			
	PCB153			
	PCB156			
	PCB158			
	PCB170			
	PCB180			
	PCB183			
	PCB187			
	PCB194			
	DDE			
	DDT			
	DDD			
	Dieldrin			
	Lindane			
	HCB			
	BDE17			
	BDE28			
	BDE47			
	BDE66			
	BDE85			
	BDE99			
	BDE100			
	BDE138			
	BDE153			
	BDE154			
	BDE183			
	BDE209			
	ACENAPTH			
	ACENAPHY			
	ANTHRACN			
	BAA			
	BAP			
	BBF			
	BENZGHIP			
	BEP			
	BKF			
	C1N			
	C1PHEN			
	C2N			
	C3N			
	CHRYSENE			
	DBENZAH			
	FLUORENE			
	FLUORANT			
	INDPYR			
	NAPTH			
	PERYLENE			
	PHENANT			
	PYRENE			
	THC			

Laboratory Details

Explanatory Notes:
Please complete a separate worksheet for each laboratory (e.g. complete 'Laboartory_1' worksheet for 1 laboratory and complete 'Laboartory_2' worksheet for a second laboratory). If there are more than 3 laboratories then please contact MS-LOT.

Laboratory 3 Details:

Laboratory name:	
Year:	

LabRefMat	**Q1**	Does the laboratory carrying out the analyses undertake the analysis of blank samples and laboratory reference materials with each batch of samples of waste and other material dumped in the maritime area that is analysed by that laboratory?	
CompAnal	**Q2**	Does the laboratory carrying out the analyses undertake periodic comparative analysis of laboratory reference materials and certified reference materials?	
QAQC	**Q3**	Does the laboratory carrying out the analyses undertake the compilation of quality control charts based upon the data resulting from the analyses of the laboratory reference materials and certified reference materials, and the use of those quality control charts to monitor analytical performance in relation to all samples of dumped wastes or other materials?	
InterlabCaleb	**Q4**	Does the laboratory carrying out the analyses undertake periodic participation in interlaboratory comparison exercises, including, where possible, international comparison exercises?	
InternatCaleb	**Q5**	Does the laboratory carrying out the analyses undertake periodic participation in national and, where possible, international laboratory proficiency schemes	
SpikedSamples	**Q6**	If the answer to questions 4 or 5 is 'Yes' then does the laboratory analyse samples of substances which are provided by the organisers of the scheme?	
BlindSamples	**Q7**	If the answer to questions 4 or 5 is 'Yes' then does the laboratory confirm that the composition of those samples is not disclosed in advance?	
Ranking	**Q8**	If the answer to questions 4 or 5 is 'Yes' then does the laboratory confirm that the results of the scheme for each participating laboratory are made available to all participating laboratories?	
FracAnal	**Q9**	Enter the size fraction that is analysed i.e. Whole or less than 63µm etc.	
GranMeth	**Q10**	PSA method	
OCMeth	**Q11**	Organic Carbon method	
MetExtrType	**Q12**	Method of extraction used for metal analysis	
MethOfDetMetals	**Q13**	Method of detection used for metal analysis	
PAHExtrType	**Q14**	Method of extraction used for poly aromatic hydrocarbon analysis	
MethOfDetPAH	**Q15**	Method of detection used for poly aromatic hydrocarbons analysis	
OHExtrType	**Q16**	Method of extraction used for organohalogens inc PCBs, pesticides, flame retardants etc analysis	
MethOfDetOH	**Q17**	Method of detection used for organohalogens inc PCBs, pesticides, flame retardants etc analysis	
OTExtrType	**Q18**	Method of extraction used for organotin analysis	
MethOfDetOT	**Q19**	Method of detection used for organotin analysis	

		LOD/LOQ	Precision (%)	Recovery (%)
mg/kg	Hg			
	As			
	Cd			
	Cu			
	Pb			
	Zn			
	Cr			
	Ni			
	TBT			
	DBT			
µg/kg	PCB28			
	PCB31			
	PCB44			
	PCB47			
	PCB49			
	PCB52			
	PCB66			
	PCB101			
	PCB105			
	PCB110			
	PCB118			
	PCB128			
	PCB138+163			
	PCB141			
	PCB149			
	PCB151			
	PCB153			
	PCB156			
	PCB158			
	PCB170			
	PCB180			
	PCB183			
	PCB187			
	PCB194			
	DDE			
	DDT			
	DDD			
	Dieldrin			
	Lindane			
	HCB			
	BDE17			
	BDE28			
	BDE47			
	BDE66			
	BDE85			
	BDE99			
	BDE100			
	BDE138			
	BDE153			
	BDE154			
	BDE183			
	BDE209			
	ACENAPTH			
	ACENAPHY			
	ANTHRACN			
	BAA			
	BAP			
	BBF			
	BENZGHIP			
	BEP			
	BKF			
	C1N			
	C1PHEN			
	C2N			
	C3N			
	CHRYSENE			
	DBENZAH			
	FLUORENE			
	FLUORANT			
	INDPYR			
	NAPTH			
	PERYLENE			
	PHENANT			
	PYRENE			
	THC			

Royal HaskoningDHV

Appendix 9-1: Subtidal benthic ecology survey of the proposed dredging area at the Port of Leith

Subtidal benthic ecology survey of the proposed dredging area at the Port of Leith.

Report Number: ER23-535

Liocarcinus depurator and *Aequipecten opercularis* on mixed sediment in the Port of Leith.

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Ecospan Project No: EP23-782

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Contents

1 EXECUTIVE SUMMARY

Forth Ports Ltd. are proposing to deepen and extend the current dredged channel into Leith. Ecospan Environmental Ltd. (Ecospan) were commissioned to survey the subtidal benthic ecology of the region within and around the proposed dredging area.

The survey of the circalittoral sediments was conducted by Ecospan on the 22nd and the 23rd of June 2023. Twelve sampling stations were within the footprint of the proposed dredge area and a further ten stations were sampled outside its footprint. At each of these stations grab sampling and drop-down video (DDV) was conducted.

Particle size distribution (PSD) of the sediments at most stations was mixed with a large component of fine sediment (<63 um). At stations within the current maintenance dredging area, there was less coarse and more fine sediment. The macrobenthos was found to be very diverse with a high number of individuals. Lower diversity and abundance occurred at stations within the dredged area. Many of the taxa present in high abundances at these stations could be considered opportunistic species potentially indicating the ecological impact of maintenance dredging.

Epibenthic taxa were identified and counted from the DDV. Much of the epifauna observed occurred on patchy rock habitat interspersed with sediment. Some of the most common taxa were *Flustra foliacea*, *Aequipecten opercularis*, *Asterias rubens* and *Nemertesia ramosa*.

Based on the data collected, the majority (16) of the stations were assigned the mosaic habitat 'A4.137 - *Flustra foliacea* and *Haliclona oculata* with a rich faunal turf on tide-swept circalittoral mixed substrata' / 'A5.443 - *Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment'.

The only priority marine feature occurred at station 18 (outside of the proposed dredging footprint) in the form of the sub-biotope 'A5.5213 - *Laminaria saccharina* and filamentous red algae on infralittoral sand'. The sensitivity of this sub-biotope to smothering is considered low and therefore will likely not be substantially impacted by the dredging. No species of conservation interest SOCI or invasive non-native species (INNS) were observed.

2 INTRODUCTION

The Port of Leith is located on the southern bank of the lower Forth Estuary. It is the largest enclosed deep-water port in Scotland and its existence dates back to the 14th century. The subtidal sediments of the Firth of Forth (including the Port of Leith) are within the Outer Firth of Forth and St Andrews Bay Special Protection Area (SPA). This SPA has been assigned mainly for its importance to populations of waterfowl and seabirds as a breeding and feeding area [1]. Maintenance dredging is currently conducted at the Port of Leith approach channel (Figure 1). Forth ports are proposing to deepen and extend the existing channel.

Dredging involves the removal of the benthos and upper layer of the seabed, changing ecological communities and habitats. A benthic survey of the proposed dredging area allows for the determination of the habitat types found within the proposed area to identify any protected features (including habitats / taxa classed as Priority Marine Features in Scotland). The identification of the macrobenthos inhabiting the area and the sediment particle size distribution (PSD) provides baseline data to facilitate an assessment of the potential ecological impact of dredging operations. This is often required for a marine license to undertake dredging.

Ecospan Environmental Ltd. (Ecospan) were commissioned by Forth Ports Ltd. to survey the subtidal benthic ecology of the region within and around the proposed dredging area.

3 AIMS

The aims of this survey are to:

- Provide comprehensive information on the epibenthic and infaunal (macrobenthic) communities present within the footprint of the proposed dredge area and adjacent areas of seabed;
- Classify the habitat types and biotopes present;
- Identify any features of conservation interest (HOCI and SOCI), invasive non-native species (INNS).

4 METHODS

The survey was conducted by Ecospan on the 22nd and the 23rd of June 2023 from the MCA Cat 3 coded research vessel *Coastal Surveyor*. Twelve stations were sampled in order to characterise the benthic habitats and macrobenthic communities within the footprint of the proposed dredging. Given the uniformity of the benthic habitats in the region, 12 sampling stations were considered sufficient to characterise the benthic habitats and macrobenthic communities within the footprint of the proposed deepening, with station locations focused in areas outside of the existing maintenance dredging. A further ten stations were sampled outside the footprint of the proposed deepening to provide details of the benthic communities that could potentially be affected by resuspension of sediment during dredging and subsequent smothering and siltation (Figure 1). A combination of grabbing and drop-down

video (DDV) at each station was used to achieve the characterisation of the sediments and macrobenthos. Coordinates of the grab samples and video transects are provided in Table 1 and their positions are plotted in Figure 2.

Figure 1. Sample station target locations.

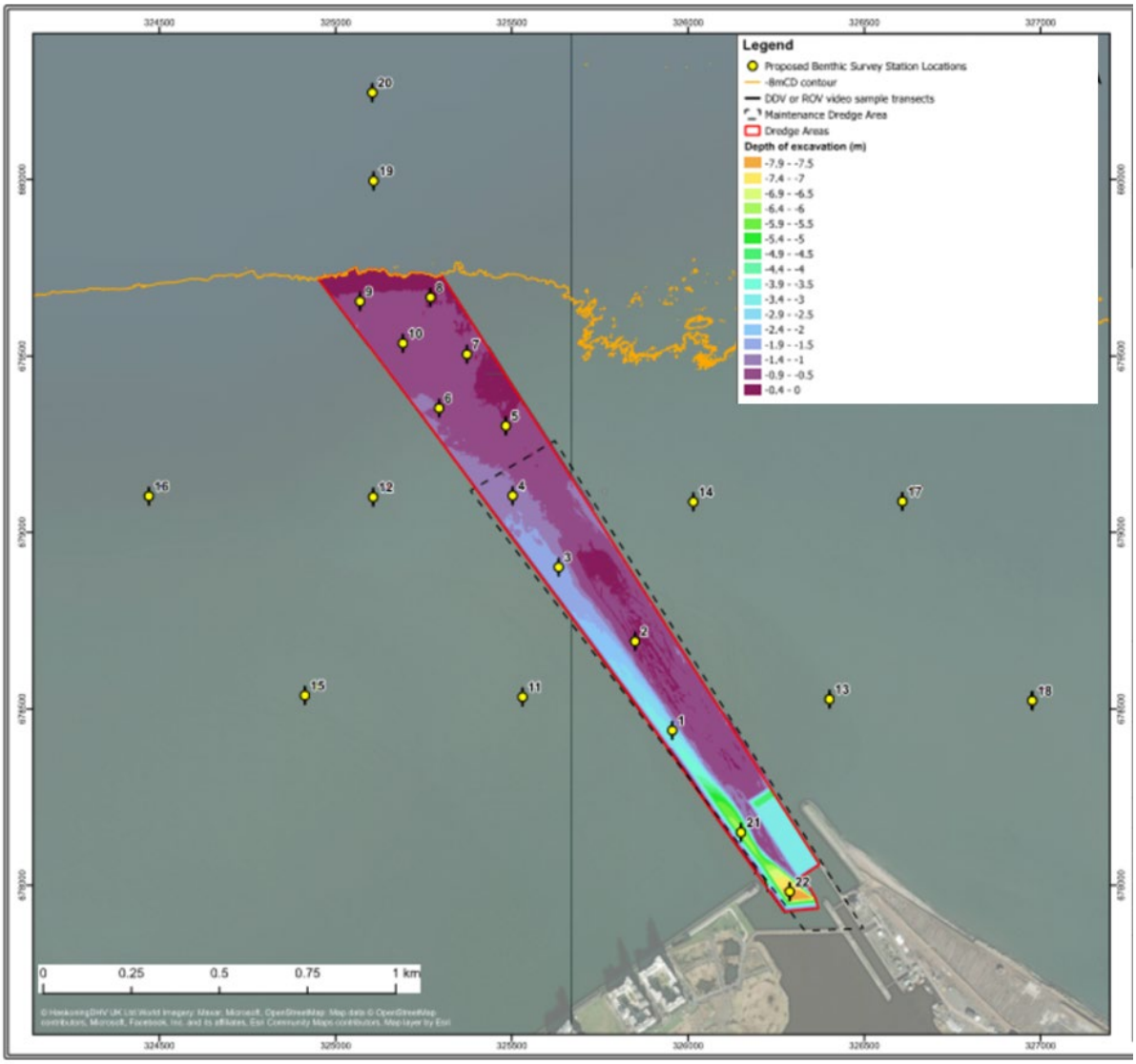


Figure 2. Sampled stations and transect locations for grab sampling and DDV (drop down video).

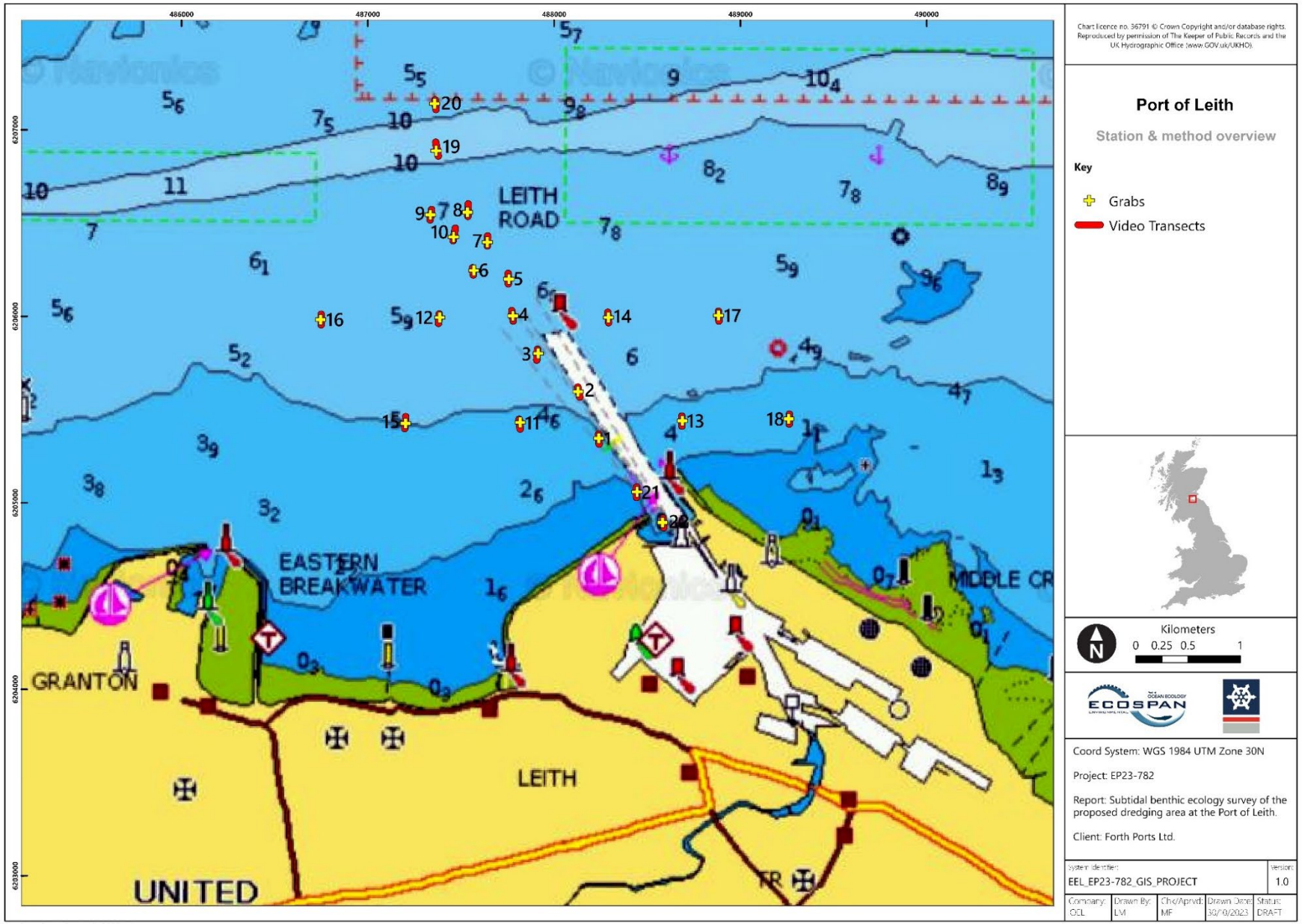


Table 1. Coordinates (WGS84) of the grab samples and video transect start and finish, with the distance from the target locations and the depth below chart datum (C.D.).

Grab sample station	WGS84		Distance (m)	Depth below C.D. (m)
	Latitude	Longitude		
1	55.99318	-3.18863	2.95	4.7
2	55.99543	-3.19042	4.03	6.8
3	55.99727	-3.19385	2.53	5.7
4	55.99908	-3.19602	1.89	6.4
5	56.00085	-3.19637	2.41	7
6	56.00127	-3.19938	4.44	6.7
7	56.00263	-3.19823	2.05	7.5
8	56.00407	-3.19993	1.91	7.5
9	56.00395	-3.20313	0.17	6.8
10	56.00288	-3.20113	2.3	7.4
11	55.99395	-3.1954	1.94	4.4
12	55.999	-3.20232	5.05	5.8
13	55.99403	-3.18143	2.47	4.2
14	55.999	-3.1878	1.47	6.1
15	55.9939	-3.20527	3.78	5.5
16	55.9989	-3.21258	0.36	4.9
17	55.9991	-3.17832	0.51	5.8
18	55.99412	-3.17228	4.52	3
19	56.00703	-3.20263	1.7	10.5
20	56.0093	-3.20277	3.71	8.5
21	55.9906	-3.18533	3.62	1.6
22	55.98912	-3.18313	0.57	0.4

Station video transect (start and finish)	WGS84		Distance (m)	Depth below C.D. (m)
	Latitude	Longitude		
1s	55.99290	-3.18860	3.3	4.3
1f	55.99338	-3.18865	4.7	5.3
2s	55.99517	-3.19027	4.3	6.7
2f	55.99565	-3.19043	6.0	7.1
3s	55.99695	-3.19397	1.3	5.9
3f	55.99747	-3.19390	12.4	6.2
4s	55.99933	-3.19612	5.9	6.8
4f	55.99883	-3.19600	2.7	6.6
5s	56.00112	-3.19643	5.3	7.4
5f	56.00062	-3.19642	1.3	6.9
6s	56.00139	-3.19950	13.1	6.9
6f	56.00105	-3.19943	1.0	6.9
7s	56.00293	-3.19820	6.9	7.2
7f	56.00245	-3.19822	2.6	7.2
8s	56.00447	-3.19987	18.2	7.5
8f	56.00387	-3.19990	1.7	7.3
9s	56.00420	-3.20303	7.4	7.2
9f	56.00370	-3.20315	3.0	6.8
10s	56.00330	-3.20098	22.2	6.9
10f	56.00270	-3.20117	3.0	7
11s	55.99410	-3.19548	9.0	4.5
11f	55.99363	-3.19540	10.6	4.4
12s	55.99917	-3.20237	3.7	6.2
12f	55.99872	-3.20243	5.1	6.2
13s	55.99377	-3.18147	0.4	4.2
13f	55.99425	-3.18148	4.2	4.5
14s	55.99925	-3.18785	3.6	6.4
14f	55.99875	-3.18778	3.0	6.3
15s	55.99422	-3.20525	12.1	5
15f	55.99365	-3.20533	2.5	5
16s	55.99915	-3.21253	4.5	6.3
16f	55.99865	-3.21253	3.7	5.7
17s	55.99930	-3.17832	2.6	6.1
17f	55.99883	-3.17828	4.6	5.9
18s	55.99387	-3.17223	4.2	2.9
18f	55.99434	-3.17222	1.3	3.1
19s	56.00744	-3.20267	21.0	10.1
19f	56.00678	-3.20245	10.0	10.2
20s	56.00948	-3.20273	1.6	7.3
20f	56.00902	-3.20265	6.1	8.9
21s	55.99033	-3.18537	2.1	1.4
21f	55.99083	-3.18537	4.8	2.9
22s	55.98888	-3.18303	2.4	0.1
22f	55.98933	-3.18310	5.7	0.7

4.1 Grab sampling

Representative samples of the sediment at each station were obtained using a 0.1 m^2 Day grab. At each station, the following data was recorded:

- Exact sampled co-ordinates using the vessels positioning equipment which is accurate to less than 1 m (Figure 1).
- Time/date.
- Water depth.
- Sample depth.
- Sediment description and odour (if noticeable).
- Visible epifauna.
- Size of any cobbles.
- A photograph of the undisturbed sample.

4.1.1 Particle size distribution (PSD)

Following the retrieval of a successful grab sample, a subsample of sediment was taken through the entire depth of the sample using a cut off syringe or similar. Cobbles (>63 mm) were not included as part of the PSD sub sample. This was analysed for particle size distribution by Ocean Ecology Ltd. in line with NMBAQCS guidance. The full particle size distribution (at 0.5 phi intervals) was determined for each sample and sediment type classified for each station [2]. The following statistics were determined:

- Full particle size distribution according to the Wentworth grain size classification system [3].
- Mean particle size.
- Sorting coefficient.
- Skewness.
- Modal size.
- Kurtosis.

4.1.2 Macrobenthos analysis

Infaunal sampling followed the ISO guideline for quantitative sampling and sample processing of marine soft-bottom macrofauna [4]. The remainder of the sediment (after the sediment sample was taken) was washed through a 0.5mm sieve following the Ecospan SOP ES02. The retained fauna were fixed and preserved in 10% borax buffered formaldehyde and stored in individually numbered containers until identified (to the lowest possible taxonomic level) and enumerated at Ecospan's laboratory following SOP OEL_QUAP_013. Any encrusting epifauna within the samples was identified and their presence/absence noted and recorded. Ecospan Environmental Ltd. participates in the National Marine Biological Analytical Quality Control Scheme (NMBAQCS). A photographic reference collection of species identified was retained

and the infaunal biomass (0.5 mm sieve mesh to major group) determined following OEL_QUAP_007 Biomass SOP.

4.2 Drop down video (DDV)

Video imagery of epibenthic communities was captured via Drop Down Video (DDV) and conspicuous epi-fauna and flora were recorded together with observed sediment type. Incidental observations of non-epifaunal species, such as demersal fish, were recorded. At each station, a 50m-long video transect was deployed north to south (Figure 1).

DDV imagery was obtained following SOP ES-13 using a high definition (1/3" Sony Super HAD CCD) video camera and video lights attached under a heavy lead 'fish' in such a way that the camera points vertically downwards. The fish was attached to a wire, controlled by a hydraulic winch and then towed slowly (< 0.5 knots) whilst guiding the camera above the seabed at the required depth. The depth of the camera above the seabed was adjusted according to the underwater visibility. The video output was recorded and the GPS position overlaid onto the recording. The video quality was reviewed, and its suitability confirmed on-board the vessel as the video was taken.

Identification of epifaunal species was undertaken in at the Ecospan office. Epifauna was identified to the lowest possible taxa and their abundance counted from the video transects. Presence/absence of encrusting epifauna species was noted and the results were collated into a spreadsheet for analysis.

Data was unable to be obtained at station 22 due to the poor underwater visibility of the camera footage.

5 RESULTS AND DISCUSSION

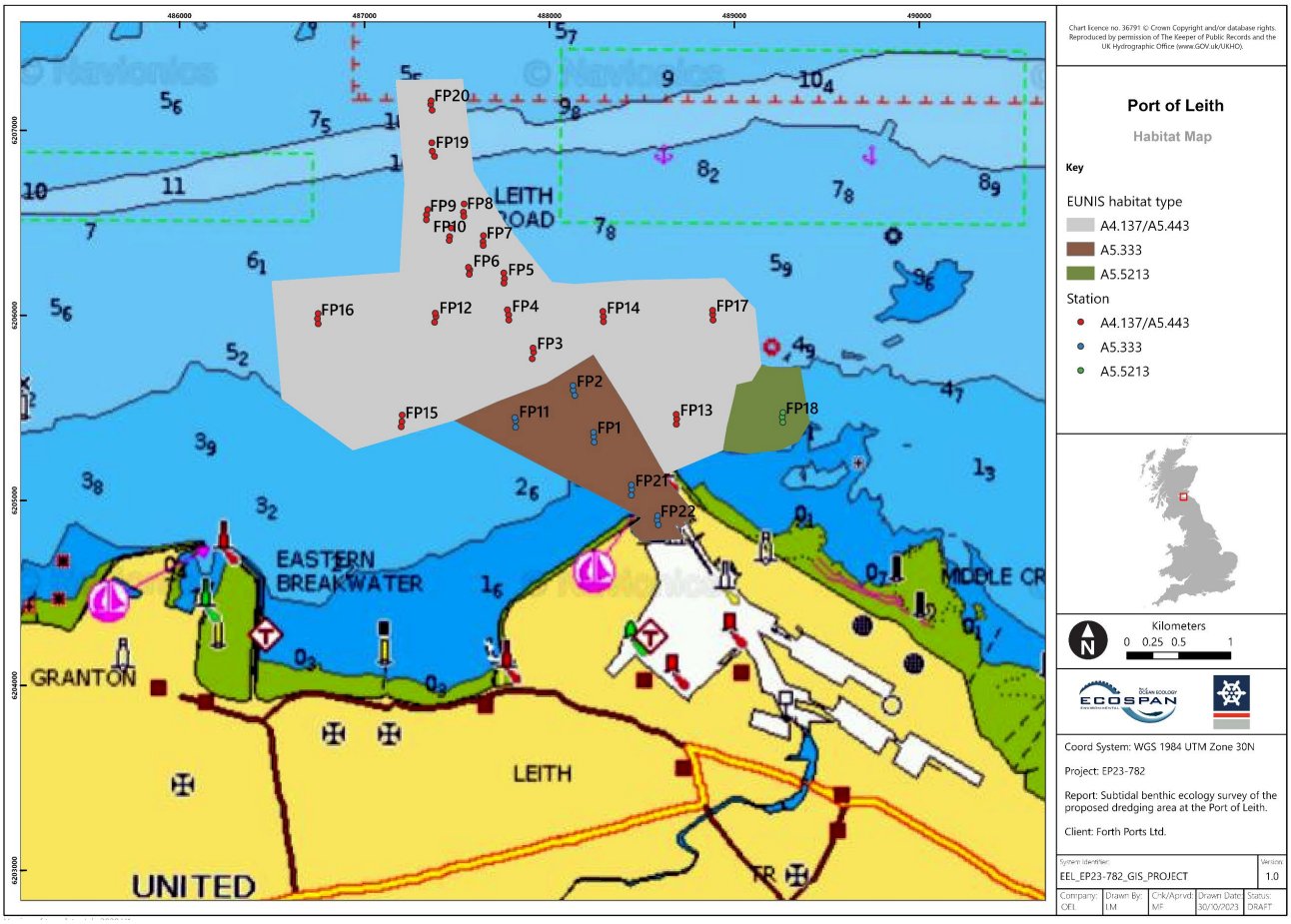
5.1 Habitat type assignment

The habitat map of the survey area is provided in Figure 1. There was a mosaic habitat consisting of a circalittoral rock biotope (A4.137 - *Flustra foliacea* and *Haliclona oculata* with a rich faunal turf on tide-swept circalittoral mixed substrata) and a circalittoral sediment biotope (A5.443 - *Kurtiella bidentata* and *Thyasir*a spp. in circalittoral muddy mixed sediment) found at the majority of the stations within the survey area (Figure 3). Much of the epifauna observed at these stations were characteristic of the biotope A4.137 and occurred on patches of coarser substrate. Much of the infauna was characteristic of the circalittoral sediment biotope A5.443.

At some stations closest to the port entrance within the current maintenance dredged area (1, 2, 21 and 22) there was a different biotope; 'A5.333 - *Mysella bidentata* and *Abra* spp. in infralittoral sandy mud'. Potentially, dredging has contributed to the difference in the recorded habitat type. Natural influences such as proximity to of the Leith River mouth could increase the level of fine sediment and also contribute to the occurrence of this biotope.

At station 18 the circalittoral sediment habitat 'A5.5213 - *Laminaria saccharina* and filamentous red algae on infralittoral sand' occurred.

Figure 3. Habitat map of the survey area.



5.2 Particle size distribution (PSD)

Sediments across the surveyed area were similar to the subtidal sediments in the wider Forth Estuary area [5]. The majority of stations had mixed sediments including proportions of gravel ranging from 0 - 26.7%, sand ranging from 19.58 – 53.40% and large proportions of fine sediment ranging from 29.6 – 78.8% (Figure 4 and Table 2). The Folk class [2] for the majority of stations (16) was gravelly mud.

The PSD confirms the biotope assignment at the majority of stations of the mosaic A4.137/A5.443 with mixed sediments that had substantial proportions of mud (43-68%), sand (20-38%) and gravel (9-27%). Station 18, where the circalittoral sand sub-biotope A5.5213 was observed, had a large proportion of gravel (25.3%) and sand (45.2%) with less mud (29.6%). There was a slightly larger proportion of gravel found at this station than expected for this sub-biotope however the PSD is generally consistent with the sediment characteristics [6].

Areas within the current maintenance dredging area (assigned the biotope A5.333), closest to the Port opening, generally exhibited lower proportions of gravel and a larger proportion of fines which is consistent with the biotope description of sandy mud.

Figure 4. Particle size distribution (PSD) of the sediment at each of the stations.

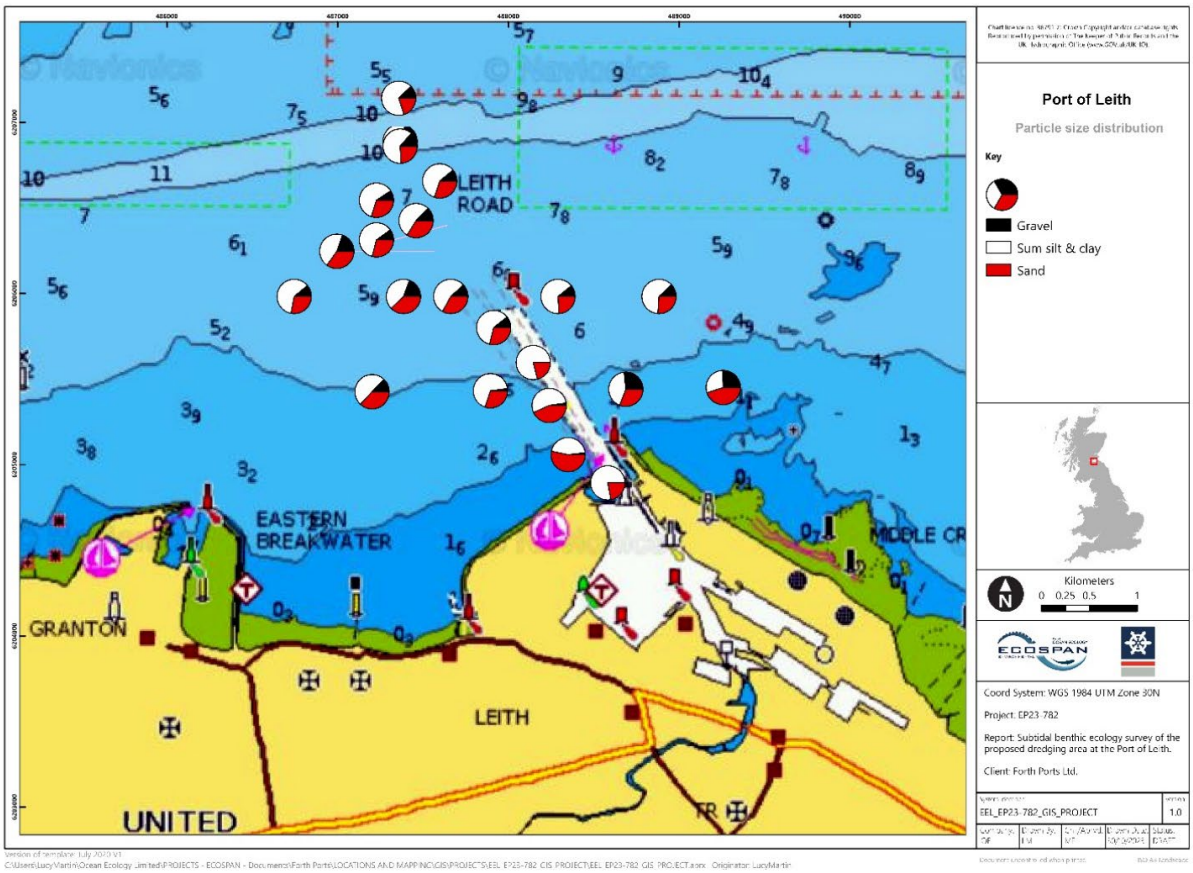
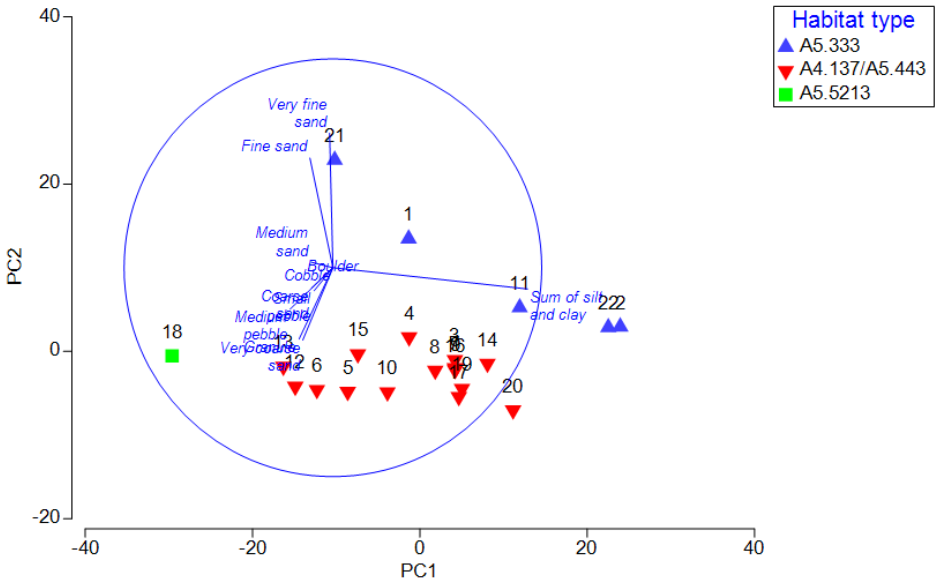


Table 2. Particle size distribution of the sediments at each station.

Area	Station	Medium pebble >8 mm	Small pebble 4-8 mm	Granule 2-4 mm	Very coarse sand 1-2 mm	Coarse sand 0.5-1 mm	Medium sand 250-500 µm	Fine sand 125-150 µm	Very fine sand 63-125 µm
Inside proposed dredging footprint	1	0.1	1.1	1.1	1.1	0.6	5.6	18.1	18.0
	2	0.0	0.0	0.0	0.0	0.0	1.1	5.8	14.3
	3	3.7	2.7	4.3	4.6	2.5	3.3	8.0	10.2
	4	3.0	3.2	5.6	4.9	2.5	3.6	7.4	14.6
	5	5.4	4.7	10.2	8.5	2.7	3.0	6.6	9.7
	6	4.8	4.5	10.4	9.2	4.3	4.6	6.9	9.8
	7	2.0	2.3	5.6	5.9	3.0	3.3	6.0	11.2
	8	4.9	1.7	4.4	7.0	1.8	4.1	8.0	9.3
	9	1.9	1.8	5.7	6.7	1.8	3.7	7.4	10.1
	10	0.5	2.9	9.6	9.7	3.8	4.6	7.1	8.4
	21	0.0	1.1	0.6	0.4	0.1	3.7	21.5	27.7
	22	0.0	0.0	0.0	0.0	0.3	1.6	8.9	11.5
Outside propose dredging footprint	11	0.7	0.5	0.8	0.8	1.1	4.0	12.9	11.6
	12	4.1	5.7	9.5	9.3	5.6	5.7	8.8	8.1
	13	18.6	2.7	5.4	4.4	2.8	4.1	9.2	10.2
	14	4.5	1.8	4.5	4.0	0.0	2.5	9.3	8.6
	15	3.3	3.0	6.6	7.3	5.0	4.4	9.3	11.4
	16	3.8	2.2	5.0	5.4	1.8	3.9	7.6	9.3
	17	1.5	2.7	7.9	8.0	0.7	3.6	7.0	7.0
	18	11.6	4.6	9.1	9.1	4.9	8.1	14.4	8.7
	19	5.1	2.4	6.0	6.2	1.1	2.4	6.0	8.7
	20	3.3	2.5	6.5	7.0	0.0	1.0	6.0	5.7

Principal component analysis (PCA) of the sediment particle sizes between stations was performed. This multivariate technique can be used to produce a graphical plot where the spatial distance between stations is a measure of their similarity. The PSD is visually similar across the site with most stations grouping towards the bottom of the plot with greater proportions of silt and clay or gravels. Stations where the biotope A5.333 occurred group towards the top right of the plot with greater proportions of fine sands and the sum of silt and clay in line. Stations with the biotope mosaic of A4.137/A5.443 had mixed sediments with varying proportions of gravel. Principal component 1 (PC1) represents 70.8% of the variation and consists of low gravel and sand proportions and high proportions of silt and clay. PC2 represents 20.6% of the variation and shows reduced gravel, coarse sand and mud proportions and increased fine sand proportions.

Figure 5. PCA plot of the sediment particle sizes at each station grouped by habitat type.



5.3 Grab sample macrobenthic analysis

5.3.1 Biomass

It can be seen from table 3 that the biomass at most stations was dominated by annelid worms.). Molluscs had relatively high biomasses across stations however there was more variance. Particularly high biomasses were seen at station 21 which had large abundances of a variety mollusc species including *Abra alba* and *Spisula elliptica*. Station 20 had a particularly high biomass of molluscs attributed to some species having high abundances (*Kurtiella bidentata and* Anomiidae molluscs) but mostly due to a large *Modiolus modiolus* individual present in the sample. Generally, there were low biomasses of crustaceans apart from a notable high abundance at station 12 caused by high abundances of barnacles and two *Cancer pagurus* individuals. Station 12 also had a very notable high biomass in the miscellanea category (all taxa that could not be categorised into the other major taxonomic groups included) which was due to the presence of a large anemone.

Table 3. Biomass by major taxonomic group at each station.

Area	Station	Taxonomic group				
		Miscellanea	Annelida	Crustacea	Mollusca	Echinodermata
Inside proposed dredging footprint	1	0.04	5.92	0.04	2.19	0.21
	2	-	0.45	0.01	0.01	-
	3	0.41	3.43	0.10	0.96	1.13
	4	0.21	3.65	0.07	0.33	0.02
	5	1.02	7.28	0.10	0.39	1.21
	6	0.13	5.18	0.15	3.95	0.13
	7	0.66	9.61	0.13	15.58	0.00
	8	0.57	6.75	0.10	0.43	0.10
	9	0.59	9.88	0.16	10.41	3.36
	21	0.05	4.01	8.88	83.45	0.11
	22	0.00	1.22	0.00	0.62	-
Outside proposed dredging footprint	10	0.38	4.79	0.03	0.11	5.18
	11	0.00	2.02	0.01	0.07	0.35
	12	185.40	4.56	32.09	2.40	1.24
	13	0.29	4.66	0.15	0.34	0.00
	14	0.17	3.99	0.04	1.14	0.18
	15	0.26	2.68	3.15	25.03	1.96
	16	0.33	4.80	0.14	3.73	0.30
	17	0.13	9.18	0.08	10.95	0.01
	18	0.17	14.07	5.17	12.42	0.02
	19	0.65	5.55	0.05	0.20	0.03
	20	0.39	8.32	0.69	163.05	0.22

5.3.2 Univariate analysis

A suite of diversity metrics have been utilised to analyse the macrobenthic diversity at each station. The raw macrobenthic abundance Table is provided in Appendix 1. Across stations the diversity was generally very high. Abundance (N) varied to a larger degree but generally increased with increased diversity (Figure 7). Pielou's evenness (J) was similar between stations showing moderate to high evenness of abundance within the communities (Table 4). From the raw data, high abundances of certain species (including *Melinna palmata, Tubificoides amplivasatus, Ampharete lindstroemi, Euclymene oerstedii, Galathowenia oculata, Levinsenia gracilis, Mediomastus fragilis, Pholoe inornata* and *Rhodine gracilior*) occurred at many of the stations.

Diversity (No. of taxa, Margalef's species richness and Shannon Weiner) was extremely high at many of the stations, but generally lower at stations within the current maintenance dredging area (21, 22, 1, 2 and 4) than areas outside, particularly stations 2 and 22 (Figure 6 and Figure 8). The A5.333 biotope is known to have high diversity and species richness, but this was not corroborated by these stations. Potentially, this reflects the impact of the maintenance dredging on the diversity of species occurring due to the removal of the macrobenthos and potential inhibition of their recolonisation (through repeated disturbance).

The sediment biotope A5.443 typically supports a variety of infaunal taxa. Examples of this biotope that have coarser sediment hold greater proportions of filter feeding organisms. The PSD at these stations show large proportions of coarse grains and some of the characterising

infauna (particularly bivalves) are filter feeding organisms. This includes large abundances of *K. bidentata* and frequent occurrences of *Thyasira flexuosa* recorded at the majority of stations.

Table 4. Diversity indices analysis of the macrobenthic community at each station.

Area	Station	No. of taxa (S)	Abundance (N)	Margalef's species richness (d)	Pielou's eveness (J')	Shannon Weiner diversity (H'(log10))	Simpsons diversity (1-Lambda')
Inside proposed dredging footprint	1	88	1650	11.74	0.73	1.42	0.94
	2	20	61	4.62	0.85	1.11	0.90
	3	138	2319	17.68	0.71	1.51	0.93
	4	85	1162	11.90	0.73	1.41	0.93
	5	138	2026	17.99	0.65	1.39	0.90
	6	155	1728	20.66	0.75	1.65	0.95
	7	160	1993	20.93	0.71	1.57	0.93
	8	126	1632	16.90	0.74	1.55	0.95
	9	152	2241	19.57	0.76	1.65	0.95
	10	111	1006	15.91	0.72	1.48	0.93
	21	84	1798	11.07	0.70	1.35	0.93
	22	32	364	5.26	0.63	0.95	0.81
Outside proposed dredging footprint	11	61	666	9.23	0.70	1.25	0.90
	12	152	1631	20.41	0.79	1.73	0.97
	13	94	1897	12.32	0.67	1.31	0.88
	14	134	1650	17.95	0.69	1.46	0.92
	15	134	1649	17.95	0.75	1.59	0.95
	16	136	1490	18.48	0.72	1.54	0.94
	17	117	1410	16.00	0.71	1.46	0.91
	18	150	2812	18.76	0.73	1.59	0.93
	19	125	1449	17.04	0.73	1.54	0.94
	20	175	2073	22.78	0.78	1.75	0.97

Figure 6. No. of taxa (S) in the grab macrobenthic sample from each station.

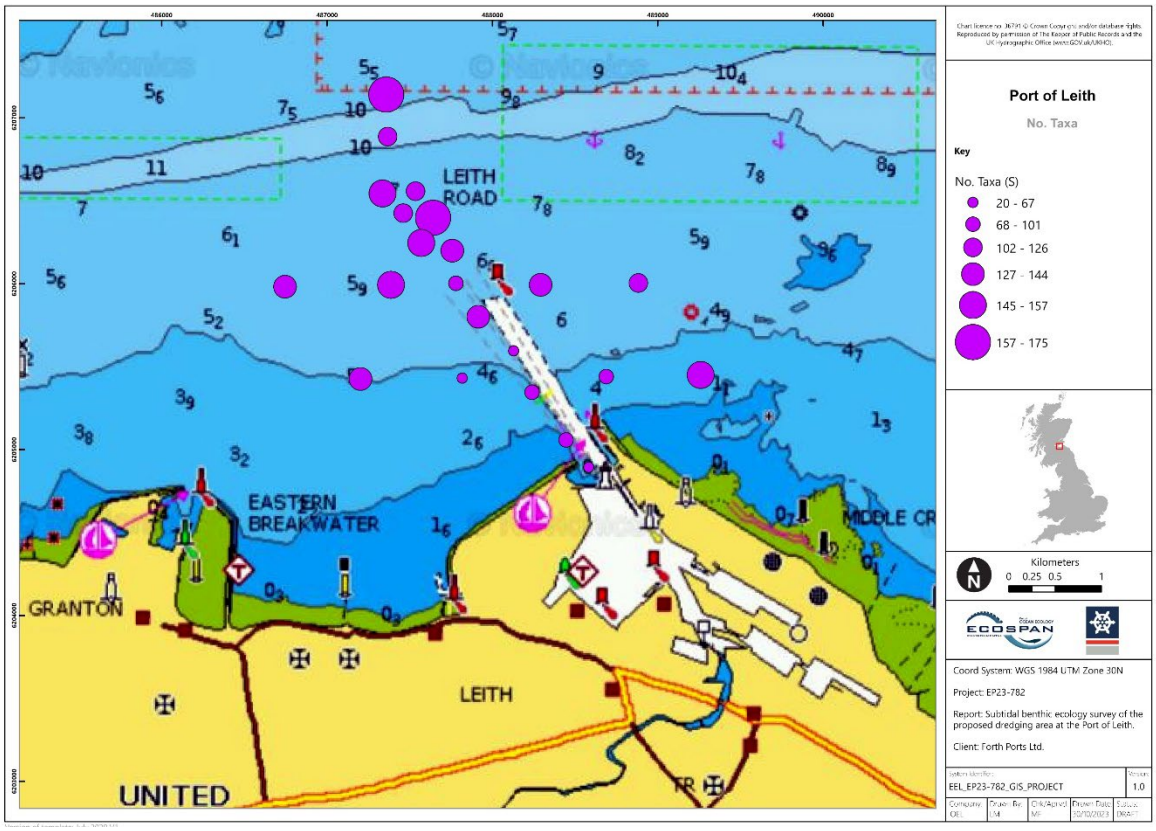


Figure 7. **Overall species abundance (N) in the grab macrobenthic sample from each station.**

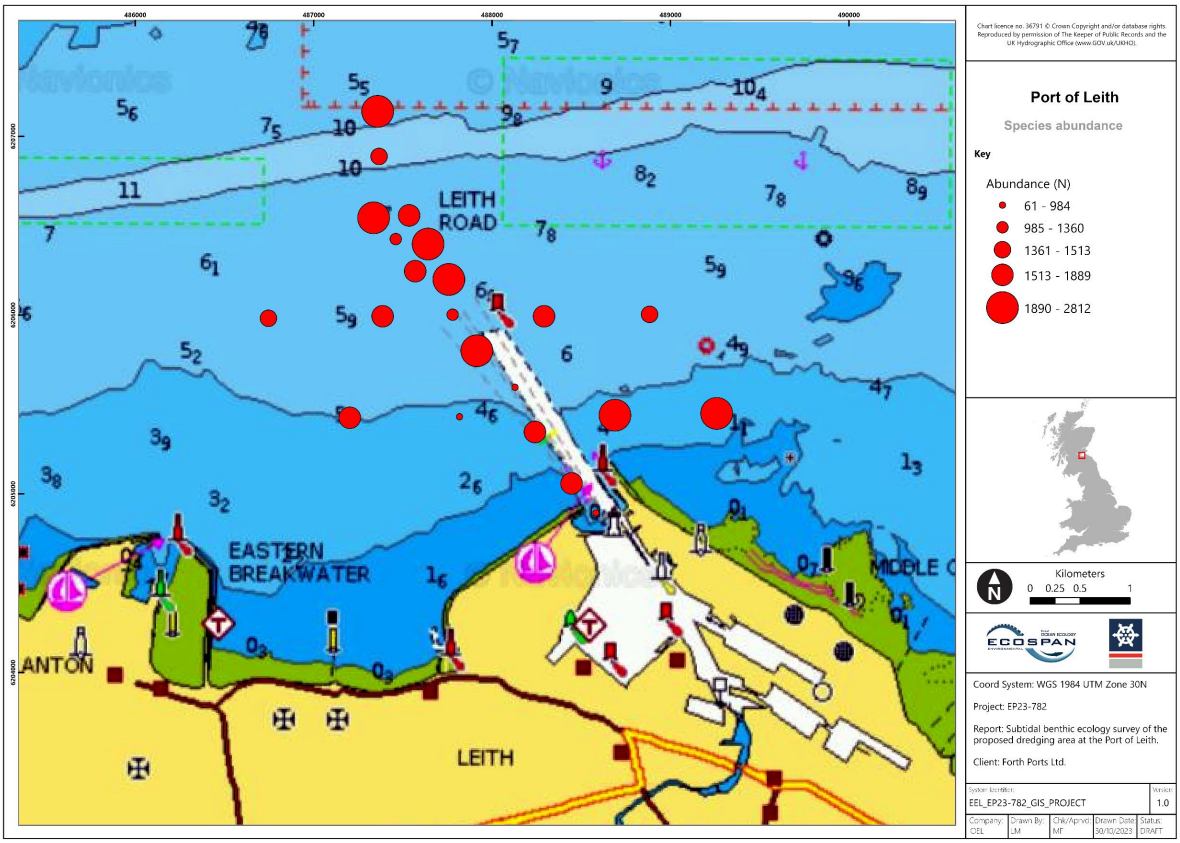
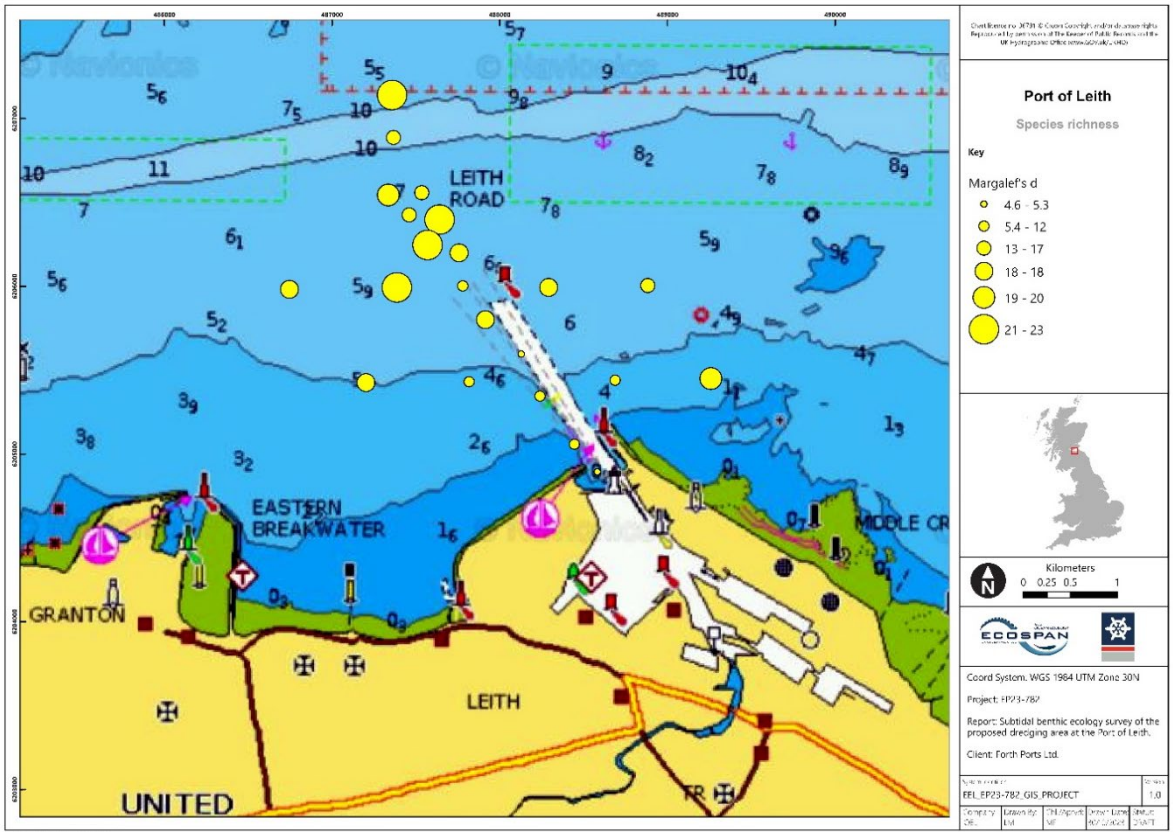


Figure 8. **Margalef's species richness (d) of the grab macrobenthic sample from each station**



5.3.3 Multivariate analysis

Multivariate methods of data analysis are usually considered to provide a more sensitive measure of community change than univariate methods [7] since all the data are analysed collectively with no loss of information such as that which occurs when reducing the data to a single number or univariate statistic. The results are often presented as a two-dimensional map of sampling stations in which the distance between the stations infers the degree of similarity in fauna type/community structure. This map is the result of a statistical manipulation called Multi-Dimensional Scaling or MDS. Prior to analysis, the raw fauna data were subjected to a fourth root transformation to reduce the influence of very abundant species on the analysis.

The fauna data at each station have been used to construct a Bray-Curtis matrix of the similarity between the stations. A cluster has been assigned to each station and the resulting dendrogram and MDS is shown in Figure 9 and Figure 10. Additionally, the data has been analysed using the SIMPROF routine in PRIMER which is a statistical routine used in hierarchical cluster analysis to determine which clusters have non-random structure (i.e., are different from each other). The resulting clusters have been super-imposed on the MDS (green lines) and dendrogram (red dashed lines).

Figure 9. Dendrogram of the macrobenthic communities at each station

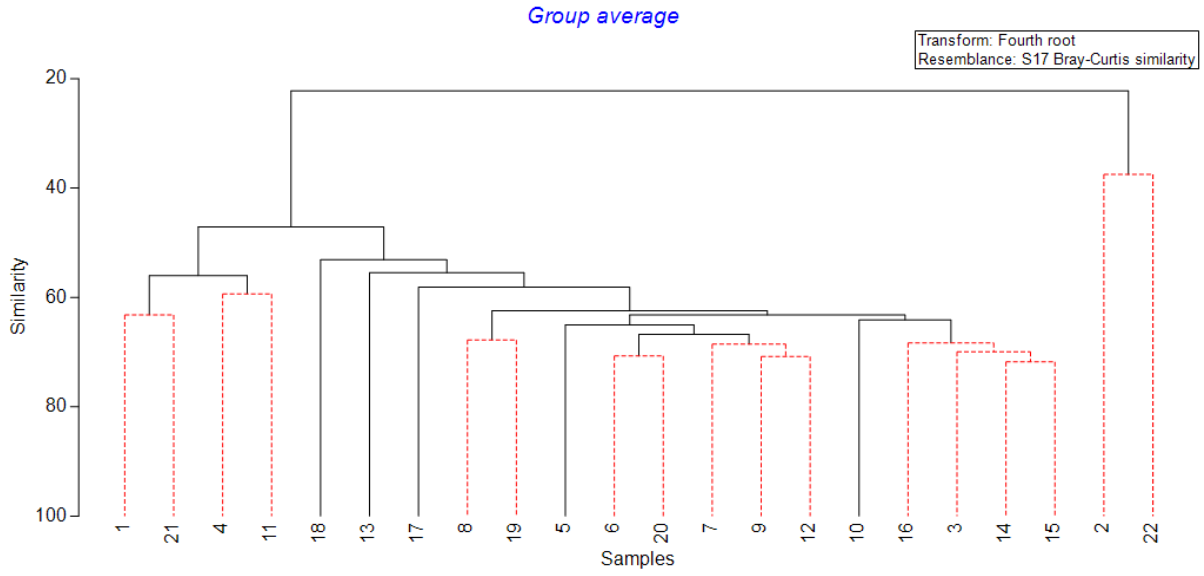
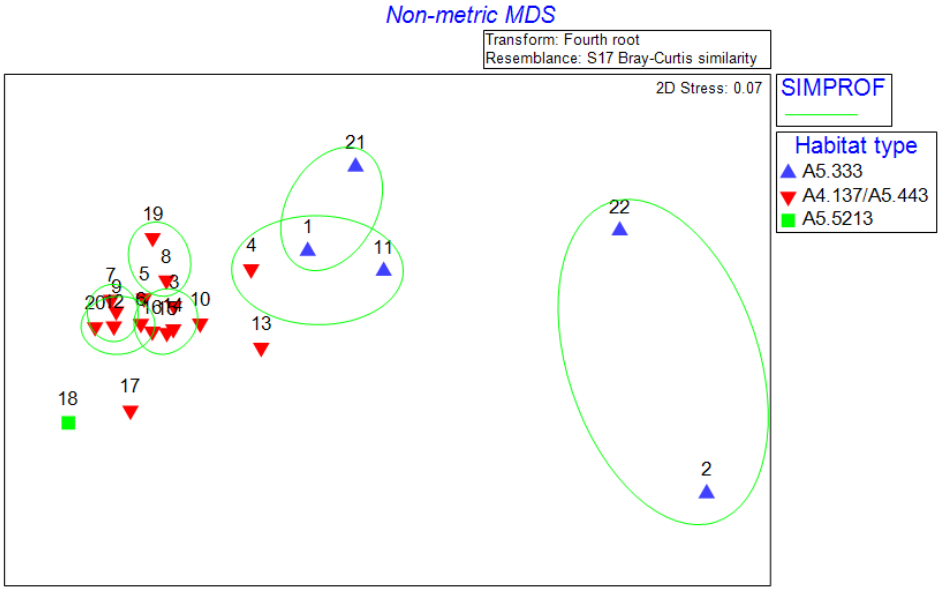


Figure 10. MDS plot of the macrobenthic communities at each station.



Macrofauna communities at stations within the same habitat type generally had a high degree of similarity (as can be seen from the cluster plot (Fig. 9) but formed statistically significant clusters within these groups. Stations where the biotope A5.333 occurred grouped towards the right-hand side of the plot and A4.137/A5.443 grouped towards the left of the plot. The habitat type A5.5213 at station 18 was separated from all other stations. Station 13 and 17 (assigned the A4.137/A5.443 mosaic) were also separated from all other stations. Station 2 and 22 were substantially distant from other stations. Univariate analysis showed that these stations had impoverished communities with the lowest number of taxa and abundance, likely driving the differences seen in Figure 10. The communities at the rest of the stations, were grouped relatively close together suggesting similar communities across most of the survey area.

SIMPER analysis was conducted to determine the similarity between the communities at stations within the survey area and determine the taxa responsible for differences seen (Table 5). There was an average similarity of 62% between the stations forming the habitat mosaic A4.137/A5.443 which is relatively high suggesting uniformity in the communities there. Stations within the biotope A5.333 exhibited lower similarity (41%) between their communities.

The average dissimilarity between the communities in the A5.333 and A4.137/A5.443 biotopes was 64%. A variety of differences in taxa contributed to the differences seen between the biotopes A5.333 and A4.137/A5.443, with none contributing substantially more than the others. Many of the taxa (including *Balanus crenatus* and *Spirobranchus lamarcki*) that were more abundant at the mosaic habitat are typically found on rocky/coarse substrate, present in greater proportions at the mosaic habitat (Table 2). In general, the communities at A5.333 were less diverse, but some taxa including *Tubificoides swirencoides*, *Nephtys incisa*, *A. alba*, *Harpinia antennaria* and *Owenia* sp. showed higher abundances. Tubificid species are generally considered opportunists that can adapt to rapid environmental fluctuations and stress [8]. The life history characteristics of some of these other taxa might allow them to be opportunistic

species, such as the rapid growth rate, high population density and larval exchange of some *Owenia* sp., the short lifespan of *H. antennaria* and the widespread distribution and often large populations of *A. alba*. This suggests that some of the differences between communities inside and outside the current maintenance dredging area could be partially due to dredging activity.

Table 5. SIMPER analysis of the communities within and between stations with the biotope A5.333 or A4137/A5.443

Groups A5.333 & A4.137/A5.443 Average dissimilarity = 64.20						
Species	A5.333 Av.Abund	A4.137/ A5.443 Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Myodocopida	0	2.35	0.85	2.32	1.32	1.32
Balanus crenatus	0	1.9	0.7	2.12	1.09	2.41
Tubificoides swirencoides	2.49	0.56	0.7	1.81	1.09	3.5
Mya (Juvenile)	0.24	2.04	0.67	2.45	1.05	4.54
Balanomorpha (Juvenile)	0.2	1.84	0.62	1.75	0.96	5.5
Melinna palmata	2.57	4.05	0.59	1.48	0.92	6.42
Laonome kroyeri	0.5	2.09	0.59	2.19	0.91	7.33
Harmothoe	0	1.53	0.56	4.05	0.87	8.21
Onchidorididae	0	1.56	0.55	2.11	0.86	9.07
Rhodine gracilior	1.49	2.68	0.55	1.2	0.86	9.92
Euclymene oerstedii	2.13	2.24	0.54	1.17	0.85	10.77
Paradoneis lyra	0.51	1.9	0.54	1.71	0.84	11.61
Terebellides	0	1.44	0.53	2.48	0.83	12.44
Dipolydora quadrilobata	0.88	2.11	0.53	1.33	0.83	13.27
Nephtys (Juvenile)	1.19	2.58	0.51	2.96	0.8	14.07
Anobothrus gracilis	0.53	1.73	0.51	1.52	0.79	14.86
Nephtys kersivalensis	0.4	1.69	0.5	1.68	0.79	15.65
Protodorvillea kefersteini	0.56	1.76	0.49	1.42	0.76	16.41
Amphiuridae (Juvenile)	0.69	1.77	0.49	1.62	0.76	17.18
Sabellaria spinulosa	0.26	1.51	0.49	1.74	0.76	17.94
Phoronis	0.26	1.49	0.49	1.79	0.76	18.69
Spirobranchus lamarcki	0	1.32	0.47	1.43	0.74	19.43
Levinsenia gracilis	2.41	3.44	0.47	1.28	0.73	20.16
Pholoe inornata	1.17	2.33	0.47	1.38	0.73	20.89
Sphaerosyllis hystrix	0.24	1.43	0.46	1.84	0.72	21.61
Nematoda	0.92	1.97	0.45	1.19	0.7	22.31
Galathowenia oculata	1.95	2.62	0.44	0.96	0.69	23
Hyala vitrea	0.2	1.35	0.44	1.48	0.69	23.69
Pariambus typicus	1.82	1.21	0.44	1.63	0.69	24.38
Scalibregma inflatum	1.16	2.07	0.44	1.1	0.69	25.07
Ampelisca (Juvenile)	0.44	1.52	0.44	1.25	0.68	25.75
Mediomastus fragilis	2.4	2.56	0.44	1.06	0.68	26.43
Apistobranchus	0.54	1.48	0.43	1.37	0.67	27.1
Tanaopsis graciloides	0.46	1.42	0.42	1.42	0.66	27.76
Nephtys incisa	1.25	0.23	0.42	1.55	0.65	28.41
Nemertea	0.98	2.03	0.42	1.37	0.65	29.05
Corophiidae (Juvenile)	0	1.18	0.41	1.46	0.64	29.7
Pholoe baltica	1.1	1.89	0.41	1.13	0.64	30.34

Group A4.137/A5.443 Average similarity: 61.53					
Species	Av.Abund	Av.Sim	Sim/SD	Contrib %	Cum.%
Melinna palmata	4.05	1.94	6.47	3.15	3.15
Levinsenia gracilis	3.44	1.68	6.34	2.73	5.88
Ampharete lindstroemi	3.01	1.4	6.13	2.27	8.15
Nephtys (Juvenile)	2.58	1.24	8.47	2.02	10.17
Tubificoides amplivasatus	2.64	1.23	5.36	2	12.18
Mediomastus fragilis	2.56	1.22	5.92	1.98	14.16
Rhodine gracilior	2.68	1.2	4.48	1.94	16.11
Galathowenia oculata	2.62	1.19	4.87	1.94	18.04
Chaetozone gibber	2.28	1.11	6.71	1.8	19.85
Pholoe inornata	2.33	1.07	6.16	1.74	21.58
Laonome kroyeri	2.09	0.98	5.99	1.59	23.18
Scalibregma inflatum	2.07	0.98	7.66	1.59	24.77
Nemertea	2.03	0.94	6.24	1.53	26.31
Mya (Juvenile)	2.04	0.91	6.57	1.47	27.78
Myodocopida	2.35	0.89	2.44	1.44	29.22
Paradoneis lyra	1.9	0.87	4.72	1.41	30.63
Nematoda	1.97	0.87	5.47	1.41	32.04
Dipolydora quadrilobata	2.11	0.85	2.14	1.38	33.42
Pholoe baltica	1.89	0.85	5.48	1.38	34.8
Kurtiella bidentata	1.91	0.83	5.01	1.34	36.14
Euclymene oerstedii	2.24	0.81	1.29	1.32	37.46
Amphiuridae (Juvenile)	1.77	0.81	4.86	1.31	38.78
Protodorvillea kefersteini	1.76	0.8	5.26	1.3	40.07
Nephtys kersivalensis	1.69	0.76	4.63	1.24	41.31
Balanus crenatus	1.9	0.74	3.16	1.21	42.52
Eteone longa	1.62	0.74	5.5	1.2	43.72
Lumbrineris cingulata	1.56	0.73	6.9	1.19	44.9
Harmothoe	1.53	0.7	6.3	1.14	46.05
Anobothrus gracilis	1.73	0.7	1.72	1.13	47.18
Balanomorpha (Juvenile)	1.84	0.66	1.54	1.07	48.24
Phoronis	1.49	0.65	2.36	1.06	49.31
Ampelisca tenuicornis	1.5	0.65	2.3	1.05	50.36

Group A5.333 Average similarity: 41.22					
Species	Av.Abund	Av.Sim	Sim/SD	Contrib %	Cum.%
Tubificoides amplivasatus	2.74	2.8	3.36	6.8	6.8
Melinna palmata	2.57	2.62	2.76	6.35	13.15
Ampharete lindstroemi	2.14	2.42	3.01	5.86	19.01
Levinsenia gracilis	2.41	2.29	2.43	5.56	24.57
Tubificoides swirencoides	2.49	2.18	2.21	5.3	29.87
Chaetozone gibber	2.16	2.11	3.11	5.13	35
Mediomastus fragilis	2.4	1.59	1.07	3.86	38.86
Nephtys (Juvenile)	1.19	1.37	2.23	3.32	42.18
Nephtys incisa	1.25	1.28	0.99	3.09	45.28
Euclymene oerstedii	2.13	1.19	1.05	2.88	48.16
Galathowenia oculata	1.95	1.18	1.14	2.86	51.02
Pariambus typicus	1.82	0.98	1.07	2.37	53.39
Capitella	1.22	0.97	1.01	2.36	55.75
Kurtiella bidentata	1.54	0.89	1.11	2.15	57.9
Abra (Juvenile)	1.31	0.81	1.1	1.97	59.87
Eudorella truncatula	1.27	0.78	1.14	1.89	61.76
Rhodine gracilior	1.49	0.77	0.97	1.86	63.63
Owenia	1.37	0.76	1.13	1.84	65.47
Pholoe inornata	1.17	0.75	1.11	1.83	67.3
Nucula nitidosa	0.99	0.71	1.06	1.72	69.02
Diastylis rugosa	0.88	0.7	1.04	1.7	70.72

5.4 DDV macrobenthic analysis

Within the A4.137/A5.443 mosaic habitat, common epifauna included abundant and frequently occurring *Flustra foliacea* and *Haliclona oculata* both of which are defining taxa of the A4.137 habitat (Table 6 and Table 7). Many species that are characteristic of the A4.137 biotope were abundant, including: *Alcyonium digitatum*, *Nemertesia antennina*, *Antiopella cristata* and *Urticina felina* at multiple stations assigned to this mosaic. The epifauna observed on the patches of rocky sediment are consistent with the assigned biotope (Table 7). There were also some commonly occurring species that are not mentioned in the biotope description including *Aequipecten opercularis*, *Asterias rubens* and *Nemertesia ramosa*. Hydrozoan and bryozoan turf was widespread and common across the survey area; however, it was not possible to determine individual organisms and only presence was recorded.

Figure 11. ***Flustra foliacea* on cobbles in mixed sediment on transect 4 (top left); *Urticina felina* on mixed sediment at transect 19 (top right); *Haliclona (Haliclona) oculata* with hydroid and bryozoan turf on mixed sediment at transect 17 (bottom left); *Aequipecten opercularis* on mixed sediment at transect 16 (bottom right).**

The A4.137 habitat type is thought to have relatively rapid recovery potential, with *F. foliacea* potentially recovering in around two years and *H. oculata* around one year. This is, however, dependent on the level of disturbance and mortality and recruitment [9]. The A5.443 habitat type has limited characterising epibenthic taxa (it mostly hosts infaunal taxa) and is considered to have low sensitivity to smothering [10].

The circalittoral sediment biotope A5.333, observed at stations closest to the port had few epifauna (Table 6). The lack of course substrate means there is limited colonisable surface for many epifaunal species that require it. The species consistently observed in this habitat were *Ophiura* sp.. They are fairly mobile organisms allowing them the ability to rapidly recolonise

dredged areas. *Virgularia mirabilis*, a species of sea pen, were observed at station 2 in high abundance. Sea pens are sessile organisms and usually vulnerable to trawling and dredging. There is no clear explanation for its occurrence at station 2, however, it has been noted that *V. mirabilis* is more tolerant than other sea pen species to physical disturbances [11] which could be the part of the reason for its ability to persist in the current maintenance dredging area.

Figure 12. ***Virgularia mirabilis*** **on fine sediment (left) and** ***Ophiura*** **sp. on fine sediment (right) at transect 2.**

Station 18 defined as the sub biotope A5.5213 had abundant algae including *Saccharina latissima*, red and brown algae, and *Laminaria digitata* colonising the substrate. These are all characteristic species of the sub-biotope. There was also the presence of *F. foliacea* and *H. oculata* as seen at many other stations. The occurrence of more algal species at this station is likely a combination of the shallower depth observed and potentially the availability of coarser substrate (evidenced by the PSD) for holdfast attachment.

Epifauna observed at station 1 (Table 7) commonly occur in circalittoral rock biotopes (e.g. algal species and *F. foliacea*) despite the habitat at station 1 being an infralittoral sandy mud biotope. This was due to a single relatively small patch of rock where these epifauna were observed and as such was not deemed as prevalent enough to affect the assignment of a circalittoral sediment biotope (A5.333).

Table 6. Qualitative data collected from the DDV transects.

Station transect	Sediment type	PSD designation from grab	Notes	Presumptive habitat type	Habitat name
1	Shelly mud, occasional rocks in second half	(g)sM: Slightly Gravelly Sandy Mud		A5.333	[*Mysella bidentata*] and [*Abra*] spp. in infralittoral sandy mud
2	Soft mud	sM: Sandy Mud	Somewhat impoverished. Possibly recently	A5.333	[*Mysella bidentata*] and [*Abra*] spp. in infralittoral sandy mud
3	Shelly mud with cobbles	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
4	Mixed sediment	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
5	Mixed sediment	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
6	Mixed sediment	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
7	Mixed sediment	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
8	Mixed sediment with occasional boulders	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
9	Mixed sediment	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
10	Mixed sediment with cobbles and small boulders	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
11	Shelly mud	(g)sM: Slightly Gravelly Sandy Mud	Not much epifauna	A5.333	[*Mysella bidentata*] and [*Abra*] spp. in infralittoral sandy mud
12	Mixed sediment	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
13	Mixed sediment with cobbles	gM: Gravelly Mud	Large number of modiolus or mussel shells	A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
14	Mixed sediment	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
15	Mixed sediment	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
16	Mixed sediment	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
17	Mixed sediment	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
18	Mixed sediment with cobbles	gmS: Gravelly Muddy Sand		A5.5213	[*Laminaria saccharina*] and filamentous red algae on infralittoral sand
19	Mixed sediment	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
20	Mixed sediment	gM: Gravelly Mud		A4.137/A5.443 matrix	[*Flustra foliacea*] and [*Haliclona oculata*] with a rich faunal turf on tide-swept circalittoral mixed substrata/[*Mysella bidentata*] and [*Thyasira*] spp. in circalittoral muddy mixed sediment
21	Soft mud	(g)mS: Slightly Gravelly Muddy Sand		A5.333	[*Mysella bidentata*] and [*Abra*] spp. in infralittoral sandy mud
22	Soft mud	sM: Sandy Mud	Very bad visibility	A5.333	[*Mysella bidentata*] and [*Abra*] spp. in infralittoral sandy mud

Table 7. DDV epibenthic species abundances at each station.

Taxon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Aequipecten opercularis				1		7	3	3	6	3		1		5	3	25	2			4		
Alcyonium digitatum			1		2	2		3	2	1		1				4	2		1	3		
Asterias rubens	1		2	1	2	1	1	5	1	4		4	21	2	2	1	5	1	3	3		
Brown algae	1																	3				
Buccinum undatum						1															1	
Carcinus maenas	1					2	2			1		2	3	1			1		2		1	
Crevice sea cucumber									1					1								
Doris pseudoargus				1																		
Flustra foliacea	4		14	8	14	11	8	7	17	7		6	13	8	4	5	23	3	11	9		
Gobius sp.	2														1							
Haliclona (Haliclona) oculata					1	1	1		3	1							13	3	2	1		
Homarus gammarus	1																					
Hyas araneus					1			1		1						2						
Hydroid and bryozoan turf			P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
Inachus sp.									5	1												
Antiopella cristata						1																
Laminaria digitata																		3				
Lineus longissimus						1		1														
Liocarcinus depurator	4		1	1	3		3	6	2	3	1	3		3	3	3			4			
Lomanotus genei												2										
Metridium senile				1				2											2	1		
Necora puber						1																
Nemertesia antennina					1		1	2	3							1						
Nemertesia ramosa				1	1		5	5	12	4	7	3			3	4			3			
Onchidoris bilamellata																1						
Ophiura sp.	10	14									9										28	
Pagurus bernhardus	4		1	2	1			4	2	1									2	2		
Pecten maximus									1	1												
Red algae																		7				
Saccharina latissima																		23				
Securiflustra securifrons				1				1		1						1						
Spirobranchus sp.										3												
Suberites ficus													1	1								
Urticina felina	3				1							1							1	1		
Virgularia mirabilis		20		6																		

5.5 HOCI, SOCI and INNS

Habitats of conservation interest (HOCI) is used here to describe habitats that qualify as Scottish priority marine features (PMFs) or UK Habitats of principal importance [12] [13]. Species of conservation interest (SOCI) include nationally scarce or rare species, UK Species of principal importance, species considered PMFs and species on the Scottish Biodiversity List [14].

The A5.5213 habitat at station 18 is included under the priority marine feature 'Kelp and seaweed communities on sublittoral sediment – A5.52'. This habitat is sensitive to substratum loss however the station where this habitat was identified is outside of the proposed dredging area. The resilience of this sub-biotope is considered high (based on the key characterising species *S. latissima* and *Chorda filum*) and the sensitivity to smothering is considered low, potentially indicating the limited risk that resuspended sediment from dredging might pose to this habitat [15].

The habitats A5.333, A4.137 and A5.443 are not considered PMFs but are considered Annex I habitats under 'Reefs – 1170 'and 'Large shallow inlets and bays – 1160'. These are not considered priority habitats.

None of the habitat types found in this survey are considered UK Habitats of principal importance despite some of these being very similar to habitat types that are (e.g., the sub-biotope 'A5.5211 – Red seaweeds and kelps on tide-swept mobile infralittoral cobbles and pebbles' is considered a UK Habitats of principal importance). The subtidal mixed sediments are not included under the illustrative biotope list of the habitat of principal importance 'Subtidal Sands and Gravels'. This is due to the sediment being more mixed. The A5.443 habitat observed contain similar characteristics to the subtidal sand and gravel habitats that are considered protected. No SOCI or invasive non-native species (INNS) were observed in the survey area.

6 CONCLUSION

The habitat types observed in the survey area featured mainly the mosaic habitat of A4.137 /A5.443 occurring at 16 out of the 22 sampled stations. A5.333 habitat also occurred at stations closest to the port opening predominantly within the current maintenance dredged area. The sub-biotope A5.5213 occurred at station 18 outside of the proposed dredging area.

The macrobenthic communities observed across the survey area generally exhibited large numbers of taxa and abundances. Stations closest to the port opening (within the current maintenance dredging area) exhibited lower diversity and abundance of taxa. Some of the abundant taxa at these stations are opportunistic species able to recolonise disturbed areas quickly. This could indicate the effect of current maintenance dredging efforts.

The only priority marine feature found (the sub-biotope A5.5213) is considered to have low sensitivity to smothering. No habitats of principal importance, SOCI or INNS were recorded in this survey.

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8 GLOSSARY

Term	Definition
Abundance	Total number of all animals (individuals) in a sample
Annex I	Habitats and species which have priority status
Assemblage	Fauna community composition at each station
Benthic	"Bottom dwelling", pertaining to the seabed or estuary bed

BIOENV	A statistical manipulation to correlate fauna communities with environmental variables.
Biotope	Habitat with a specific community assemblage.
Bray-Curtis similarity	Statistic that compares fauna samples in terms of abundance and number of taxa
Community	A collection of fauna (or flora) cohabiting in and characteristic of an area of the environment
Community analysis	Statistical technique used to assess the similarity of faunal populations between stations
Diversity	The range of animals (taxa) in a sample
Epifauna	Animals that live on the seabed
Fine sediment	Fraction of the sediment that is composed of silt and clay
Infauna	Animals that live within the sediment
Macrobenthic	Sediment dwelling (benthic) animals
Margalef's species richness	A measure of the variety of species present.
MDS	Multi-Dimensional Scaling, a statistical manipulation used to identify groups of distinct fauna (communities).
Mosaic habitat	Multiple habitats occurring in patchy distributions across the same area.
Multivariate	Statistics which can be applied to a complete taxa abundance data matrix without any loss of information i.e. not requiring reduction of the data to a single number or index
Pielou's eveness	A measure of the relative abundance of each species
PSD	(Particle size distribution) The size of the grains (particles) within a sediment

Shannon Wiener diversity	An index (single number) of fauna diversity, increases with fauna diversity
SIMPER	Multivariate statistical technique to examine the species contributions to similarities within groups and differences between groups.
SIMPROF	Multivariate statistical technique to examine the significance of the clusters produced from hierarchical analysis
Simpson's index	An index of fauna diversity, increases with fauna diversity
Taxa/Taxon	A grouping of the fauna, may be a species or, if different species are indistinguishable, it may be based on a higher taxonomic group such as the genus or family
Univariate	Statistics that describe the fauna in terms of a single number
Wentworth scale	Recognised 8 band scale of sediment particle size
A5.333 biotope	*Mysella bidentata* and *Abra* spp. in infralittoral sandy mud
A4.137 biotope	*Flustra foliacea* and *Haliclona oculata* with a rich faunal turf on tide-swept circalittoral mixed substrata
A5.443 biotope	*Kurtiella bidentata* and *Thyasira* spp. in circalittoral muddy mixed sediment
A5.5213 sub-biotope	*Laminaria saccharina* and filamentous red algae on infralittoral sand

9 APPENDIX

Appendix 1. Macrobenthic abundances from grab samples at each station.

Higher taxanomic group	Taxon	Inside proposed dredging footprint												Outside proposed dredging footprint									
		1	2	3	4	5	6	7	8	9	10	21	22	11	12	13	14	15	16	17	18	19	20
Florideophyceae	*Ceramium*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Florideophyceae	*Gracilaria*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Florideophyceae	*Heterosiphonia plumosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Florideophyceae	*Plocamium cartilagineum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Rhodophyta	Rhodophyta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Porifera	Porifera	0	0	0	0	1	1	1	1	1	1	0	0	0	1	0	1	1	1	1	1	0	1
Demospongiae	*Cliona*	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1
Anthozoa	Actiniaria	0	0	1	0	2	0	2	0	1	0	0	0	0	5	3	0	0	1	1	7	1	11
Anthozoa	*Alcyonium digitatum*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Anthozoa	*Edwardsiidae*	0	0	0	1	1	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
Anthozoa	*Virgularia mirabilis*	6	0	4	3	1	2	0	2	0	0	1	0	1	1	0	5	0	1	0	0	0	1
Hydrozoa	*Calycella syringa*	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	1	1	1	0	0	1	0
Hydrozoa	*Campanulariidae*	0	0	0	0	0	1	1	1	1	1	0	0	1	1	0	1	1	1	1	1	1	1
Hydrozoa	*Clytia hemisphaerica*	0	0	1	1	1	1	1	1	1	0	0	0	0	1	0	1	1	1	1	1	0	1
Hydrozoa	*Clytia paulensis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0
Hydrozoa	*Diphasia*	0	0	1	0	1	1	0	1	0	1	0	0	0	0	0	1	0	1	1	1	1	1
Hydrozoa	*Eudendrium*	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0
Hydrozoa	Filifera	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrozoa	*Halecium*	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	1	1	0	1	0	1
Hydrozoa	*Halopteris catharina*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Hydrozoa	*Hydrallmania falcata*	0	1	1	0	1	1	1	0	0	0	0	0	0	1	1	1	0	1	1	1	1	1
Hydrozoa	*Lovenella clausa*	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0
Hydrozoa	*Nemertesia*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrozoa	*Sertularella*	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
Hydrozoa	*Sertularia*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Annelida	*Golfingia (Golfingia) elongata*	0	0	0	0	0	0	7	0	6	0	0	0	0	1	0	0	0	0	2	6	0	3
Annelida	*Nephasoma (Nephasoma) minutum*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Annelida	*Phascolion (Phascolion) strombus strombus*	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Annelida	Sipuncula (Juvenile)	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Annelida	*Thysanocardia procera*	0	0	0	0	0	0	1	2	1	3	0	0	0	1	0	1	0	0	0	0	4	0
Clitellata	*Tubificoides amplivasatus*	115	6	89	35	47	68	15	57	78	6	162	51	46	104	85	44	92	61	24	154	38	51
Clitellata	*Tubificoides benedii*	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	7	0	0
Clitellata	*Tubificoides swirencoides*	113	2	0	1	0	0	1	1	0	0	162	108	2	9	26	0	0	0	1	46	1	0
Nematoda	Nematoda	12	0	19	8	12	9	18	41	63	5	6	0	2	76	9	4	10	2	9	49	35	18
Nemertea	Nemertea	6	0	24	19	19	18	33	17	30	19	3	1	1	16	3	7	8	11	9	16	36	40
Phoronida	*Phoronis*	3	0	18	6	8	0	8	16	8	4	0	0	0	3	3	6	8	11	2	0	7	2
Platyhelminthes	Platyhelminthes	1	0	0	0	2	4	0	0	3	0	0	0	0	2	0	0	8	0	0	0	0	3
Priapulida	*Priapulus caudatus*	1	0	0	0	2	0	1	0	1	1	0	0	0	2	0	1	3	1	4	0	0	0
Polychaeta	*Acromegalomma*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Ampharete lindstroemi*	42	5	155	70	361	80	115	51	50	12	23	20	30	61	70	120	111	98	84	9	34	90
Polychaeta	*Amphicteis gunneri*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Amphictene auricoma*	0	0	0	0	0	0	2	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	*Anobothrus gracilis*	7	0	19	0	38	13	18	22	27	14	1	0	0	10	9	12	7	14	0	5	11	18
Polychaeta	*Aphelochaeta*	2	0	0	3	4	0	6	4	5	0	2	0	0	2	0	0	0	3	5	6	0	0
Polychaeta	*Aphelochaeta marioni*	0	0	4	1	0	0	0	0	0	2	0	2	0	3	1	3	1	0	0	0	0	0
Polychaeta	*Aphrodita aculeata*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Aphroditidae* (Juvenile)	0	0	2	0	1	3	0	1	3	0	0	0	0	1	2	0	0	0	0	0	1	3
Polychaeta	*Apistobranchus*	1	0	10	5	5	4	17	22	28	4	0	0	8	4	1	6	0	3	0	0	60	6
Polychaeta	*Aricidea (Acmira) catherinae*	0	0	0	0	0	0	0	0	0	0	86	3	0	2	2	0	0	0	0	0	0	0
Polychaeta	*Aricidea (Aricidea) minuta*	6	0	0	0	0	0	0	0	0	0	1	0	0	0	9	0	2	0	2	15	4	0
Polychaeta	*Aurospio banyulensis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Polychaeta	*Branchiomma bombyx*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Polychaeta	*Capitella*	6	1	2	0	2	2	0	0	3	2	18	5	0	11	18	0	4	4	2	30	0	1
Polychaeta	*Chaetozone gibber*	70	5	63	15	33	13	24	25	29	27	64	3	26	27	45	33	43	25	20	26	26	14
Polychaeta	*Chone fauveli*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Polychaeta	*Cirratulus* (Juvenile)	1	0	1	0	0	3	2	0	5	8	0	0	0	4	1	0	0	7	5	45	0	10
Polychaeta	*Cirratulus cirratus*	0	0	0	3	0	0	3	1	2	0	0	0	0	2	0	0	3	2	0	73	3	8
Polychaeta	*Cirriformia* (Juvenile)	0	0	6	0	0	3	0	0	0	0	0	0	0	2	0	0	0	1	0	15	0	0
Polychaeta	*Cirriformia tentaculata*	0	0	0	0	1	2	1	0	0	0	0	0	0	17	0	0	1	1	14	83	0	2
Polychaeta	*Commensodorum commensalis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Polychaeta	*Cossura*	4	0	1	0	2	0	0	4	4	0	0	11	0	1	0	0	0	1	0	0	1	2
Polychaeta	*Dialychone dunerificta*	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	2	1	4	0	0	0	0
Polychaeta	*Dialychone longiseta*	0	0	0	0	6	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	*Diplocirrus glaucus*	0	0	4	1	0	1	4	3	0	1	0	0	0	1	0	1	0	1	1	0	5	0
Polychaeta	*Dipolydora caulleryi*	0	0	0	2	0	0	6	1	5	0	0	0	0	0	0	0	0	0	4	6	0	1
Polychaeta	*Dipolydora coeca*	0	0	0	0	2	1	6	0	16	0	0	0	0	0	0	0	0	2	8	21	0	2
Polychaeta	*Dipolydora quadrilobata*	8	0	45	3	49	38	62	35	94	11	4	0	3	14	36	40	15	75	0	3	3	4
Polychaeta	*Dodecaceria*	0	0	0	0	1	0	10	0	6	0	0	0	0	0	0	0	0	0	2	31	1	1

Appendix 1 continued

Higher taxanomic group	Taxon	Inside proposed dredging footprint												Outside proposed dredging footprint									
		1	2	3	4	5	6	7	8	9	10	21	22	11	12	13	14	15	16	17	18	19	20
Polychaeta	*Drilonereis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Polychaeta	*Epigamia alexandri*	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	1	0	0	6	1	0	2
Polychaeta	*Erinaceusyllis erinaceus* (Epitoke)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Polychaeta	*Eteone longa*	14	0	12	2	15	8	2	9	7	3	10	1	1	9	20	6	13	15	2	23	2	7
Polychaeta	*Euclymene oerstedii*	117	1	64	32	10	93	53	89	66	175	143	0	71	60	0	52	50	0	0	0	93	24
Polychaeta	*Eulalia aurea*	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	20	0	3
Polychaeta	*Eulalia mustela*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
Polychaeta	*Eulalia ornata*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	4	0	0	31	0	0
Polychaeta	*Eulalia tripunctata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Polychaeta	*Eulalia viridis*	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	6	0	3
Polychaeta	*Eumida bahusiensis*	0	0	0	0	4	0	2	0	0	2	2	0	0	0	4	0	0	0	0	1	8	1
Polychaeta	*Eumida punctifera*	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Eumida sanguinea*	1	0	0	2	1	6	2	5	2	1	0	0	0	2	0	0	2	7	1	35	0	10
Polychaeta	*Eunereis longissima*	0	0	0	1	1	0	2	0	0	2	2	0	0	1	0	1	0	1	0	1	0	0
Polychaeta	*Eupolymnia nebulosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Polychaeta	*Eupolymnia nesidensis*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Polychaeta	*Eusyllis blomstrandi*	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0
Polychaeta	*Exogone naidina*	1	0	3	0	0	4	1	1	3	3	0	0	0	5	0	3	3	2	2	0	2	3
Polychaeta	*Exogone naidina* (Juvenile)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Polychaeta	*Galathowenia oculata*	133	0	119	83	162	15	50	48	70	7	41	7	23	31	163	34	30	34	19	9	35	52
Polychaeta	*Gattyana cirrhosa*	0	0	4	1	0	3	0	1	0	2	0	0	0	0	1	1	1	5	1	0	5	0
Polychaeta	*Glycera* (Juvenile)	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0
Polychaeta	*Glycera alba*	1	0	0	0	0	1	1	5	5	1	0	0	0	2	0	0	0	1	0	0	1	2
Polychaeta	*Glycera unicornis*	0	0	0	1	0	0	1	0	1	3	0	0	0	0	0	0	0	0	0	0	2	2
Polychaeta	*Glyphohesione klatti*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Polychaeta	*Goniada maculata*	0	0	0	2	1	1	2	0	0	0	1	0	0	2	0	0	0	0	0	0	2	0
Polychaeta	*Harmothoe*	0	0	6	1	8	7	3	7	7	13	0	0	0	12	2	6	6	2	8	15	2	14
Polychaeta	*Harmothoe clavigera*	0	0	0	0	3	0	3	0	0	0	0	0	0	2	0	0	1	0	0	4	0	5
Polychaeta	*Harmothoe extenuata*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Polychaeta	*Harmothoe fernandi*	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	2	0	0	0
Polychaeta	*Harmothoe impar*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Hypereteone foliosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Polychaeta	*Lagis koreni*	0	0	0	1	1	2	0	0	0	0	1	0	0	4	0	0	0	0	0	0	0	2
Polychaeta	*Lanice conchilega*	1	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Laonice bahusiensis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Polychaeta	*Laonome kroyeri*	5	1	27	14	64	30	29	16	21	4	0	0	0	4	15	18	19	23	22	4	15	27
Polychaeta	*Leiochone*	1	0	0	0	0	0	3	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0
Polychaeta	*Leitoscoloplos mammosus*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Lepidonotus squamatus*	0	0	0	0	3	6	3	2	5	1	0	0	0	5	0	1	6	2	1	5	0	6
Polychaeta	*Levinsenia gracilis*	186	6	186	192	146	160	145	187	143	82	10	6	145	39	82	224	152	139	113	6	223	144
Polychaeta	*Lumbrineris cingulata*	1	0	4	1	5	3	8	6	9	8	1	0	1	10	4	5	3	14	9	2	6	10
Polychaeta	*Magelona*	0	0	7	9	5	1	0	5	0	8	0	0	1	0	0	1	3	1	0	0	15	0
Polychaeta	*Magelona alleni*	0	0	1	0	0	0	2	1	7	0	0	0	0	0	0	0	0	0	0	0	4	7
Polychaeta	*Magelona filiformis*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Malacoceros vulgaris*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Polychaeta	*Malmgrenia bicki*	0	0	0	0	1	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1
Polychaeta	*Malmgrenia darbouxi*	0	0	1	0	0	1	0	0	0	1	0	0	0	0	2	1	0	0	0	0	0	0
Polychaeta	*Malmgrenia ljungmani*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Mediomastus fragilis*	117	0	42	66	50	56	38	36	31	7	156	99	16	93	68	48	65	46	25	142	24	62
Polychaeta	*Melinna palmata*	190	16	495	178	450	262	444	220	223	150	30	8	97	82	594	331	216	291	331	44	164	235
Polychaeta	*Microphthalmus*	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Myrianida*	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Mysta picta*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Polychaeta	*Neoamphitrite figulus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0
Polychaeta	*Nephtys* (Juvenile)	7	1	48	21	37	59	49	53	50	25	1	3	1	37	51	45	50	94	46	19	14	74
Polychaeta	*Nephtys caeca*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Nephtys hombergii*	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Nephtys incisa*	6	3	3	4	0	0	0	0	0	0	0	4	14	0	0	0	0	0	0	0	0	1
Polychaeta	*Nephtys kersivalensis*	1	0	9	2	6	6	2	8	9	6	1	0	0	11	35	10	12	19	19	22	1	8
Polychaeta	*Notomastus*	5	0	3	1	4	4	7	0	2	2	1	0	0	3	1	5	1	2	0	1	2	2
Polychaeta	*Ophelina acuminata*	3	0	3	0	7	0	1	1	0	0	21	1	0	0	1	2	5	1	1	0	0	0
Polychaeta	*Ophryotrocha*	0	0	1	0	1	0	1	2	0	0	1	1	0	1	1	1	1	0	0	0	2	0
Polychaeta	*Owenia*	19	0	2	0	3	3	2	0	1	1	37	1	3	0	1	0	1	1	1	0	0	0
Polychaeta	*Oxydromus flexuosus*	1	0	0	0	0	0	0	0	1	1	0	0	0	3	1	0	0	0	1	0	0	0
Polychaeta	*Paradoneis eliasoni*	15	0	5	0	0	6	0	0	3	1	3	0	8	0	1	1	0	16	0	2	4	3
Polychaeta	*Paradoneis lyra*	6	0	27	13	13	18	22	20	19	5	0	0	1	10	17	16	3	4	25	9	2	33
Polychaeta	*Paranaitis kosteriensis*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Parasabella*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Pectinariidae* (Juvenile)	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Pherusa plumosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	0	2

Appendix 1 continued

Higher taxanomic group	Taxon	Inside proposed dredging footprint												Outside proposed dredging footprint									
		1	2	3	4	5	6	7	8	9	10	21	22	11	12	13	14	15	16	17	18	19	20
Polychaeta	*Pholoe assimilis*	0	0	0	0	0	0	8	14	9	0	0	0	0	3	0	0	0	0	15	0	0	3
Polychaeta	*Pholoe baltica*	24	0	4	8	9	17	34	13	34	11	12	0	4	38	5	2	7	5	11	14	34	26
Polychaeta	*Pholoe inornata*	19	1	45	15	6	61	22	19	48	58	6	0	2	50	10	34	28	17	12	145	75	61
Polychaeta	*Phyllodoce groenlandica*	9	0	0	0	0	0	0	0	0	0	1	0	1	0	2	1	2	0	0	0	0	0
Polychaeta	*Phyllodoce longipes*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Phyllodoce maculata*	0	0	0	0	3	4	2	0	2	0	0	0	0	2	0	0	4	0	0	0	0	6
Polychaeta	*Phyllodoce mucosa*	5	0	3	2	0	1	0	1	1	1	11	0	0	1	2	0	0	6	4	4	0	0
Polychaeta	*Pista*	0	0	1	0	1	2	1	2	1	2	0	0	0	2	0	0	0	0	0	2	3	0
Polychaeta	*Pista maculata*	0	0	2	0	2	0	0	0	1	0	0	0	0	0	0	2	0	0	1	1	0	3
Polychaeta	*Platynereis dumerilii*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Polychaeta	*Podarkeopsis capensis*	0	0	5	2	4	2	2	1	3	3	0	0	1	7	0	4	2	2	0	0	1	4
Polychaeta	*Polycirrus*	1	0	6	2	1	2	1	0	1	0	1	0	1	2	1	4	3	1	3	18	0	2
Polychaeta	*Praxillella affinis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Polychaeta	*Prionospio fallax*	8	0	19	12	5	7	15	31	13	9	4	0	4	4	0	4	12	2	0	1	31	11
Polychaeta	*Proceraea*	0	0	2	0	0	1	0	0	1	0	0	0	0	0	0	2	1	1	2	0	0	0
Polychaeta	*Protodorvillea kefersteini*	7	0	7	3	6	11	4	3	5	16	2	0	0	50	23	7	5	28	19	150	6	7
Polychaeta	*Psamathe fusca*	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	1	0	0	2	1	0	1
Polychaeta	*Pseudomystides limbata*	0	0	0	0	1	1	0	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	*Pseudopolydora nordica*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Polychaeta	*Pseudopolydora pulchra*	0	0	3	0	1	3	0	3	2	0	0	0	0	1	8	4	3	4	3	2	0	2
Polychaeta	*Pygospio elegans*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
Polychaeta	*Rhodine gracilior*	62	0	205	95	70	50	73	90	88	22	1	1	50	25	4	132	53	27	9	0	62	50
Polychaeta	*Sabellaria spinulosa*	3	0	12	2	6	0	16	3	23	1	0	0	0	27	0	5	16	11	7	21	8	19
Polychaeta	Sabellidae (Juvenile)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Scalibregma inflatum*	27	0	37	12	19	23	16	5	32	17	19	0	4	50	9	15	13	28	19	10	14	15
Polychaeta	*Scoloplos armiger*	6	0	0	0	0	2	1	0	2	1	25	0	6	2	4	1	2	4	0	4	2	1
Polychaeta	*Serpulidae*	0	0	0	0	1	0	1	0	0	1	0	0	0	8	0	0	0	12	0	69	0	1
Polychaeta	*Sphaerodoridium*	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Polychaeta	*Sphaerosyllis hystrix*	2	0	2	0	7	16	1	4	10	7	0	0	0	3	5	6	5	6	10	19	4	6
Polychaeta	*Sphaerosyllis hystrix* (Epitoke)	0	0	0	0	1	0	0	0	1	2	0	0	0	2	0	0	0	5	0	2	0	0
Polychaeta	*Spio arndti*	0	0	0	0	14	0	8	15	11	6	0	0	0	15	0	6	1	1	1	2	2	0
Polychaeta	*Spio decorata*	12	0	15	19	0	6	0	0	0	0	1	1	7	0	4	5	16	1	0	0	0	0
Polychaeta	*Spiophanes bombyx*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Spiophanes kroyeri*	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Polychaeta	*Spirobranchus lamarcki*	0	0	3	0	3	8	6	0	4	1	0	0	0	31	4	0	0	37	33	610	11	35
Polychaeta	*Spirobranchus triqueter*	0	0	0	0	0	1	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0
Polychaeta	*Sthenelais limicola*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Polychaeta	*Streblospio*	1	1	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0
Polychaeta	Syllidae (Epitoke)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polychaeta	*Syllides*	0	0	0	0	0	2	0	1	7	1	0	0	0	3	2	2	0	1	2	0	0	1
Polychaeta	*Syllidia armata*	0	0	0	0	1	1	0	0	1	1	0	0	0	1	0	3	2	0	0	3	1	1
Polychaeta	*Syllis armillaris*	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	5	0	0
Polychaeta	*Syllis cornuta*	0	0	0	1	0	0	3	0	2	0	0	0	0	2	0	1	0	0	0	7	0	0
Polychaeta	Terebellidae (Juvenile)	0	0	11	0	4	4	4	0	0	1	0	0	0	1	0	3	2	2	1	1	0	2
Polychaeta	*Terebellides*	0	0	5	3	9	2	6	0	12	5	0	0	0	2	5	4	4	16	25	0	2	5
Polychaeta	*Tharyx*	8	1	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	4	0	0	0
Polychaeta	*Tharyx killariensis*	2	0	5	1	1	0	0	1	1	0	1	0	5	3	0	0	0	0	0	0	2	2
Arachnida	Acari	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Copepoda	Copepoda	1	4	1	0	1	1	5	0	5	2	1	0	0	7	0	1	1	0	0	9	0	0
Malacostraca	*Akanthophoreus gracilis*	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Malacostraca	*Ampelisca* (Juvenile)	0	0	18	3	2	0	5	10	3	3	2	1	0	2	131	4	7	20	2	56	10	2
Malacostraca	*Ampelisca brevicornis*	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	*Ampelisca diadema*	0	0	1	0	0	0	0	0	0	0	0	0	0	2	31	1	1	1	2	0	2	1
Malacostraca	*Ampelisca provincialis*	0	0	1	2	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Malacostraca	*Ampelisca tenuicornis*	8	0	11	9	4	7	5	4	9	3	4	1	2	0	38	8	11	9	3	0	1	4
Malacostraca	*Amphilochus manudens*	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0
Malacostraca	*Aoridae*	0	0	9	0	0	0	0	0	0	7	0	0	0	0	0	11	0	1	0	0	0	0
Malacostraca	*Argissa hamatipes*	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Malacostraca	*Astacilla* (Juvenile)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	*Bodotria scorpioides*	2	0	5	1	2	0	1	6	6	2	1	0	0	0	15	0	3	0	0	1	2	4
Malacostraca	*Cancer pagurus*	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Malacostraca	*Carcinus maenas*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	*Cheirocratus*	0	0	0	1	0	2	0	0	0	2	0	0	0	0	1	0	1	0	0	1	2	8
Malacostraca	*Cheirocratus robustus*	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
Malacostraca	Corophiidae (Juvenile)	0	0	5	0	12	6	5	4	27	0	0	0	0	1	1	1	3	0	16	47	0	36
Malacostraca	*Crassicorophium bonellii*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0	2	0
Malacostraca	*Cumella (Cumella) pygmaea*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Malacostraca	*Diastylis bradyi*	0	0	0	0	0	0	0	0	6	0	0	0	0	1	0	0	0	0	0	0	2	0
Malacostraca	*Diastylis laevis*	2	0	2	0	6	1	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 1 continued

Higher taxanomic group	Taxon	Inside proposed dredging footprint												Outside proposed dredging footprint									
		1	2	3	4	5	6	7	8	9	10	21	22	11	12	13	14	15	16	17	18	19	20
Malacostraca	*Diastylis rugosa*	2	2	6	2	0	4	4	7	1	5	1	0	1	0	32	9	20	7	0	1	9	5
Malacostraca	*Dyopedos monacanthus*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Malacostraca	*Ericthonius*	0	0	14	0	0	10	4	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0
Malacostraca	*Ericthonius punctatus*	0	0	1	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Malacostraca	*Eualus cranchii*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Malacostraca	*Eudorella truncatula*	17	0	9	20	7	2	8	14	7	3	10	1	6	3	2	9	2	0	0	0	8	6
Malacostraca	*Gammaropsis maculata*	0	0	30	3	5	12	1	3	3	1	0	0	0	2	1	0	1	0	1	8	0	18
Malacostraca	*Gammaropsis palmata*	2	1	0	11	18	7	14	13	35	0	0	0	1	1	8	0	2	4	2	5	27	4
Malacostraca	*Gitana sarsi*	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1
Malacostraca	*Gnathia*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
Malacostraca	*Gnathia*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Malacostraca	*Gnathia oxyuraea*	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Malacostraca	*Harpinia antennaria*	10	0	1	1	0	0	0	1	0	1	72	0	1	0	0	0	1	0	0	0	0	0
Malacostraca	*Harpinia crenulata*	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Malacostraca	*Harpinia pectinata*	0	0	0	0	0	0	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	*Hyas araneus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Malacostraca	*Iphimedia minuta*	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	2	0	0	1	0	0	0
Malacostraca	*Megamphopus cornutus*	0	0	0	0	2	5	1	0	11	2	0	0	0	0	2	0	0	1	0	1	0	4
Malacostraca	*Metaphoxus fultoni*	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	*Monocorophium acherusicum*	0	0	10	0	0	0	2	1	0	1	0	0	0	0	2	0	2	0	13	0	0	8
Malacostraca	*Monocorophium sextonae*	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	2	0	0	0	18	0	0
Malacostraca	*Munna*	0	0	0	0	0	2	2	1	3	0	0	0	0	0	0	1	0	0	0	0	2	2
Malacostraca	*Nototropis swammerdamei*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	*Nototropis vedlomensis*	0	0	0	0	1	0	0	0	3	0	1	0	0	1	22	5	5	1	0	3	0	3
Malacostraca	Paguridae (Juvenile)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Malacostraca	*Pagurus bernhardus*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Malacostraca	*Pandalus montagui*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Malacostraca	*Paramphilochoides intermedius*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Malacostraca	*Pariambus typicus*	77	0	10	9	8	3	8	12	0	1	72	1	24	0	21	1	4	1	0	0	9	1
Malacostraca	*Perioculodes longimanus*	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	*Photis longicaudata*	0	0	3	0	4	0	0	0	0	0	0	0	1	0	16	4	1	4	0	1	0	0
Malacostraca	*Photis reinhardi*	8	0	0	0	0	0	0	0	0	0	3	0	2	0	0	0	0	1	0	0	0	0
Malacostraca	*Phtisica marina*	0	0	1	0	0	3	0	1	2	0	0	0	1	0	1	0	1	1	0	4	7	2
Malacostraca	*Pisidia longicornis*	0	0	0	0	0	3	0	0	1	0	0	0	0	3	0	0	3	0	2	11	1	10
Malacostraca	*Pseudocuma (Pseudocuma) longicorne*	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	1	0	2	0	0	0	0
Malacostraca	*Pseudoparatanais batei*	0	0	4	0	3	5	3	4	15	1	0	0	0	2	0	2	1	1	1	11	1	2
Malacostraca	*Pseudoprotella phasma*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malacostraca	*Stenothoe monoculoides*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Malacostraca	*Tanaopsis graciloides*	0	0	3	6	7	21	14	3	37	13	3	0	1	13	0	10	4	11	5	3	0	0
Malacostraca	*Tritaeta gibbosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	16	8	0	0
Pycnogonida	*Achelia echinata*	0	0	1	0	1	1	2	0	0	1	0	0	0	0	1	2	2	2	10	5	0	3
Pycnogonida	*Anoplodactylus petiolatus*	0	0	0	2	0	0	3	1	2	0	0	0	1	1	0	1	0	1	0	1	4	0
Pycnogonida	*Callipallene brevirostris*	0	0	5	0	4	10	0	2	12	0	0	0	0	1	0	10	5	1	5	4	0	13
Pycnogonida	*Nymphon brevirostre*	0	0	7	0	0	5	6	2	5	1	0	0	0	1	1	5	1	4	0	1	3	2
Pycnogonida	*Phoxichilidium femoratum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Pycnogonida	Pycnogonida (Juvenile)	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	1
Pycnogonida	*Pycnogonum litorale*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Thecostraca	Balanomorpha (Juvenile)	1	0	22	9	0	14	37	2	38	5	0	0	0	93	0	41	71	5	32	12	1	44
Thecostraca	Balanomorpha	0	0	0	0	2	0	3	1	1	0	0	0	0	12	0	0	0	0	0	7	0	3
Thecostraca	*Balanus balanus*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
Thecostraca	*Balanus crenatus*	0	0	21	11	6	12	17	6	2	1	0	0	0	26	1	53	128	1	176	6	3	15
Thecostraca	*Verruca stroemia*	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	6	1	0	11
Ostracoda	Myodocopida	0	0	3	3	9	70	125	157	313	70	0	0	0	85	1	6	2	41	1	2	95	80
Ostracoda	Podocopida	0	0	0	0	0	1	2	3	2	0	0	0	0	1	0	0	0	0	0	0	4	3
Ostracoda	*Pterygocythereis jonesii*	0	0	0	3	1	0	19	1	8	0	0	0	0	4	0	7	0	1	0	0	0	2
Bivalvia	Abra (Juvenile)	5	0	10	12	3	5	2	4	4	1	37	4	2	9	21	2	9	3	1	7	0	7
Bivalvia	*Abra alba*	0	0	3	0	0	1	0	0	0	0	295	0	2	0	34	0	12	0	0	72	0	1
Bivalvia	*Abra nitida*	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Bivalvia	*Abra prismatica*	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Bivalvia	*Acanthocardia echinata*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	*Aequipecten opercularis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
Bivalvia	Anomiidae (Juvenile)	0	0	0	0	0	7	2	0	20	0	0	0	0	5	0	1	18	0	3	39	0	90
Bivalvia	Cardiidae (Juvenile)	0	0	5	0	0	3	1	3	7	0	0	0	0	2	8	3	2	1	3	1	1	5
Bivalvia	*Chamelea striatula*	2	0	4	0	0	2	2	4	1	0	2	0	0	2	1	0	0	3	0	0	1	3
Bivalvia	*Dosinia* (Juvenile)	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	*Dosinia exoleta*	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
Bivalvia	*Hiatella arctica*	0	0	4	0	2	4	2	1	6	0	0	0	0	7	0	0	1	1	0	16	0	16

Appendix 1 continued

Higher taxanomic group	Taxon	Inside proposed dredging footprint												Outside proposed dredging footprint									
		1	2	3	4	5	6	7	8	9	10	21	22	11	12	13	14	15	16	17	18	19	20
Bivalvia	*Kurtiella bidentata*	42	0	11	21	17	15	55	15	10	4	22	1	16	49	2	25	10	2	4	7	5	57
Bivalvia	*Macoma balthica*	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Bivalvia	*Modiolus modiolus*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Bivalvia	*Musculus discors*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bivalvia	*Musculus subpictus*	0	0	6	0	6	30	20	0	7	0	0	0	0	3	0	0	1	21	7	5	2	29
Bivalvia	*Mya* (Juvenile)	2	0	12	5	14	38	15	20	52	35	0	0	0	36	4	4	15	7	18	22	10	73
Bivalvia	*Mya truncata*	0	0	1	0	0	0	0	0	3	0	0	0	0	2	1	1	2	1	4	9	0	1
Bivalvia	*Mysia undata*	1	0	0	0	0	1	1	0	5	0	0	0	0	0	0	1	0	0	1	0	0	0
Bivalvia	Mytilidae (Juvenile)	0	2	20	2	8	12	6	3	9	2	0	0	1	7	4	2	26	0	7	47	1	14
Bivalvia	*Mytilus edulis*	0	0	2	0	0	0	0	0	3	0	0	0	0	1	0	0	6	0	0	76	0	0
Bivalvia	*Nucula nitidosa*	1	1	2	1	0	3	0	2	2	1	7	0	3	0	0	0	0	0	0	0	0	1
Bivalvia	Nuculidae (Juvenile)	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	*Parvicardium scabrum*	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0	0	2	0	0	8	0	0
Bivalvia	Pectinidae (Juvenile)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	*Phaxas pellucidus*	0	0	0	1	0	1	0	0	0	0	0	0	0	0	3	1	1	0	1	0	1	0
Bivalvia	*Pododesmus patelliformis*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	*Spisula elliptica*	0	0	0	0	0	0	0	0	0	0	118	1	0	0	0	0	0	0	0	0	0	0
Bivalvia	*Spisula subtruncata*	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Bivalvia	Tellininae (Juvenile)	0	0	0	0	0	1	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	*Thracia convexa*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia	*Thracia phaseolina*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Bivalvia	Thracioidea (Juvenile)	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Bivalvia	*Thyasira flexuosa*	6	0	0	4	0	1	0	1	0	0	2	0	2	1	1	2	0	2	0	0	0	0
Bivalvia	*Timoclea ovata*	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Bivalvia	*Varicorbula gibba*	0	0	4	0	1	0	0	4	1	2	1	0	0	0	0	0	1	0	0	0	0	2
Bivalvia	*Venerupis corrugata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	0
Caudofoveata	*Chaetoderma nitidulum*	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
Gastropoda	*Alvania punctura*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Gastropoda	*Armina loveni*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	*Buccinidae* (Juvenile)	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Gastropoda	*Buccinum undatum*	0	0	0	0	0	0	2	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0
Gastropoda	*Cuthona*	0	0	0	0	0	5	1	0	0	0	0	0	0	5	0	2	6	0	0	0	0	1
Gastropoda	*Diaphana minuta*	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	*Doto*	0	0	2	0	0	9	20	0	2	5	0	0	0	5	0	5	0	4	13	2	0	13
Gastropoda	*Eulimella acicula*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gastropoda	*Facelina*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	Gastropoda	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Gastropoda	*Goniodoris*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gastropoda	Heterobranchia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gastropoda	*Hyala vitrea*	0	0	38	16	19	8	19	5	18	1	0	0	1	15	1	0	2	0	1	1	0	5
Gastropoda	*Laona quadrata*	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gastropoda	*Odostomia acuta*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda	*Odostomia plicata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Gastropoda	*Odostomia turrita*	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Gastropoda	*Odostomia unidentata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Gastropoda	*Onchidorididae*	0	0	14	0	9	42	6	11	6	6	0	0	0	17	1	2	24	11	0	33	3	53
Gastropoda	*Onoba semicostata*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Gastropoda	*Parthenina decussata*	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0
Gastropoda	*Philine quadripartita*	2	0	1	0	0	0	0	1	2	0	1	0	0	1	1	0	2	1	0	0	1	0
Gastropoda	Philinoidea (Juvenile)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Gastropoda	*Rissoa parva*	0	0	0	0	1	0	1	1	0	0	0	2	0	0	1	0	0	0	0	0	1	6
Gastropoda	*Spiralina spiralis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Gastropoda	*Steromphala umbilicalis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Gastropoda	*Tragula fenestrata*	0	0	1	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gastropoda	*Tritoniidae*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Entoprocta	*Loxosomella*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Entoprocta	*Pedicellina*	0	0	1	0	1	1	1	1	0	0	0	0	1	0	0	1	0	1	1	1	1	1
Entoprocta	*Barentsia*	0	0	1	0	1	1	1	0	1	1	0	0	0	0	0	1	1	1	1	1	0	1
Gymnolaemata	*Alcyonidium diaphanum*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Gymnolaemata	*Alcyonidium parasiticum*	0	0	1	0	1	1	1	1	0	1	0	0	0	1	0	1	1	1	0	0	1	1
Gymnolaemata	*Amathia*	0	0	1	0	1	0	1	1	0	0	0	0	0	1	0	1	1	1	1	1	0	1
Gymnolaemata	*Arachnidium*	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Gymnolaemata	*Bicellariella ciliata*	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0
Gymnolaemata	*Callopora dumerilii*	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Gymnolaemata	*Conopeum reticulum*	1	0	1	0	0	1	1	1	1	1	1	0	1	1	1	1	1	0	1	0	1	1
Gymnolaemata	*Cradoscrupocellaria ellisi*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gymnolaemata	*Electra pilosa*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0
Gymnolaemata	*Escharella immersa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Gymnolaemata	*Eucratea loricata*	0	0	1	0	1	1	1	0	0	0	0	0	1	0	0	1	0	1	1	1	1	1
Gymnolaemata	*Fenestrulina malusii*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1

Appendix 1 continued

Higher taxanomic group	Taxon	Inside proposed dredging footprint												Outside proposed dredging footprint									
		1	2	3	4	5	6	7	8	9	10	21	22	11	12	13	14	15	16	17	18	19	20
Gymnolaemata	*Flustra foliacea*	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1
Gymnolaemata	*Nolella*	0	0	1	0	1	1	1	1	1	1	0	0	0	1	0	1	1	1	1	1	1	1
Gymnolaemata	*Scruparia*	0	0	0	0	1	1	0	1	0	0	0	0	0	1	0	1	0	1	0	0	0	1
Gymnolaemata	*Scrupocellaria scruposa*	1	0	0	0	0	1	1	1	1	1	0	0	0	1	0	1	1	1	0	1	1	1
Gymnolaemata	*Securiflustra securifrons*	0	0	0	0	0	1	1	0	1	0	0	0	0	1	0	1	1	1	1	0	1	1
Gymnolaemata	*Walkeria uva*	0	0	1	0	0	1	0	0	0	1	1	0	0	0	0	1	1	1	0	0	1	0
Stenolaemata	*Crisia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Asteroidea	*Asterias rubens*	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Asteroidea	Asteroidea (Juvenile)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Holothuroidea	Dendrochirotida (Juvenile)	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Holothuroidea	*Thyone fusus*	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holothuroidea	*Paraleptopentacta elongata*	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	1	0	0	0	0	0
Ophiuroidea	*Amphipholis squamata*	8	0	0	0	1	3	1	0	0	0	1	0	0	2	0	0	1	2	6	12	0	8
Ophiuroidea	*Amphiura filiformis*	6	0	1	0	2	1	0	3	0	1	0	0	2	1	0	3	5	2	0	0	1	3
Ophiuroidea	Amphiuridae (Juvenile)	0	0	8	15	24	13	17	19	12	4	26	0	2	4	4	7	23	5	1	2	17	16
Ophiuroidea	*Ophiothrix fragilis*	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	1
Ophiuroidea	*Ophiura albida*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ophiuroidea	Ophiuridae (Juvenile)	1	0	1	0	1	1	0	2	3	1	4	0	0	0	1	0	1	0	0	1	2	0
Enteropneusta	Enteropneusta	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Ascidiacea	Ascidiacea (Juvenile)	0	0	2	0	0	3	4	1	5	0	0	0	0	0	0	11	10	1	1	7	2	5
Ascidiacea	*Ascidiella aspersa*	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Ascidiacea	*Ascidiella scabra*	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Ascidiacea	*Dendrodoa grossularia*	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Ascidiacea	Didemnidae	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1