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Revision Record

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D1	N/A	2016-11-07	Issued for IDC
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1 Introduction

1.1 General

This Construction Environmental Management Plan (CEMP) has been prepared in relation to the following work phase (as described in the Overarching CEMP, document reference LF000005-PLN-190) in association with the Onshore Transmission Works (the Development) associated with the Beatrice Offshore Wind Farm.

- Phase 4 – Cable Landfall.

1.2 Purpose of Document

Planning Condition 3 of The Moray Council (TMC) Decision Notice (Ref. 15/00631/EIA, dated 03 November 2015) states:

"Prior to any development commencing on any agreed phase of development a detailed Construction Environmental Management Plan (CEMP) for that phase, based on the Outline Construction Environmental Management Plan included as Technical Annex 3b of the Environmental Statement, shall be submitted to and approved in writing by the Council as Planning Authority in consultation with SEPA and SNH. The CEMP must specifically contain the following details:

- a) A construction noise and vibration management plan including proposed measures for the mitigation of construction noise and vibration, where necessary;*
- b) A dust and air quality management Plan including proposed measures for the mitigation of dust arising from construction activities, where necessary;*
- c) Measures taken to protect groundwater dependant terrestrial ecosystems and ensure functionality of the wetland areas;*
- d) Schedule of Mitigation; and*
- e) Core path enhancement works as detailed in Chapter 14, Para 14.8 of the Environmental Statement. Stipulate that these works will be delivered prior to the substation becoming operational.*

The development shall be implemented in accordance with the approved CEMP."

Beatrice Offshore Windfarm Ltd (BOWL) has appointed Nexans as the Principal Contractor (PC) for the construction of all works in relation to Phase 4. The PC has appointed Murphy Group as its Main Subcontractor; Murphy Group will be responsible for the day to day implementation of this CEMP on behalf of the PC. The PC will retain overall and primary responsibility for the production, implementation and management of this CEMP.

As per Section 4.1 of the Overarching CEMP, the PC will ensure that all contractor employees, subcontractors, suppliers and other visitors to the site are made aware of the content of the Overarching CEMP and this Site-specific CEMP that is applicable to them.

This CEMP should be read in tandem with the Overarching CEMP document which has been produced as an umbrella document to inform TMC and all statutory consultees of the proposed management methodologies to be employed during construction of the Development. The Overarching CEMP also contains information relevant to Planning Condition 3 (d) and commitments made in the Environmental Statement (ES) (document reference LF000005-REP-390 to LF000005-REP-404).

This CEMP does not seek to repeat any information already provided in the Overarching CEMP. This CEMP provides more detailed information with regards the following Planning Conditions and references in the Overarching CEMP.

Table 1.1 Relevant Information from the Planning Conditions and the Overarching CEMP

Planning Condition/Overarching CEMP Reference	Topic	Further Information in this CEMP
Planning Condition 2 and Overarching CEMP Section 5.5	Compliance with stated noise threshold during construction	Section 14
Planning Condition 3 (a) and Overarching CEMP Section 5.5	Construction noise and vibration management	Section 14
Planning Condition 3 (b) and Overarching CEMP Section 2.3.7 and Section 5	Dust and air quality management	Section 15
Planning Condition 6 (b) and Overarching CEMP Section 12	Flood risk	Section 17
Planning Conditions 9 (b) and 18 and Overarching CEMP Section 10.2	Diversion of local footpaths and cycleways	Section 20
Planning Condition 17	Parking	Section 8
Planning Condition 19	Drainage onto the highway	Section 10 and 16
Planning Condition 23 and Overarching CEMP Section 9	Archaeological protection	Section 13
Planning Condition 24 (d)	Construction phase surface water management	Section 17
Overarching CEMP Section 3.1	Roles and responsibilities	Section 6
Overarching CEMP Sections 3.1.2 and 8	Ecological clerk of works	Section 10
Overarching CEMP Sections 5.1 – 5.4	Pollution prevention and monitoring	Section 16
Overarching CEMP Section 8.2	Biosecurity	Section 12
Overarching CEMP Section 15	Reinstatement	Section 19
Overarching CEMP Section 14	Utility surveys	Section 9
Overarching CEMP Section 16.2	Access	Section 7
Decision Notice Information Note	Water abstraction during construction	Section 18

Section 2.3 of the Overarching CEMP provides information about environmental sensitivity (see **Table 1.2** below). Any changes or further detail regarding the environmental sensitivities described can be found in the following locations.

Table 1.2 Environmental Sensitivities

Topic	Reference to Further Information
Ecology and ornithology	Section 11 of this CEMP document
Hydrology	Section 17 of this CEMP document
Archaeology and cultural Heritage	Section 13 of this CEMP document
Noise	Section 14 of this CEMP document
Access, Traffic and Transport	Onshore Cable – Land Installation Traffic Management Plan (TMP) (document reference LF000005-PLN-283)
Socio-economics, tourism and recreation	Onshore Cable – Land Installation TMP
Local air quality	Section 15 of this CEMP document
Health and safety considerations	Onshore Cable – Land Installation TMP

Planning Condition 3 (e) is not relevant to this CEMP as the approach to core path enhancement works (at KT13 and KT17) are described in the Phase 1 Substation CEMP (document reference LF000005-PLN-192).

The structure of this document is as follows:

- Section 2 – References.
- Section 3 – Terms and Definitions.
- Section 4 – Abbreviations and Acronyms.
- Section 5 – Overview of the Development.
- Section 6 – General Environmental Management.
- Section 7 – Access.
- Section 8 – Parking.
- Section 9 – Utilities.
- Section 10 - Environmental and Ecological Clerk of Works (EECoW).
- Section 11 – Pre-construction Ecology Surveys.
- Section 12 – Biosecurity.
- Section 13 – Archaeological Protection.
- Section 14 - Noise and Vibration Management Plan.
- Section 15 - Dust and Air Quality Management Plan.
- Section 16 – Pollution Prevention and Monitoring.
- Section 17 - Flood Risk and Surface Water Management.
- Section 18 – Water Abstraction and De-watering during Construction.
- Section 19 – Reinstatement.
- Section 20 - Rights of Way and Footpaths.
- Section 21 – List of Appendices.

The Murphy Group Standard Procedures (as detailed at **Table 2.2**, **Table 21.1** and **Appendices 4A – 4T** of this document) provide an overview of the principles and approach to be adopted by Murphy Group throughout construction works in the UK. Some of the Group Procedures contain information that is not specific to undertaking works either in Moray (with reference to local policy) or in Scotland

(with reference to legislation, guidance documents and authorities applicable to Scotland). Where this is the case, that information is superseded by information contained in documents produced prior to and during the construction period (such as this CEMP document and the Overarching Site Waste Management Plan (SWMP) (document reference LF000005-PLN-191).

It is intended that this CEMP will be maintained and updated throughout the construction process as a 'live' document that is regularly reviewed and updated to reflect conditions experienced on site. It will provide comprehensive information on environmental management appropriate to the stage of development.

2 References

2.1 Internal References

Table 2.1 Internal References

Reference	Issued by	Title
855_1110_6018_00	Nexans	Spey Way - Right of Way Diversion Layout and Location Drawing
855_1110_6023_00	Nexans	Direct Pipe Construction Site Layout Drawing

2.2 External References

Table 2.2 External References

Reference	Issued by	Title
LF000005-REP-390 to LF000005-REP-404	BOWL	Environmental Statement
LF000005-PLN-190	BOWL	Overarching Construction Environmental Management Plan
LF000005-PLN-192	BOWL	Phase 1 Substation CEMP
LF000005-PLN-285	BOWL	Phases 2 and 3 Cable Route CEMP
LF000005-PLN-191	BOWL	Overarching Site Waste Management Plan
LF000005-PLN-271	BOWL	Site-specific Site Waste Management Plan
LF000005-REP-820	BOWL	Written Scheme of Investigation
LF000005-REP-1268	BOWL	Archaeological Evaluation along the Route of the Proposed Onshore Transmission Works between Keith and Portgordon, Moray
LF000005-PR-217	BOWL	Construction Phase Surface Water Management Plan
LF000005-PR-218	BOWL	Onshore Cable - Landfall Site Flood Risk Prevention
LF000005-PLN-283	BOWL	Onshore Cable - Land Installation Traffic Management Plan
LF000005-REP-1516	BOWL	Soil Analysis Report
LF000005-MS-203	BOWL	Recreation Routes Management Risk Assessment and Method Statement

Reference	Issued by	Title
LF000005-MS-206	BOWL	Archaeological Watching Brief and Controlled Strip
LF000005-PLN-282	BOWL	Emergency Response Plan
MOH0001-PRO-00001	Murphy Group	Training and Development
MOH0001-PRO-00002	Murphy Group	Internal Audits
MOH0001-PRO-00003	Murphy Group	Management Review
MOH0001-PRO-00005	Murphy Group	Document and Data Control
MOH0001-PRO-00007	Murphy Group	Method Statements and Safety Risk Assessments
MOH0001-PRO-00008	Murphy Group	Quality Observations
MOH0004-PRO-00003	Murphy Group	Environmental Aspects and Impacts
MOH0004-PRO-00017	Murphy Group	Environmental Responsibilities
MOH0004-PRO-00019	Murphy Group	Contract Environmental Management
MOH0004-INS-00001	Murphy Group	Invasive Plants
MOH0004-INS-00004	Murphy Group	Contaminated Land
MOH0004-INS-00005	Murphy Group	Noise and Vibration
MOH0004-INS-00007	Murphy Group	Air Pollution Prevention
MOH0004-INS-00008	Murphy Group	Archaeology and Heritage
MOH0004-INS-00012	Murphy Group	Wildlife
MOH0004-INS-00014	Murphy Group	Working near Watercourses
MOH0004-INS-00020	Murphy Group	Site Compounds and Permanent Yards
MOH0004-INS-00021	Murphy Group	Water Supply and Abstraction
MOH0004-INS-00029	Murphy Group	Water Discharge
MOH0004-INS-00030	Murphy Group	Oil Storage and Control
MOH0004-INS-00031	Murphy Group	Material Storage and Management

3 Terms and Definitions

Table 3.1 Terms and Definitions

Term	Definition
Developer	BOWL
The Development/Development Area	Describes the red line boundary used for the detailed planning application which encompasses all areas of the planning permission (relevant to Phase 4 – cable landfall).

Term	Definition
Environmental and Ecological Clerk of Works	A qualified ecologist or environmental practitioner employed to oversee construction works and ensure the required environmental and ecological mitigation is being applied in line with the planning conditions.
Main Subcontractor	Murphy Group – the main subcontractor appointed by the PC.
Principal Contractor	Nexans - the main appointed contractor carrying out construction of the Development.

4 Abbreviations and Acronyms

Table 4.1 Abbreviations and Acronyms

Abbreviation/Acronym	Definition
ACAS	Aberdeenshire Council Archaeology Service
BPM	Best Practicable Means
BOWL	Beatrice Offshore Windfarm Ltd
BS	British Standard
CAR	Controlled Activities Regulations
CEMP	Construction Environmental Management Plan
DAQMP	Dust and Air Quality Management Plan
EECoW	Environmental and Ecological Clerk of Works
ES	Environmental Statement
HDD	Horizontal Directional Drilling
HSG	Health and Safety Guidance
KM	Kilometre
M	Metre
MHWS	Mean High Water Springs
MPH	Miles Per Hour
NVMP	Noise and Vibration Management Plan
PC	Principal Contractor
PCN	Potato Cyst Nematode
RAMS	Risk Assessment and Method Statement
SEARS	Scotland's Environmental and Rural Services
SEPA	Scottish Environment Protection Agency

Abbreviation/Acronym	Definition
SWMP	Site Waste Management Plan
TMC	The Moray Council
TMP	Traffic Management Plan
WBDM	Water Based Drilling Muds
WSI	Written Scheme of Investigation

5 Overview of the Development

5.1 Phase 4

Phase 4 will consist of the following works:

- Installation of cables beneath the intertidal zone.

Appendix 1 of this document provides an overview of the consented Development area at the landfall and the surrounding area.

The preferred option for bringing the cable onshore is via horizontal directional drilling (HDD) and every effort will be made to ensure that this is employed on the site. However, in the unlikely event that HDD is not feasible then the alternative method of trenching will be employed.

This alternative method will only be implemented where BOWL's assessment is that it is not reasonably practicable to install the preinstalled pipe on the required profile to facilitate the export cable's safe pull-in from a final exit point offshore, beneath the shingle area, to the designated onshore entry point. The required drill profile has to satisfy the 25 year design life requirements of the current assessed coastal processes with an agreed safety margin.

5.1.1 Preferred Option – HDD

Appendix 2A shows the layout and arrangement of the (preferred option) works to be undertaken in the landfall area. This includes the layout and arrangement of the access roads, HDD launch sites, office and welfare areas, parking, drilling mud area, material laydown area, and topsoil storage area.

5.1.2 Alternative Method – Trenching

The alternative method would consist of the installation of the cables in the landfall area by open trenching. The layout of the landfall for the alternative method would be similar to the preferred option. An indicative site layout for the alternative method is shown in **Appendix 2B**. This includes indicative positions for the access roads, soil storage areas and the position and dimensions of the two cable working corridors. In the event the alternative method is implemented, a more detailed layout will be provided.

In order to clarify any changes to the baseline which could occur as a result of installation of the cables via the alternative method, a summary has been provided in **Appendix 3**. Where additional and/or different measures are required to facilitate the use of this alternative method, these are highlighted within the relevant sections of this CEMP.

6 General Environmental Management

6.1 Structure and Responsibility

The roles of Site Manager and Environmental Advisor for Phase 4 of the works will be fulfilled by the same individuals as those fulfilling the roles during Phases 2 and 3 (the cable route) of the works. Therefore in the interests of avoiding unnecessary repetition between documents Section 6 of the Phases 2 and 3 Cable Route CEMP (document reference LF000005-PLN-285) should be referred to for full details of their responsibilities and the approach to general environmental management. Section 6 of the Cable Route CEMP provides details of the following aspects of general environmental management:

- Site Manager responsibilities.
- Environmental Advisor responsibilities.
- Approach to:
 - Risk Assessments and Method Statements (RAMS).
 - Training.
 - Communication.
 - Document control
 - Contract checks and inspections
 - Environmental aspects and impacts.
 - Audits.
 - Environmental responsibilities.

The provisions set out in Section 6 of the Phases 2 and 3 Cable Route CEMP will be adopted during the Phase 4 cable landfall works subject to this CEMP document and adhered to at all times.

7 Access

Section 16.2 of the Overarching CEMP states:

"Contractors for all individual project phases will identify construction methodologies for access tracks in the specific CEMP for each phase (that will be appended to this overarching CEMP document)."

7.1 Access Points - Overview

Access to the landfall area will be taken from the following access points:

- Access Point 1 – B9014 northeast of main construction compound.
- Access Point 2 – B9014 west of main construction compound.

These access points will be reinstated to their previous condition upon completion of the works, unless the Road Authority requests that they remain in place. See Section 19 of this document for further details regarding reinstatement.

The location of the access points are provided at **Appendix 1**.

7.2 Access Construction Methodology

7.2.1 Access Points and Amendments to the Public Highway

The Onshore Cable – Land Installation TMP (document reference LF000005-PLN-283) has been produced in accordance with Planning Conditions 11, 12 and 13. Information regarding access from,

and amendments to the public highway can be obtained from the Onshore Cable – Land Installation TMP.

7.2.2 Access Tracks within Landfall Area

Temporary access tracks, up to 6 metres (m) in width, will be constructed within the landfall area (see 'Direct Pipe Construction Site Layout Drawing' (document reference 855_1110_6023_00)) by stripping the topsoil, which will then be stored adjacent for later reinstatement. A terram geotextile membrane will be installed to ensure that the access track is installed separately to the sub-base; this will then be overlain with type 1 stone material.

Detailed method statements for the construction of access tracks will be produced by the Main Subcontractor and approved by the Site Manager prior to their installation.

Access roads along the working corridor will be maintained in a suitable condition throughout the construction period and monitored regularly by the PC.

8 Parking

Planning Condition 17 of TMC Decision Notice states:

"Dedicated parking areas shall be provided during construction to prevent vehicles parking on the public road verge, the locations of which shall be agreed with Moray Council Transportation."

No parking will be permitted on any public highway, verge or embankment during the construction of the Development.

Dedicated vehicle parking areas (25 spaces) will be provided at the landfall construction compound.

All vehicles will be required to reverse park into the designated spaces.

Parking facilities will not be provided in any other locations.

'Direct Pipe Construction Site Layout Drawing' (document reference 855_1110_6023_00) shows the proposed layout for the landfall area including all parking areas.

9 Utilities

Section 14 of the Overarching CEMP states:

"In the specific CEMP for each phase of the project, the contractor will detail how they intend to carry out a pre-construction utilities survey and will update the CEMP to reflect its findings and to detail any mitigation required."

All services will be identified prior to any excavation works being undertaken. Services will be identified by contact with service owners, cable avoidance tools, and information provided by the PC to subcontractors. This will be undertaken by the Main Subcontractor (by a suitably qualified person) in accordance with Health and Safety Guidance 47 (HSG47) (Avoiding Danger from Underground Services).

Utility owners will be advised of the work locations and start and end dates for works. This will be an ongoing process with the Main Subcontractor ensuring the utility companies are kept informed of work locations throughout the construction period as required.

Utility owners will be asked to mark out utilities either by spray painting or pegging. The PC will then hand dig as required, following HSG47 until the utility is found. The utility provider may require a watching brief for works, if required the Main Subcontractor will inform the PC of this requirement before works takes place. All utilities will be supported, as required by the utility provider or in accordance with HSG47.

No works will take place within any gas services wayleave. Where required, the utility provider will be contacted and mark out the boundary area which will subsequently not be encroached during the construction works.

All working parties, subcontractors and visitors will be made aware of the requirements above via site inductions.

10 Environmental and Ecological Clerk of Works

10.1 Introduction

The ES contains a commitment for an Ecological Clerk of Works to be employed during the construction phases of the Development. The role of the Ecological Clerk of Works is also described at Sections 3.1.2 and Section 8 of the Overarching CEMP.

This CEMP includes summary details of pre-construction ecology surveys undertaken and will be updated at a later date to include details of mitigation measures to be implemented to ensure significant adverse effects are avoided.

10.2 The Role

The role identified for the Development incorporates the separate responsibilities of the Environmental Clerk of Works and the Ecological Clerk of Works into a single role. This single role is referred to as the EECow.

The role of the EECow is to monitor and ensure best practice of the construction works with environmental and ecological planning conditions and requirements as set out in TMC Decision Notice, the associated ES and associated ES Technical Appendices.

All ecological commitments as set out in the Overarching CEMP will be coordinated by the EECow including pre-construction surveys, mitigation and management measures, and protected species licences.

10.3 Environmental and Ecological Duties

Following a review of the documentation set out above, the following are the key ecological duties of the EECow:

- Pre-construction extended Phase 1 Habitat Survey of the working areas.
- Pre-construction species surveys (badger, otter, water vole, non-native invasive plant species, and trees with bat potential).
- Should the presence of protected species be confirmed following pre-construction surveys, there may be a requirement for species-specific mitigation strategies to be produced. Where required, appropriate protected species licences will be obtained.
- Undertake a weekly site walk-over checking for any non-compliance with the general pollution prevention and drainage management measures listed in the CEMP documents. This will include aspects such as (but not limited to) managing run off during high rainfall events,

correct storage of oils and other chemicals, emergency response strategies in place in the event of a spillage, capping of any stored pipes and ramping of excavations required to protect mammal species. Monitoring will be undertaken in relation to the water quality and environmental protection measures set out in the CEMP documents.

- Visual monitoring of nearby watercourses, habitats and roadways for signs of run-off and pollution and advising when remedial action to drainage and pollution prevention measures is necessary (with the detail of the remediation being developed by the PC). This will ensure compliance with Planning Condition 19 and enable monitoring of the environmental (pollution) aspects of the drainage and flood risk plans produced in accordance with Planning Conditions 6, 24 (d) and 24 (e). Monitoring will be undertaken in relation to the water quality and environmental protection measures set out in the CEMP documents.
- Monitor the implementation of mitigation measures in relation to non-native invasive plant species and biosecurity.
- Work closely with the Site Manager, and the Nexans and Murphy Group Environmental Advisors with regards the identification of any corrective actions, improvements or further mitigation measures; their implementation will be the responsibility of the PC.
- Review the PC's drainage and water quality register to ensure appropriate checks are being undertaken as required by the CEMP documents.
- Toolbox talks on any of the above, wherever relevant, covering generic good environmental and ecological practice.
- Carry out a weekly look-ahead meeting with the PC to identify any environmental risks.
- Produce a weekly summary of tasks undertaken, any issues arising and actions undertaken and/or required.
- Produce a monthly report for issue to the PC and the Site Manager. A copy will be provided to TMC if requested.

Construction works will be undertaken in accordance with the Group Procedure - Wildlife – (MOH0004-INS-000012, see **Appendix 4N**).

10.4 Site Attendance and Review

The EECow will undertake site attendance as part of the overall EECow role for the cable route (see Section 10.5 of Phases 2 and 3 Cable Route CEMP). It is expected that the EECow will attend site two to three days per week with an additional half day per week required for reporting. As part of this, it is likely that the EECow will attend the landfall site twice a week for the duration of the Phase 4 works.

The weekly requirement for the EECow will be reviewed after six months depending on progress of the construction programme and the ongoing sensitivity of environmental and ecological receptors within the study area.

11 Pre-construction Ecology Surveys

11.1 Overview

Detailed ecological surveys were carried out between 2011 and 2014 prior to the submission of the detailed planning application to TMC. In accordance with the Overarching CEMP and to ensure the availability of an up to date ecological baseline to inform appropriate mitigation measures, a range of pre-construction ecological surveys were carried out in June 2016 by ecologists from Etive Ecology Ltd and FDM Ecology Ltd. These included ground truthing of Phase 1 habitat types within the red line

boundary, searches for non-native invasive plant species, badger survey, otter survey, assessment of features with bat roost potential and general appraisals for other fauna species.

11.2 Summary of Findings

11.2.1 Habitat

Habitats at the landfall area is predominately arable land. The land close to mean high water springs (MHWS) at the norther extent of the landfall consists of shingle; shingle is also present together with scattered scrub along the eastern boundary of the landfall area. The intertidal area between MHWS and mean low water springs consists of brackish standing water.

11.2.2 Non-native Invasive Plant Species

Himalayan balsam non-native invasive plant species were found in two locations (see **Appendix 1**) immediately adjacent the landfall area as follows:

- Where the southeast corner of the landfall site (red line boundary) meets the bank of the Burn of Tynet.
- In a small drain immediately adjacent the western extent of the landfall site.

11.2.3 Protected Species

No protected species (badger, otter, and bat) signs were found at or close to the landfall area.

11.3 Mitigation

Mitigation measures are provided below.

11.3.1 Non-native Invasive Plant Species

Himalayan Balsam Adjacent the Landfall Area

7m exclusion zones will be erected around the Himalayan balsam. The exclusion zones will be demarcated by fencing or tape and 'Invasive Species' warning signage to denote species and restrictions imposed. Construction works within these areas will be avoided throughout the construction phase. If avoidance is not possible, cut vegetation and associated soils within these areas (containing the Himalayan balsam) will be treated as hazardous waste and disposed of in accordance with Section 11 of the Overarching SWMP and Section 9 of the Site-specific SWMP (document reference LF000005-PLN-271). Method statements for these works will be produced by the EECOW and implemented on site. The EECOW will discuss the proposals with Scottish Environment Protection Agency (SEPA) with regards general guidance and any permit requirements.

Any 'special waste' arising from the treatment of such species will be disposed of in a landfill licenced to accept special waste (in accordance with Appendix 2E of the Site-specific SWMP). In addition, the arisings will be consigned and managed in accordance with the Special Waste Regulations 1996 (as amended).

Equipment used for vegetation cutting will be washed in a demarcated area close to the source to ensure there is no spread of Himalayan balsam.

General

The works will be undertaken in accordance with the Group Procedure – Invasive Plants (MOH0004-INS-00001, see **Appendix 4I**). The EECOW will undertake toolbox talks with construction staff to assist in the identification of non-native invasive plant species should they subsequently be found within

other areas of the landfall site during construction. Construction staff will be advised of the measures required to eliminate the accidental spread of non-native invasive plant species in accordance with the requirements of this Site-specific CEMP, the Overarching CEMP and the Overarching and Site-specific SWMP documents.

11.3.2 Other Ecological Features

Nesting Birds

- Where possible all vegetation clearance will take place outwith the nesting bird season (taken to be 01 April to 31 August). If clearance of the landfall area is not possible during this period, clearance outwith the nesting bird period will focus on high risk habitats which will be identified by the EECow if required.
- Any clearance of habitats during the breeding bird season will be preceded by a check for nesting birds carried out by the EECow no more than 72 hours in advance of clearance.
- Where an active nest is found, an appropriate buffer zone will be established around the nest, indicated by hazard tape and signage. No work will be allowed in this zone until the young have fledged. The EECow will continue to monitor the nest and advise the contractor of time-scales until fledging occurs.
- The EECow will continue to make daily observations of bird activity across the site during construction and if any Schedule 1 species are recorded, additional mitigation may be required if nesting is identified. This is likely to involve implementation of larger buffer zones to avoid nesting disturbance and in the event of Schedule 1 species being recorded, Scottish Natural Heritage will be consulted.

Other

The EECow will continue to consider the potential for badger, otter, bats, water vole, and reptiles when carrying out pre-construction checks. The EECow will also liaise with the EECow for the adjacent Scottish and Southern Electricity Network cable installation works to identify any new records. The EECow will provide sufficient information (for the PC to include in the induction) regarding the potential for encountering species and the procedure to be followed in the event of discovery.

12 Biosecurity

12.1 Introduction

Section 8.2 of the Overarching CEMP provides an overview of the approach to biosecurity; this is a key consideration given the movement of vehicles between different farms. There are obligations in Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community.

12.2 Survey and Results

Soil sampling in the landfall area and along the length of the cable route was undertaken in September 2016 to determine the presence of Clubroot or Potato Cyst Nematode (PCN). The full results of the soil sampling are provided in the Soil Analysis Report (document reference LF000005-REP-1516).

With reference to the landfall and the surrounding area (the movement of vehicles from Access Point 1 and Access Point 2 has the potential to cross contaminate), the results of soil sampling state that Clubroot was 'not detected' and PCN was 'not found'. The exception to this is where PCN empty cysts

were found at the landfall. Empty cysts are categorised as having no eggs present and are therefore dead; however biosecurity protocols will be followed during construction works as PCN remains present in the soil.

12.3 Biosecurity Mitigation Measures

The following biosecurity measures (strongly informed by Scotland's Environmental and Rural Services (SEARS) protocol on biosecurity (<http://www.sears.scotland.gov.uk/DocumentView.aspx?id=133>) will be implemented during construction.

12.3.1 Three Steps for Successful Sanitation

Cleaning and disinfection will be undertaken in the landfall area north of Speyside Way using the three steps described below.

Step 1 – Removal of Soil and Dirt

Compressed air, a wire brush or a scraper will be used to physically remove dirt and soil from machinery, equipment, vehicles and boots.

Step 2 – High Pressure Hose Wash

A pressure washer (which can combine water and an industrial detergent) will be used on areas such as the wheels where soil and dirt build ups, and becomes difficult to remove. Boots will be washed in a footbath with 10cm of water mixed with detergent.

Step 3 - Disinfection

A disinfectant (diluted bleach solution) will be used to disinfect wheels, tyres, tracks, buckets and digging parts, or any part of machines, vehicles or equipment which comes into contact with the ground. This will be applied by the use of a small sprayer, such as a knapsack. Boots will be disinfected by placing into a second footbath containing 10cm of a diluted bleach solution and rinsing. The second footbath will also be used to clean brushes, scrapers and any other soil removal equipment used during Step 1.

General

To minimise the risk of contamination of neighbouring fields, cleaning will take place within the contaminated field, away from access points to neighbouring fields. The cleaning site will be at least 10m from watercourses and drains, have a stable surface and be relatively flat to avoid runoff.

All contaminated soil will be left in that field; disposal will not be undertaken within 10m of a watercourse, on bare soil or on uneven or sloping ground.

A log will be kept of:

- Vehicle movements in and out of the worksite (source and destination, level of risk).
- Any specific farmer or landowner requirements.
- The extent of cleaning undertaken and condition of vehicle on entering the site.

Training for staff will specifically include awareness of biosecurity and how to minimise risks. In the event that any specific incidences are encountered, this will be reinforced by tool box talks to the teams working on the land concerned.

The selection of the materials used in the haul road construction will be carefully selected by the PC as this material is likely to become contaminated during the course of the works and will require to be disposed of appropriately.

The PC will monitor the SEARS website and Government bulletins for information on any declarations of notifiable diseases.

13 Archaeological Protection

13.1 Written Scheme of Investigation

Planning Condition 23 of TMC Decision Notice states:

"No works shall take place within any agreed phase until a written scheme of archaeological investigation for that phase has been submitted to and approved in writing by the Council as Planning Authority in consultation with Aberdeenshire Council Archaeology Service. Thereafter, the development within that phase shall be undertaken in accordance with the approved scheme unless otherwise agreed in writing by the Council as Planning Authority."

Section 9 of the Overarching CEMP states:

"Given the potential for unknown archaeological remains to survive within the Development site boundary, it is proposed that a phased programme of archaeological investigation is undertaken, as follows:

- Consultation with Aberdeenshire Council Archaeology Service on behalf of TMC in order to establish appropriate mitigation for known and potential on-site archaeology;*
- Trial trenching over the heritage features falling within the construction footprint;*
- Evaluation trenching of areas of high archaeological potential within the construction footprint;*
- Depending upon the results of the trial trenching, in conjunction with consultation, it is likely that a watching brief will be required over the specified areas of the construction footprint (where moderate to low potential is anticipated); and*
- Post-excavation and reporting, as appropriate to the results of the excavation.*

The WSI has been prepared by a professional archaeological consultant, and will make provision for appropriate protection of identified sites or monitoring (through watching brief) of construction works."

The Archaeological Written Scheme of Investigation (WSI) (document reference LF000005-REP-820) has been produced and approved by TMC (in consultation with Aberdeenshire Council Archaeology Service (ACAS)) in accordance with Planning Condition 23.

13.2 Archaeological Trial Trenching

A programme of archaeological trial trenching works was undertaken by the PC between 20 June and 08 July 2016. A report (document reference LF000005-REP-1268) describing the trenching works undertaken and the results of the excavation works has been produced and submitted to ACAS for their consideration and submitted to TMC for information.

13.2.1 Summary of Results – Archaeological Trial Trenching

In relation to the landfall area, Trench 1 was dropped prior to the trial trenching commencing to ensure the trenching avoided the dunes in the area.

In accordance with Section 3 of the WSI, the PC has produced a RAMS entitled 'Archaeological Watching Brief and Controlled Strip – RAMS' (document reference LF000005-MS-206) which provides details of archaeological watching brief and/or controlled strip targeted to those areas where archaeological features have the potential to be present. A watching brief is proposed for the landfall and has been agreed with ACAS on behalf of TMC in accordance with Section 3 of the WSI. The RAMS was submitted to TMC on 21 October 2016 in accordance with Section 3 of the WSI.

14 Noise and Vibration Management Plan

Section 5.5 of the Overarching CEMP provides an overview of the general approach to manage noise during construction.

This Noise and Vibration Management Plan (NVMP) fulfils the requirement as set out under Planning Condition 3 (a) of TMC Decision Notice and the requirement as set out under Planning Condition 2 of TMC Decision Notice.

Planning Condition 2 of TMC Decision Notice states:

"Unless otherwise agreed in writing by the Planning Authority during the night hours of 2300 to 0700 hours at any noise sensitive dwelling, construction noise associated with the development shall not exceed a sound pressure level, LAeq (1 hour) of 45dB, as determined 1m from the external façade of a bedroom."

14.1 Noise and Vibration Thresholds and General Control Measures

14.1.1 Introduction

The control of noise and vibration levels associated with construction activities will be undertaken through specific noise and vibration mitigation measures (from good construction practice). All measures shall be implemented by the PC and all subcontractors.

The ES identified the following potentially significant impacts as requiring site-specific mitigation:

- Night-time noise generated by HDD works at the cable landfall.

The purpose of this section of the NVMP is to describe how noise and vibration levels will be controlled at the landfall (where the ES identified a potentially significant impact). This NVMP will be undertaken in accordance with the Group Procedure – Noise and Vibration (MOH0004-INS-00005, see **Appendix 4K**).

14.1.2 Construction Noise Thresholds

The proposed noise emission limits for construction activities are presented in **Table 14.1** below.

Table 14.1 Construction Noise Thresholds

Period		Construction Noise Threshold (1m from receptor facade)
Day of Week	Time of Day (T)	dB L _{Aeq,T}
Monday - Friday	07.00 – 19.00 (Summer)	70
	07.30 – 17.30 (Winter)	70
	19.00 – 23.00 (Summer)	60
	17.30 – 23.00 (Winter)	60
	23.00 – 07.00	45*
Saturday	07.00 – 13.00	70
	13.00 – 23.00	60

Period		Construction Noise Threshold (1m from receptor facade)
Day of Week	Time of Day (T)	dB L _{Aeq,T}
	23.00 – 07.00	45*
Sunday and Bank Holiday	07.00 – 19.00	60
	19.00 – 23.00	55
	23.00 – 07.00	45*
*Compliance with Planning Condition 2.		

Notes: dB re: 20μPa

Measured at a noise sensitive receptor location (1m from receptor facade)

Where L_{Aeq} = the equivalent continuous A-weighted sound pressure level, being the single number that represents the total sound energy measured over that period

Noise levels may be permitted up to 75 decibels (dB) L_{Aeq,1hour} for specific works of short duration where "best practicable means" have been demonstrated to TMC and noise sensitive premises have been informed at least 48 hours in advance.

The PC and all subcontractors will be required to follow standard Best Practicable Means (BPM) as outlined in BS (British Standards) 5228-1:2009+A1:2014¹ and BS 5228-2:2009+A1:2014². This will include the following measures:

- Electrical items of plant will be used instead of diesel plant where possible, particularly in sensitive locations.
- Plant will be started up sequentially rather than all together.
- Internal haul roads will be well maintained and avoid steep gradients where possible.
- Loading/unloading activities will be located away from residential properties and shielded from those properties where practicable.
- Drop heights of materials will be minimised.
- Continuous noisy plant will be housed in acoustic enclosures, where practicable.
- Effective exhaust silencing and plant muffling equipment will be fitted and maintained in good working order.
- Static plant known to generate significant levels of vibration will be fitted with vibration dampening features.
- Each item of plant used will be carefully selected so as to comply with the noise limits quoted in the relevant European Commission Directive 2000/14/EC/United Kingdom Statutory Instrument 2001/17013.

¹ British Standards Institution. BS5228-2:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites - Noise, London, 2014.

² British Standards Institution. BS5228-2:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites - Vibration, London, 2014.

³ European Commission Directive 2000/14/EC and United Kingdom Statutory Instrument 2001/1701.

- Consideration will be given to the recommendations set out in Annex B (Noise sources, remedies and their effectiveness) of Part 1 of BS 5228.
- Equipment will be well-maintained and where possible will be used in the mode of operation that minimises noise.
- Plant and equipment will be shut down when not in use.
- Semi-static equipment will be sited and orientated as far as is reasonably practicable away from occupied buildings and, where feasible, will be fitted with suitable enclosures.
- Mobile construction plant will be located, as far as is reasonably practicable, away from adjacent occupied buildings or as close as possible to noise barriers or site hoardings to provide additional screening from sensitive noise receptors.
- Materials will be handled in a manner that minimises noise.
- Vehicles will not wait or queue on the public highway.
- Reversing alarms will incorporate one of the following features where practicable: directional sounders, broadband signals, self-adjusting sounders, flashing warning lights. Alternative comparable systems may be used to minimise noise and nuisance from reversing alarms.
- All appropriate contractor personnel will be instructed on BPM measures to reduce noise and vibration as part of their induction training, and followed up by tool box talks.
- Noisy activities will be staggered in time and space where feasible.
- Only designated haul routes (on site) will be used.

14.1.3 Reversing

The PC will manage the noise from reversing alarms by means of the following:

- The site layout will be designed to limit and where reasonably practicable, avoid the need for the reversing of vehicles. The exception to this is parking spaces at the main construction compound and satellite construction compound where a reverse parking policy will be implemented.
- A banksman will be utilised to avoid the use of reversing alarms.
- Reversing alarms incorporating one or more of the features listed below or any other comparable system will be used: highly directional sounders, broad band signals, self-adjusting output sounders, flashing warning lights.

14.1.4 Training

All site personnel will receive training appropriate to the nature of their roles and responsibility; the training will include specific information in relation to noise and vibration management. All staff will receive induction training that will incorporate environmental awareness training including training in relation to noise and vibration, if their work activities are assessed as being particularly noise/vibration emission prone. On-site toolbox talks will enable site workers to understand how their actions will interact with the environment and potentially impact upon sensitive receptors near to their work areas.

14.1.5 Construction Vibration Thresholds

The construction vibration action level provided in **Table 14.2** below relates to typical site construction activities, and is based upon guidance provided in BS 5228-2:2009+A1:2014.

Table 14.2 Vibration Action Level

Construction Activity	Vibration Level (mm/s PPV)	Effect
All Activities	1.0	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation is provided to residents.
	12.5	Onset of possible cosmetic damage to residential or light commercial buildings.

In the event that a complaint of excessive vibration levels is received, a vibration monitoring exercise will be undertaken at impacted sensitive receptors. If the levels of vibration recorded are determined to exceed those stated in the table above, the cause will be investigated and the responsible activity ceased until appropriate mitigation measures have been applied to prevent further exceedances.

14.2 Cable Landfall Noise Control Measures

14.2.1 Preferred Option - HDD

Cable landfall operations will be carried out between the hours of 07.00 – 19.00, seven days a week. 24 hour working may be required for HDD works. Whilst it is noted that these working hours represent a minor extension to those detailed within the ES, noise thresholds as detailed in **Table 14.1** will be adhered to all times, thereby ensuring compliance with the assessed noise limits.

The HDD drive site would be more than 330m from the nearest residential receptor, 'Ha' of Auchenreath', which is far greater than the recommended separation distances for day (41m) and evening (114m) HDD operations.

The recommended separation distance for night operations is 525m. The predicted noise level from landfall HDD operations of 50dB $L_{Aeq,T}$, which is 5dB above the night-time limit in **Table 14.1**. In accordance with standard best practice, physical barriers will be erected between the HDD operations and Ha' of Auchenreath during any night-time working; this will reduce the predicted noise level to 45dB $L_{Aeq,T}$ which would satisfy the threshold value stated in **Table 14.1**.

The application of best practicable means (refer to Section 14.1.2) should therefore ensure that the noise thresholds (**Table 14.1**) will be achieved.

14.2.2 Alternative Method - Trenching

Cable landfall operations will be carried out between the hours of 07.00 – 19.00, seven days a week. No night-time working will be required for the alternative method.

Worst case effects of the alternative method are predicted to be below the daytime 70 dB(A) threshold, with only land trenching works potentially exceeding the extended 60 dB(A) threshold applicable during evenings and weekends. Based on the worst case scenario, both excavation and backfilling of the land trenching will exceed the 60 dB(A) limit by 1 dB(A). However, given the short timescales over which this exceedance would be experienced and that in reality noise levels are expected to be lower, no additional mitigation is required. However, where practicable, the work programme will be phased to reduce effects arising from noisy operations.

The application of best practicable means (refer to Section 14.1.2) should therefore ensure that the noise thresholds (**Table 14.1**) will be achieved.

14.3 Noise Monitoring

14.3.1 Long-term Unattended Construction Noise Monitoring at the Cable Landfall

A permanent sound level logger will be installed at a location that is representative of the residential property 'Ha' of Auchenreath' for the duration of the landfall works. Measurements of noise levels will be carried out with sound level measuring equipment conforming to BS EN 61672-1 (IEC 61672-1), Type 1. The sound level meter will be capable of real-time analysis, providing averaging (L_{Aeq}), maximum (L_{Amax}), and statistical level measurements (L_{A90}) as a minimum. The meter will be set to record on a fast-time response, with random microphone correction. A class 1 field calibrator in accordance BS EN 60942: 2003 will be used to set the sensitivity of the entire sound measurement system at the start of measurements, and each medium-term monitoring period, and to check that no significant sensitivity drift had occurred upon completion.

Sound level measuring equipment will be calibrated, within the previous two years, by a certified laboratory whose measurements are traceable to national or international standards, by a United Kingdom Accreditation Service approved (or equivalent) test laboratory, and have test certificates available. In addition, meteorological monitoring equipment will be installed at the monitoring point to assist in investigation of noise complaints and shall include recording of wind speed and direction, rainfall, temperature and relative humidity data.

Due to the relatively short duration of noise monitoring required at this location, equipment will be powered by battery or solar. Routine battery changes and data downloads will occur weekly. Data downloads would be required sooner in the event of complaints received.

Weekly monitoring reports will be prepared detailing the measurement data and a comparison with the relevant threshold values.

14.3.2 Construction Noise Limit Exceedances

In the event of a construction noise limit exceedance, the noise monitoring equipment would be programmed to send an automatic notification (short message service or an email) to the Nexans Environmental Advisor and Site Manager. It would be the responsibility of the Nexans Environmental Advisor to notify other levels of project management within the project team.

Upon receipt of notification of an exceedance, the PC would implement the following measures:

- Immediately undertake an investigation of construction activities on site to ascertain if any work activities are being implemented not in accordance with specified noise control measures. If the exceedance is directly attributable to site activities, the site foreman would stop the specific work activity suspected of causing noise emissions as soon as it is safe to do so and determine why the appropriate measures of this plan were not being implemented. The remedial measures to ensure no repeat of the noise threshold level exceedance will be determined by the Nexans Environmental Advisor. Work activities that were identified to have caused the exceedance would not be allowed to continue/resume until the agreed remedial measures have been implemented to the satisfaction of the BOWL Environmental Advisor.
- Rectify any identified causes, record actions in the Site File and notify the BOWL Environmental Advisor of the actions implemented.
- If the cause of the noise limit being breached is not related to site operations, record the outcome of the investigation in the Site File and report the findings to the BOWL Environmental Advisor once the investigation is completed.

14.3.3 Complaint Investigations

In the event that complaints regarding noise and/or vibration are received (and following investigation of the source, and if recurrence is likely), measurements will be undertaken either at the complainant's

property or at a suitable known reference distance from the works so that any additional attenuation factors can be determined in accordance with the procedures in BS 5228 Part 1 and Part 2; measurements if required will also be undertaken in accordance with these and other appropriate standards.

14.4 Public Notification

The BOWL Community Liaison Manager will be responsible for managing the interface between the project and the community in which the works are being undertaken. In respect of the NVMP, the following procedures will be implemented:

- Local residents will be informed of the commencement and likely duration of the construction work activities through a letter drop. The letter will include a contact telephone number which will be manned at all times that work activities are being undertaken on site.
- If work activities have the potential to generate noise levels in excess of the construction noise threshold levels (**Table 14.1**), TMC and local residents will be informed of the works at least 48 hours prior to works commencing. This will include measures to minimise disruption to local residents.
- If extended working hours (to those described at Section 14.2.1 and Section 14.2.2) are required as an engineering necessity, TMC will be notified in advance, including all measures to minimise disruption to local residents, who will also be notified in advance.
- If extended working hours (to those described at Section 14.2.1 and Section 14.2.2) are required for health and safety reasons, i.e. cessation of work would leave an unsafe situation, TMC will be notified within 24 hours of the works being made safe or first thing on Monday morning (Bank Holiday being an exception) in the event of weekend working. In such case, the processes and techniques will be reviewed to reduce the potential for re-occurrence.

Where a complaint is received with respect to construction noise and/or vibration, the BOWL Community Liaison Manager will liaise with the other members of the project team to investigate the complaint. Appropriate and practicable action will be taken, such as cessation of certain activities at specific times, the creation of additional physical barriers (screening), or the use of quieter construction techniques or plant.

15 Dust and Air Quality Management Plan

Section 2.3.7 and Section 5 of the Overarching CEMP provide an overview of the general approach to manage air quality during construction.

This Dust and Air Quality Management Plan (DAQMP) fulfils the requirement as set out under Planning Condition 3 (b) of TMC Decision Notice.

The DAQMP prescribes the procedures and protocols that will be adhered to during site works, ensuring full compliance with environmental legislation, environmental contractual requirements and Planning Condition 3. This DAQMP will be undertaken in accordance with the Group Procedure – Air Pollution Prevention (MOH0004-INS-00007, see **Appendix 4L**).

15.1 Environmental Statement Conclusions

Due to relatively low potential for, and transient nature of, air quality (including dust) effects, the ES included a brief, qualitative assessment of potential air quality effects.

During construction, it was concluded that good practice measures in construction methodology would prevent potential effects at areas in close proximity to construction activity. Potential effects were considered not significant.

15.2 Air Quality Control Measures

15.2.1 Introduction

The control of emissions to air (including that of dust) associated with construction activities will be undertaken through the implementation of appropriate mitigation measures as defined in best practice guidance documents. All measures will be implemented by the PC so as to minimise the emissions generated from site activities.

The purpose of the DAQMP is to describe how emissions to air will be controlled throughout all stages of the site construction works.

15.2.2 Design Control Measures, Operational and Physical Constraints

In line with the best practice measures outlined in the Institute of Air Quality Management guidance published in 2014⁴, the following control measures will be implemented throughout the full duration of the construction programme:

- Communications
 - Display the name and contact details of person(s) accountable (the Nexans Environmental Advisor) for air quality and dust issues on the site boundary.
 - Display the head or regional office contact information.
 - The above information will be displayed at Access Points 1 and 2, the main construction compound and where the Development crosses Speyside Way.
- Site Management
 - The Nexans Environmental Advisor will record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
 - The Nexans Environmental Advisor will make the complaints log available to TMC when requested.
 - The Nexans Environmental Advisor will record any exceptional incidents that cause dust and/or air emissions, either on or off-site, and the action taken to resolve the situation in the log book.
- Monitoring and Inspection
 - The Nexans Environmental Advisor will ensure daily on-site visual inspections are undertaken to monitor compliance with this DAQMP as required and will record all inspection results in a site log book which would be made available to TMC upon request. Daily inspections of haul routes and any subsequent actions would also be recorded in the site log book.
 - The frequency of on-site visual inspections will be increased when specific activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
 - The Nexans Environmental Advisor will ensure off-site inspections at representative receptors (Ha' of Auchenreath, The Steadings, and Dryburn) are undertaken within

⁴ Institute of Air Quality Management. Guidance on the Assessment of Dust from Demolition and Construction. 2014

200m of the red line boundary; these properties are more than 200m from the landfall area but have the potential to be affected by construction vehicle movements associated with the cable landfall works. To ensure a pragmatic and proportional approach is taken, off-site inspections will be undertaken on a weekly basis. In the event of any dust complaints or off-site issues as identified by the weekly checks, the frequency of off-site checks will be increased to daily until the complaint/issue can be validated and any mitigation employed as necessary to control dust releases from the site. These off-site inspections would incorporate additional dust soiling checks of surfaces such as cars and window sills at properties in proximity to the working site boundary. The location of representative receptors within 200m of the red line boundary is shown at **Appendix 1**.

- Preparation and Maintenance
 - Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
 - Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on-site.
 - Remove materials that have the potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site, where practicable cover, seed or fence stockpiles to prevent wind whipping.
- Operating Vehicles and Machinery
 - Ensure all vehicles switch off engines when stationary - no idling vehicles.
 - Impose and signpost a maximum speed limit of 15 miles per hour (mph) on surfaced and 10mph on unsurfaced haul roads and work areas.
- Operations
 - Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
 - Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
 - Use enclosed chutes and conveyors and covered skips.
 - Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
 - Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Trackout
 - Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any significant amounts of material tracked out of the site.
 - Avoid dry sweeping of large areas.
 - Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
 - Record all inspections of haul routes and any subsequent action in a site log book.
 - Implement a wheel washing system, with rumble grids to dislodge accumulated dust and mud prior to leaving the site. Further wheel washing details (including their

location) are provided in the Onshore Cable – Land Installation TMP in accordance with Planning Condition 8 (c).

- Environmental Awareness Training
 - All site personnel will receive training appropriate to the nature of their roles and responsibilities. The training will include specific information in relation to air quality and dust emissions management. All staff will receive induction training that will incorporate environmental awareness training and specific training in relation to air quality. On-site toolbox talks will enable site workers to understand how their actions will interact with the air quality environment and potentially effect sensitive receptors near to their work areas.

15.3 Public Notification, Complaints, Auditing and Updating the DAQMP

15.3.1 Public Notification

The BOWL Community Liaison Manager will be responsible for managing the interface between the Development and the community in which the works are being undertaken. In respect of the DAQMP the following procedures will be implemented:

- Local residents will be informed of the commencement and likely duration of the construction work activities through a letter drop. The letter will include a contact telephone number which will be manned at all times that work activities are being undertaken on site.

15.3.2 Complaints Procedure

To ensure complaints can be substantiated, the site telephone number shall be clearly displayed at the site entrance. Local residents will be able to contact the PC and/or local authority in the event of any dust soiling or other air quality related issues considered to emanate from the site activities.

In all instances, upon receipt of the dust complaint at the site, the details will be recorded in the site Incident Logbook. Each complaint will be assigned a discrete complaint number in the Incident Logbook.

Where a complaint is received with respect to emissions to air (including that of dust deposition), the PC will investigate the complaint. Suitable measurements will be undertaken either at the complainant's property or at an appropriate location along the site boundary so that the complaint can be validated.

Appropriate and practicable action will be taken, such as cessation of particularly dust generating activities during prolonged periods of dry weather, until emissions can be suitably controlled via additional suppression techniques, e.g. surface dampening. All on-site processes and activities will also be reviewed.

15.3.3 Reviewing and Updating of the DAQMP

This DAQMP will be reviewed periodically and also following any incidents on-site, changes in site operations, or if the elevated dust levels occur over a prolonged period, which require a change in any part of the DAQMP.

All updates will be agreed between the PC and TMC.

16 Pollution Prevention and Monitoring

16.1 Pollution Prevention

Sections 5.1 – 5.4 of the Overarching CEMP provide an overview of the general approach to pollution prevention and monitoring during construction.

The construction of Phase 4 will be undertaken in accordance with the pollution prevention and monitoring measures as set out in the Overarching CEMP Sections 5 (Pollution Prevention and Best Guidance), 6 (Waste Management), and 7 (Temporary Drainage Management) and the Group Procedures – Oil Storage and Control (MOH0004-INS-00030) (see **Appendix 4S**) and Material Storage and Management (MOH0004-INS-00031) (see **Appendix 4T**). The Nexans Environmental Advisor will carry out the inspections referred to above (Section 5.4 of the Overarching CEMP).

Construction works will be undertaken in accordance with the Group Procedure – Contaminated Land – (MOH0004-INS-000004, see **Appendix 4J**).

In the event of an incident on site (e.g. pollution incident), the Nexans Emergency Response Plan LF000005-PLN-282) will be implemented.

16.1.1 Drilling Mud Control Measures

Water based drilling muds (WBDM) will be used as part of the HDD operation. Bentonite will be a key component of the drilling mud; as bentonite is inert, it is not classified as a hazardous substance.

The following measures will be implemented to minimise bentonite waste and ensure protection of the environment (particularly water quality and associated ecological receptors):

- The drilling mud will exclude the use of all hazardous substances.
- The drilling mud will be mixed in enclosed or shielded areas.
- Silt settlement ponds will be required to recover the WBDM for re-use during the HDD process.
- The PC will consider the appropriate use and placement of silt fences, cut-off drains, silt traps and drainage matting to ensure bentonite is prevented from entering the water environment.
- Excess WBDM will be collected in skips for offsite disposal by a licensed waste contractor (see Section 8.4 of the Site-specific SWMP).
- The Murphy Group Environmental Advisor will prepare a working method statement for the HDD operation which will take into account the information submitted in the Construction Phase Surface Water Management Plan (document reference LF000005-PR-217) and the Overarching CEMP. The method statement will be reviewed by the Site Manager and the EECOW prior to any works taking place.
- The EECOW will be present for aspects of the HDD process where appropriate. This will be discussed and agreed between the EECOW and the Site Manager and will likely be required at more environmentally sensitive locations.
- Should any pollution incidences arise, works will cease immediately and the EECOW will be informed (if not already on site). Mitigation will be identified as soon as possible by the Site Manager and the EECOW and works will not re-start until all identified mitigation measures are in place.
- Important information will be communicated via topic specific toolbox talks given by the EECOW and the Nexans Environmental Advisor to all relevant construction personnel.

In the event of an incident on site (e.g. watercourse pollution incident involving drilling mud), the Nexans Emergency Response Plan will be implemented.

Planning Condition 19 of TMC Decision Notice states:

"No water shall be permitted to drain or loose material be carried onto the public footway/carriageway."

The construction of Phase 4 will be undertaken in accordance with Planning Condition 19. Compliance with Planning Condition 19 will be monitored principally by the PC (as part of the site-specific monitoring and response programme described above) but also by the EECow during the weekly site visits during construction.

17 Flood Risk and Surface Water Management

17.1 Flood Risk at the Landfall

Planning Condition 6 (b) of TMC Decision Notice states:

"In relation to flood risk prevention, the development must incorporate the following information which must be submitted to and approved by the Council as Planning Authority in consultation with SEPA prior to commencement of development on the relevant phase of development which includes the landfall works:

- b) Detailed proposals on plans showing the estimated volume and extent of displaced flood water as a result of the mitigation measures at the landfall site, including any proposals for compensatory storage, which must accord with the flood risk sections of Scottish Planning Policy."*

The Onshore Cable Landfall Site Flood Risk Prevention document (document reference LF000005-PR-218) provides appropriate information with regard to Planning Condition 6 (b).

Consultation with SEPA has determined that the provision of compensatory storage is not necessary due to its proximity to the coast, the temporary nature of the works, and having limited impacts on the storage and conveyance capacity of the functional floodplain.

It will be the responsibility of the PC to develop the detailed design drainage plans based on the greenfield runoff rates and volumes from the hardstandings created during the construction works.

The Onshore Cable Landfall Site Flood Risk Prevention document provides details on the water management (flow and volume) requirements to be implemented during construction (to ensure works can continue during any anticipated flooding events). Examples of measures to be implemented include the monitoring of weather and tides, twice weekly inspections by the EECow of water features within the vicinity of the landfall site, HDD-specific measures (such as visual inspections of drill centre lines) associated with the preferred option, and trenching-specific measures (such as installation of pumps when excavating trenches at depth) associated with the alternative method.

The Onshore Cable Landfall Site Flood Risk Prevention document provides details of the pre-flood and post-flood approach to be adopted when responding to flood risk (flood warnings and action plan).

17.2 Construction Phase Surface Water Management Plan

Planning Condition 24 (d) of TMC Decision Notice states:

"Prior to the commencement of development on any agreed phase, the following details where applicable to that phase must be submitted to and approved by the Moray Council as Planning Authority in consultation with the Moray Flood Risk Management team:

- d) Construction phase surface water management plan."*

17.2.1 Surface Water Management

The Construction Phase Surface Water Management Plan provides appropriate information with regard to Planning Condition 24 (d). That document describes the proposed controls required for water protection measures during construction.

The primary sources of surface water on site are:

- Precipitation (rainfall and snowfall).
- Pumping out of excavations.
- Rising water table.
- Surface water run-off.
- Flooding (fluvial, pluvial and shallow groundwater located at surface).
- Artificial drainage channels (field ditches and existing roadside drainage).
- Natural water features.

Table 7.2 of the Construction Phase Surface Water Management Plan describes the sequence of proposed activities together with the proposed control measures associated with each activity. This includes measures such as but not limited to; maintaining a 50m buffer between chemical, oil and fuel storage areas and surface water features, and water quality monitoring.

Table 7.4 of the Construction Phase Surface Water Management Plan describes the water protection measures. This includes measures such as but not limited to: appropriate storage of turves and soils; reinstatement of exposed soil as soon as practicable to minimise erosion; installation of geo-membrane to be laid prior to first layer of stone placement for access tracks; and ensuring all excavations are shored or battered back to reduce potential sediment source.

The PC, the Main Subcontractor, and any other subcontractors will prepare a detailed set of working method statements which take into account the information submitted in the Construction Phase Surface Water Management Plan and the Overarching CEMP. Those method statements will be reviewed by the Site Manager and the EECow prior to any works taking place.

17.2.2 Monitoring

The EECow and the Nexans and Murphy Group Environmental Advisor will develop and implement a site-specific monitoring and response programme which considers the effectiveness of measures applied to control water movement, attenuation and treatment of runoff around the site.

17.2.3 Training

Site induction training will emphasise measures necessary to prevent pollution with particular attention to the storage and use of fuel and other hazardous substances on site. Induction training will also include emergency response arrangements in compliance with the emergency response plan, and spill kit and spill clean-up training. Further training shall be given as necessary to those most likely to be directly involved in the storage and handling of fuels and other hazardous substances on site.

This information will be communicated via topic specific toolbox talks given by the EECow to all relevant construction personnel. This will ensure that personnel are familiar with their obligations in adhering to relevant legislation and requirements to ensure that they work in a safe manner and give appropriate consideration to the protection of the water environment. Examples of the topics covered include, but not limited to:

- Oils and chemicals.
- Silt response.
- Spill prevention, control and response.
- Refuelling.
- Waste management.

- Cement.
- Drilling mud.

18 Water Abstraction and De-watering during Construction

TMC Decision Notice contains an Information Note from SEPA which states:

"We highlight that the HDD rigs will require a water supply which may be fairly substantial. As such, full details of water abstraction, including source e.g. ground water or surface water; location e.g. grid ref and description of site; volume e.g. quantity of water to be extracted; timing of abstraction e.g. will there be a continuous abstraction; nature of abstraction e.g. sump or impoundment; proposed operating regime e.g. details of abstraction limits and hands off flow; survey of existing water environment including any existing water features and impacts of the proposed abstraction upon the surrounding water environment, should be provided in the CEMP. In addition, we would highlight that this activity may require a licence under the Controlled Activities Regulations (CAR)."

A Construction Phase Surface Water Management Plan has been produced in accordance with Planning Condition 24 (d) which sets out the proposed controls required for water protection. See Section 17.2 of this document for further details. The PC will adhere to the Construction Phase Surface Water Management Plan at all times and will prepare a detailed set of working method statements which take into account the information submitted in the Construction Phase Surface Water Management Plan and the Overarching CEMP. Those method statements will be reviewed by the Site Manager and the EECow prior to any works taking place.

Water supply, abstraction and discharge will be undertaken in accordance with the Group Procedures – Water Supply and Abstraction (MOH0004-INS-00021) (see **Appendix 4Q**), and Water Discharge (MOH0004-INS-00029) (see **Appendix 4R**).

18.1 Water Abstraction

No water abstraction is expected to be undertaken during the construction (or operation) of the Development. The Main Subcontractor will provide their own water supply which will be stored in a water tank in the construction compound area. In the event that water abstraction is required, SEPA will be contacted with regards the potential requirement for the works to be undertaken in accordance with a CAR Licence under The CAR Regulations 2011.

18.2 De-watering

The de-watering of excavations will only occur once appropriate permits to pump are in place and approved by the Site Manager in consultation with the EECow. The RAMS will consider the sensitivity of the surrounding environment.

All excavations will be shored or battered back to reduce potential sediment source. Storage of excavated material will be as close as possible to the working area and will not be stored in environmentally sensitive areas; the Site Manager and the EECow will be consulted in the event that guidance is required regarding appropriate storage of excavated material. All material storage areas will be at a safe distance (50m) from watercourses with run-off protection adopted.

Any activity involving the pumping of water from excavations will require consideration of The CAR Regulations 2011. It will be necessary to consult with SEPA to establish if the works can be completed under General Binding Rule 15 (temporary abstraction of groundwater) or if it is necessary to apply for a licence.

19 Reinstatement

Sections 7 and 15 of the Overarching CEMP provide general information with regards the approach to the reinstatement of land required during the construction period.

19.1 Overview

All land temporarily required during the construction period will be reinstated to its former condition, or such condition as the landowner may approve, upon completion of the works. Reinstatement works will commence at the earliest available opportunity and will be fully communicated to the relevant landowner.

19.2 Conditions Surveys

To facilitate reinstatement, pre-condition surveys will be carried out of all land affected by the Development. This will include a photographic record, written description and topographical survey which will be used to ensure a complete and accurate reinstatement of land.

19.3 Reinstatement of Land

Reinstatement will include making good any damage or disturbance to any soil structure, native or ornamental planting, grass, fencing, hard landscaping or structures where in-site replacement is possible. No replanting of hedgerows or trees will take place directly above the route of the underground cable.

Excavated spoil will be used to backfill (subsoil and topsoil). The surface will be re-seeded to match its pre-construction condition. Alternative seed mixes and/or approaches to reinstatement will be discussed with the EECOW and agreed with individual landowners prior to implementation.

19.3.1 Alternative Method – Trenching

Reinstatement will be a key aspect for reducing effects on the Spey Bay Site of Special Scientific Interest and shingle berm. A watching brief will be maintained during the excavation process to ensure that layers are stripped and stored in separate designated areas which will be clearly marked. Following cable installation, the trenches will be backfilled in reverse order to ensure that layers are reinstated in the correct order. Outwith the shingle berm, soil will be compacted. Compaction will not be undertaken within the shingle berm; this will ensure that the high levels of porosity naturally created within the shingle berm are maintained.

20 Rights of Way and Footpaths

Planning Condition 9 (b) of TMC Decision Notice states:

"Prior to commencement of construction on any agreed phase of construction identified (Condition 8b) the following details for that phase must be submitted to and approved by the Planning Authority in consultation with the Transportation Section and thereafter the works must be completed in accordance with the approved details:

- c) Diversion routes for local footpaths and cycleways during the construction period shall be agreed with Moray Council Planning (Core Paths). All signage associated with the diversion routes shall be agreed with Moray Council."*

The above requirement is also replicated at Planning Condition 18.

Section 10.2 of the Overarching CEMP states:

"Wherever the cable route crosses a right of way or path, the contractor will put in place a temporary diversion to enable these routes to continue to be used for recreational purposes. Notices must be displayed in prominent locations with details of any areas of restricted access."

Section 2.3.6 of the Overarching CEMP states:

"Four recreational routes (National Cycle Route 1, Speyside Way, Isla Way, and Core Path KT12) will be affected by the Development during construction. These routes will not be permanently closed or diverted but there may be some temporary disruptions to users during construction. It is therefore proposed that at locations where the access tracks cross footpaths or cycle routes, the TMP presents a safe system of working to ensure the safety of rights of way users and the construction workforce. The measures have been designed to ensure safety whilst keeping rights of way open to users."

The landfall works will not directly affect the Speyside Way which is immediately south of the southern boundary of the landfall area. The proposed approach to managing recreational routes during the Phase 2 and 3 cable installation works is provided in the Onshore Cable – Land Installation TMP, the Recreation Routes Management RAMS (document reference LF000005-MS-203) and the Spey Way – Right of Way Diversion Layout and Location Drawing (document reference 855_1110_6018_00)). During construction, Speyside Way will be managed by members of the construction team to ensure that construction vehicles, plant and machinery can access the landfall area whilst ensuring continued and safe access for all users of Speyside Way.

20.1 Alternative Method - Trenching

It is noted that should the alternative method be employed at the landfall, direct effects will be experienced by users of the footpath which follows the line of the shingle berm and those who access the foreshore. For health and safety purposes, access along this footpath and the foreshore will be prohibited during the construction period. This will be achieved through the installation of fencing and signposting, which will tie in with any Marine Safety Zones in place for the offshore works to prevent accidental access. Should the alternative method be employed, users of the footpath and foreshore will be diverted to the Speyside Way, with safe access and egress points created to ensure that beach users can easily access the footpath diversion and will not be able to cross the working area at low tide. Such measures will be fully agreed with TMC Access Officer if required.

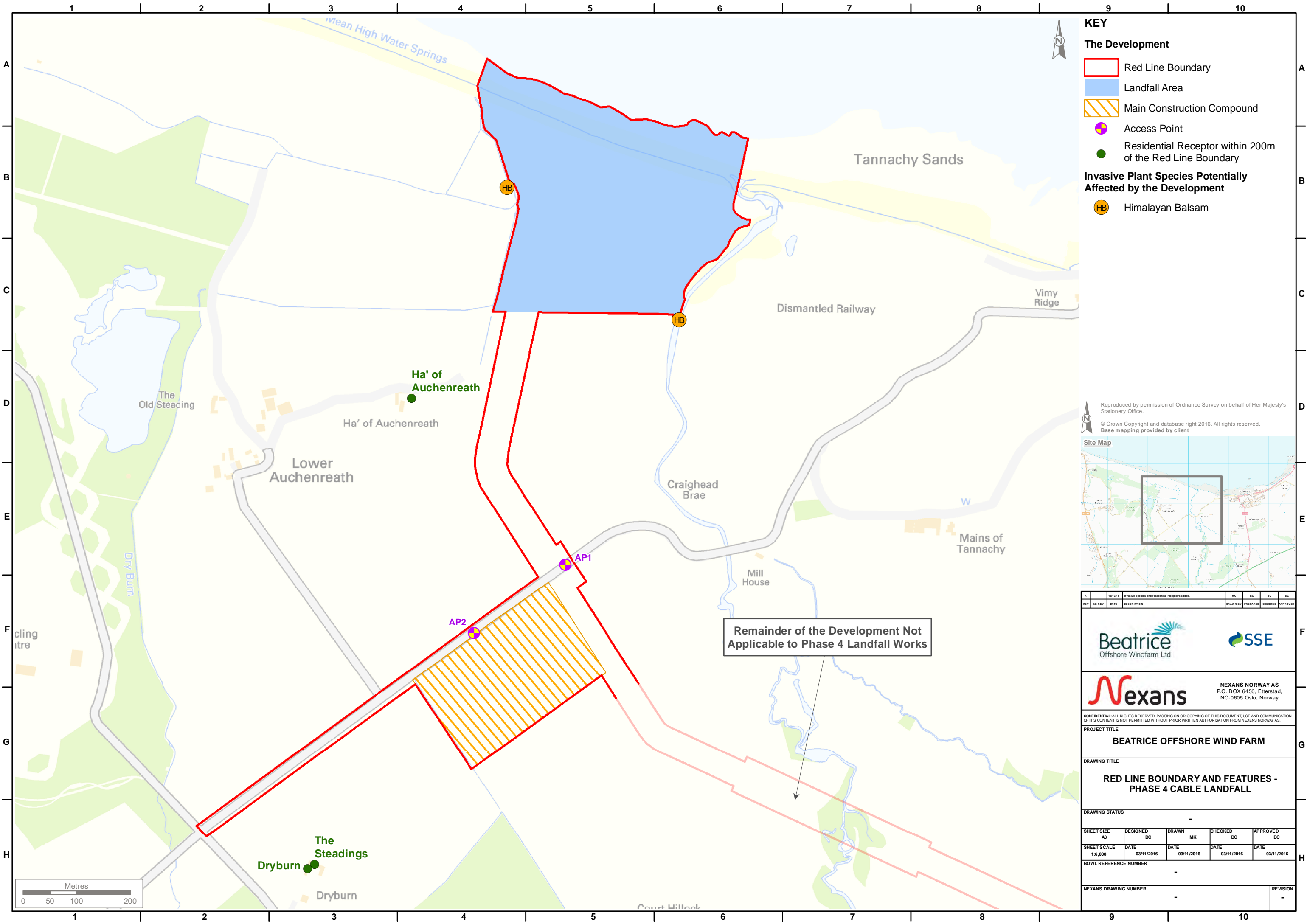
21 List of Appendices

Table 21.1 List of Appendices

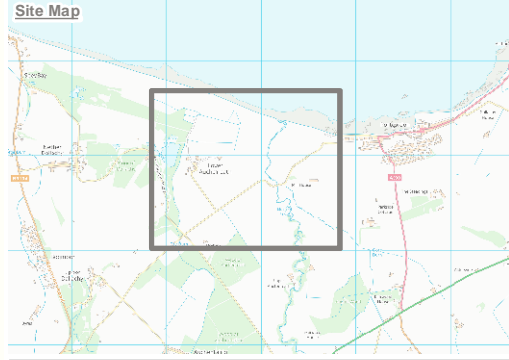
Appendix Number	Title	Total Number of Pages
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4R	MOH0004-INS-00029 Water Discharge	4
4S	MOH0004-INS-00030 Oil Storage and Control	8
4T	MOH0004-INS-00031 Material Storage and Management	5

Appendix 1:

Red Line Boundary and Features



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Base mapping provided by client



A	-	12/10/16	Invasive species and residential receptors added.	MK	BC	BC	BC	
REV	NR	REV	DATE	DESCRIPTION	DRAWN BY	PREPARED	CHECKED	APPROVED

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PROJECT TITLE
BEATRICE OFFSHORE WIND FARM

DRAWING TITLE
**RED LINE BOUNDARY AND FEATURES -
PHASE 4 CABLE LANDFALL**

DRAWING STATUS
-

SHEET SIZE A3	DESIGNED BC	DRAWN MK	CHECKED BC	APPROVED BC
SHEET SCALE 1:5,000	DATE 03/11/2016	DATE 03/11/2016	DATE 03/11/2016	DATE 03/11/2016

BOWL REFERENCE NUMBER
-

NEXANS DRAWING NUMBER -	REVISION -
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Appendix 2A:

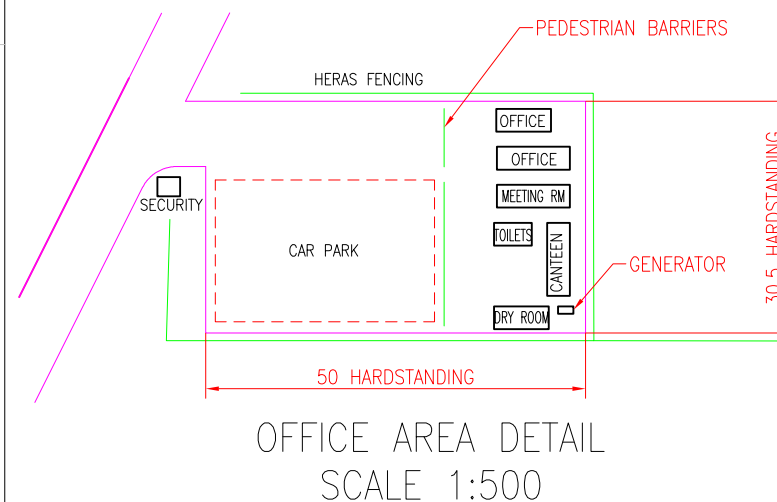
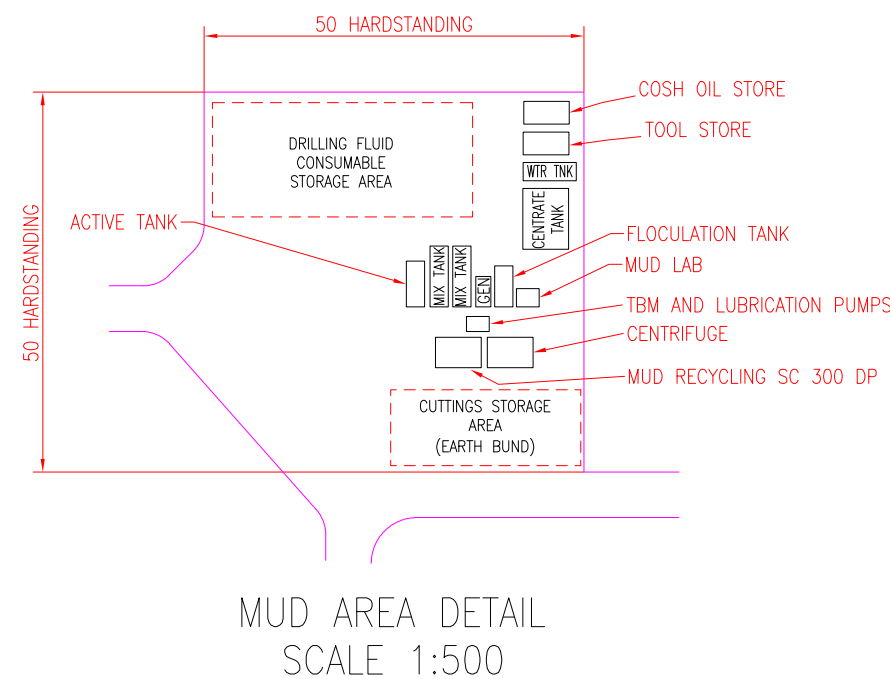
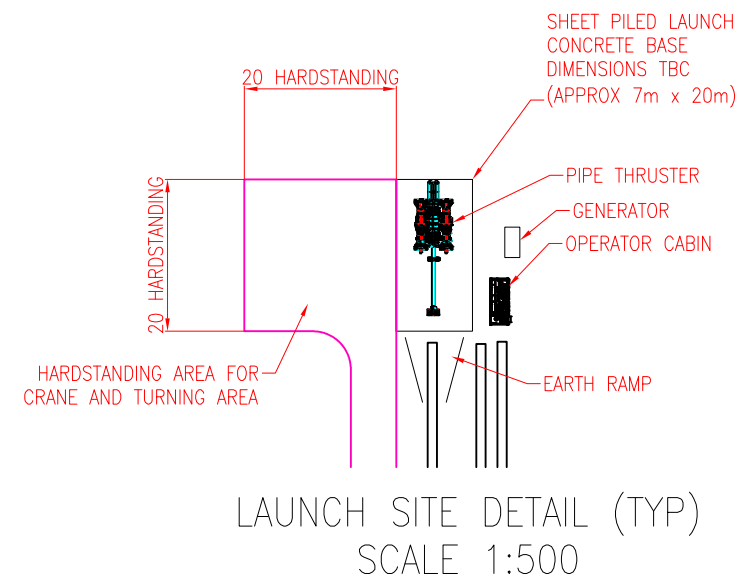
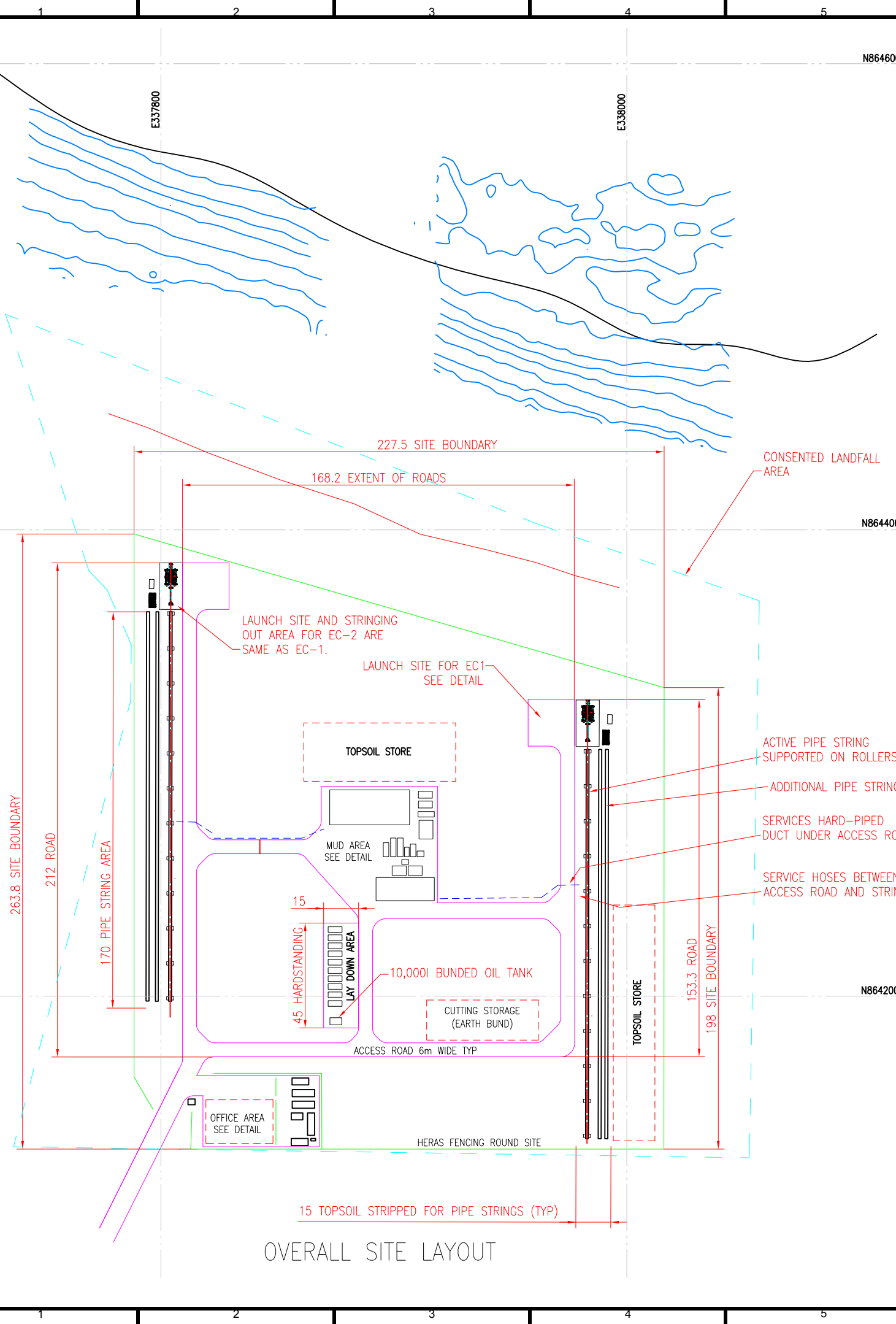
Preferred Option (HDD) - Site Layout

STOCKTON INTERNAL REVISIONS

REV	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED	RELEASED
P4	26/10/16	CONSISTENT AREA SHOWN, LAYOUT UPDATED.	YC	YC	ILH	-
P3	13/10/16	MINOR UPDATES	RHS	RHS	ILH	-
P2	13/10/16	HARDSTANDING IN LAYDOWN AREA	RHS	RHS	ILH	-
P1	12/10/2016	FIRST ISSUE (PRELIMINARY)	RHS	RHS	ILH	-

NOTES:

- 1 - ALL HARDSTANDING AREAS AND ACCESS ROADS TO BE STONED WITH MOT TYPE 1.
- 2 - STRIPPED TOPSOIL STACKED AND STORED ON-SITE DURING WORKS FOR LATER REINSTATEMENT.
- 3 - ALL WORKS SHOWN ARE TEMPORARY; ONLY INSTALLED BURIED PIPE IS PERMANENT.
- 4 - SIZE OF LAUNCH PIT TO BE CONFIRMED.
- 5 - ALL DIMENSIONS IN METRES.
- 6 - COORDINATES SHOWN ARE IN BRITISH NATIONAL GRID (OSGB36).



REV	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED	RELEASED
R2	26/10/2016	ISSUED FOR REVIEW	STOCKTON	STOCKTON	JOH	LTV
D1	13/10/2016	DC	STOCKTON	STOCKTON	JOH	-



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PROJECT TITLE
BEATRICE OFFSHORE WIND FARM

DRAWING TITLE
DIRECT PIPE CONSTRUCTION SITE LAYOUT DRAWING

DRAWING STATUS
DRAFT

SHEET SIZE	PREPARED	CHECKED	APPROVED	RELEASED
A1	STOCKTON	JOH	LTV	LTV
SHEET SCALE	DATE	DATE	DATE	DATE
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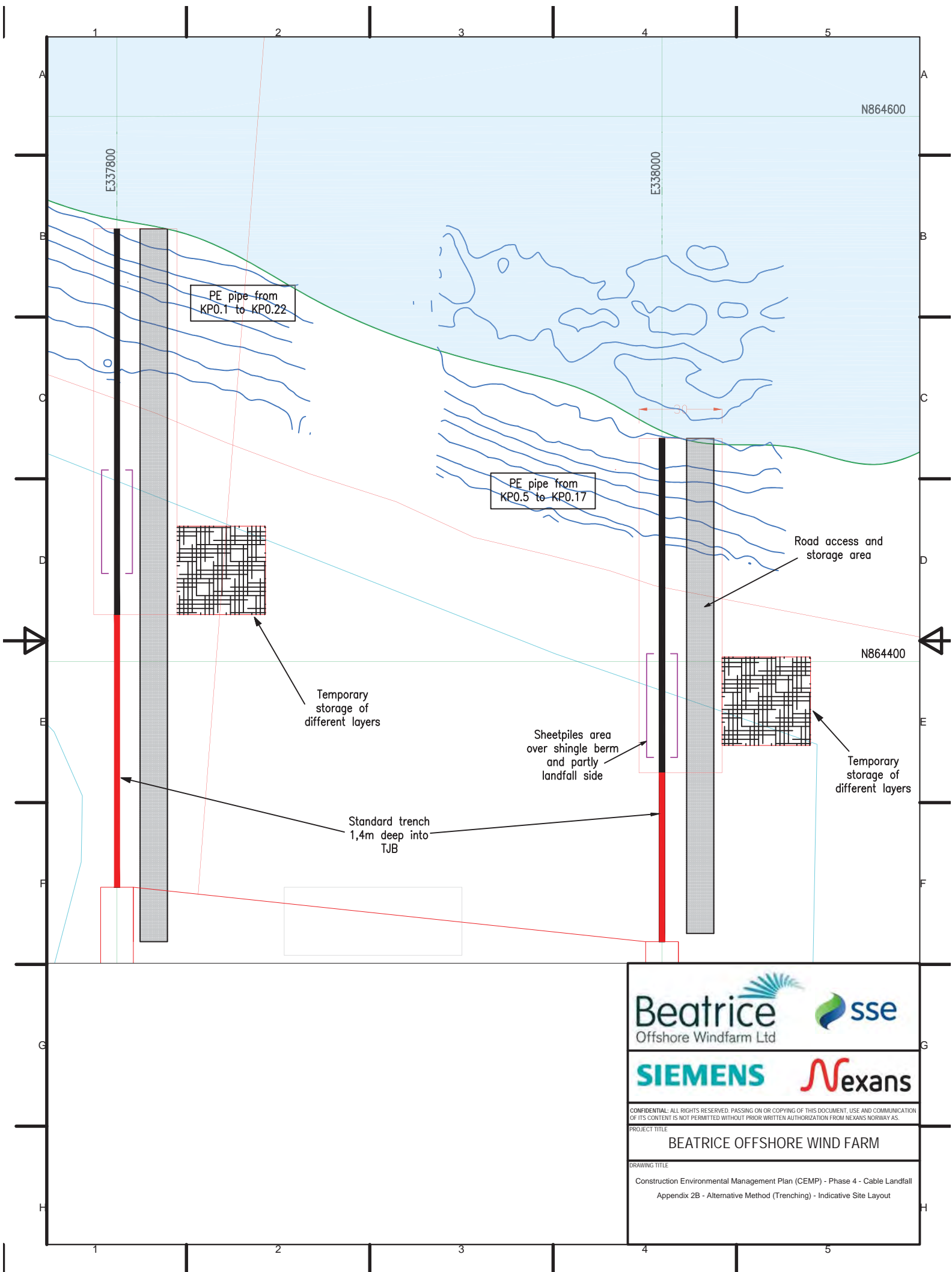
BOWL REFERENCE NUMBER
855_1110_6023_00

DRAWING NUMBER
60693-EIMT-XL-210379

REVISION
R2

Appendix 2B:

Alternative Method (Trenching) – Indicative Site Layout



Appendix 3:

Alternative Landfall Approach



**BEATRICE OFFSHORE WINDFARM ONSHORE TRANSMISSION
WORKS – CABLE LANDFALL
CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN**

APPENDIX 3 – ALTERNATIVE LANDFALL APPROACH

BEATRICE OFFSHORE WINDFARM LIMITED

DECEMBER 2016



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Revision	Description	Date of Issue
1	First issue for client review	15/11/2016
2	Second issue for client review	22/11/2016
3	Final issue	13/12/2016

QA	Name	Date	Signature
Author	Various	11/11/16	
Review	Kirsty McGuigan, Environmental Consultant	15/11/16	
Approval	Fiona MacGregor, Associate Director	11/11/16	

ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AC	Alternating Current
CEMP	Construction Environmental Management Plan
BOWL	Beatrice Offshore Windfarm Limited
EC1	Export Cable 1
EC2	Export Cable 2
EECoW	Environmental and Ecological Clerk of Works
ES	Environmental Statement
HDD	Horizontal Directional Drilling
HV	High Voltage
km	Kilometre
kV	Kilovolt
LBAP	Local Biodiversity Action Plan
m	Metre
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MS	Method Statement
SBL	Scottish Biodiversity List
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TMC	The Moray Council
UKBAP	UK Biodiversity Action Plan

1 INTRODUCTION

Beatrice Offshore Windfarm Ltd (BOWL) obtained consent for the onshore transmission works (the Development) relating to the Beatrice Offshore Wind Farm in November 2015. The consent included the process by which the cable is to be brought onshore and it was detailed that the preferred methodology was for Horizontal Directional Drilling (HDD), however it was noted that the methodology was yet to be confirmed. The preferred form of HDD installation is via Direction Direct Pipe and whilst it remains BOWL's intention to utilise this **method for bringing the cable onshore, the project's financial** investors have requested that an alternative method of cable installation at the landfall is considered as a contingency should HDD not be possible.

The purpose of this appendix of the Landfall Construction Environmental Management Plan (CEMP) is to provide an overview of the methods and mitigation measures required to minimise and avoid any changes to the environmental baseline during construction of the cable landfall by means of trenching at Spey Bay.

This appendix encompasses all onshore environmental elements associated with the cable landfall, from the Mean Low Water Springs (MLWS) mark landwards. The offshore environmental elements likely to be affected by the cable landfall construction, including intertidal and benthic ecology aspects, are considered in the documentation being submitted in support of the Marine Licence Application. This appendix does not seek to repeat information present elsewhere, rather it seeks to demonstrate the differences between the proposed construction methodologies.

1.1 Project Background

Consent for the Development was granted on the 3rd November 2015. This consent covered the substation at Blackhillock, the 18.5 kilometre (km) onshore cable route, the cable landfall at Portgordon and access to the development areas. As part of the application, whilst the methodology for the landfall was expected to be via HDD, contingency was included for consideration of alternative methodologies for bringing the cable onshore, in the event that HDD could not be completed for technical reasons.

The alternative methodology under consideration is trenching; the same methodology which is employed over the majority of the cable route. BOWL has provided the following definition of when the alternative methodology will be employed:

"BOWL may seek to adopt the alternative methodology in the event that BOWL's assessment is that it is not reasonably practicable to install the preinstalled pipe on the required profile to facilitate the export cable's safe pull-in from a final exit point offshore, underneath the designated SSSI [Site of Special Scientific Interest] area, to the designated onshore entry point. The required drill profile has to satisfy the 25 year design life requirements of the current assessed coastal processes with an agreed safety margin."

Part of the reasoning behind the employment of HDD across the cable landfall was to avoid any direct effects on the Spey Bay SSSI.

1.1.1 Spey Bay SSSI

The Spey Bay SSSI is designated for its geological and biological importance. Situated on the south side of the Moray Firth, the **Spey Bay SSSI** *"comprises a delta at the mouth of the River Spey, narrow shingle beach to the east and west of the river mouth and a very large strand plain of shingle deposits to the west, the largest in Scotland"*¹.

¹ Spey Bay Site of Special Scientific Interest Citation: available from http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=1461. [Accessed 07/11/2016]

The geological interest of the SSSI is considered to be of the highest importance for its geomorphology. The scale and interactions of its shingle ridges, coastal strand plain and the complex and shifting area of the river delta combine to make Spey Bay one of the most important physiographic sites in Britain. The geological interests of the SSSI are further detailed in Section 4.2.

The biological interests of the SSSI include riparian and coastal habitats: saltmarsh, mobile shingle, riverbank scrub and woodland. The wide range of habitats comprising the SSSI supports a rich flora. This flora includes numerous vascular plants, many of which are nationally or regionally rare, or declining. This composition of habitats also supports diverse invertebrate communities, including two species of butterfly. The biological interests of the SSSI are further detailed in Section 4.1.3.1.

1.2 Consultation

Consultation has been undertaken with the Moray Council (TMC), Scottish Natural Heritage (SNH) and Marine Scotland (MS) to discuss the alternative landfall methodology. These bodies are largely satisfied with the approach being undertaken.

1.3 Documents

The following documents have been reviewed during the production of this appendix:

- Alternative Landfall Cable Installation Method Marine Licence Application – Environmental Report²;
- 2015 Onshore Transmission Works Environmental Statement (ES)³;
- Offshore – Direct Landing Contingency below SSSI⁴;
- Geomorphological Assessment of Alternative Landfall Option⁵; and
- Cable Route Pre-construction Ecological Appraisal⁶.

2 OVERVIEW OF ALTERNATIVE CABLE LANDFALL INSTALLATION

The alternative approach to the landfall will involve excavation of two trenches from the onshore transmission joint bays between 420 and 450 metres (m) in length. The two High Voltage Alternating Current (HVAC) 220 kilovolt (kV) cables would make landfall approximately 350 m to the west of the channel of the Burn of Tynet, with each cable separated by a distance of approximately 180 m (Figure 1, Annex 1). The works associated with this alternative method are hereafter referred to as the Trenching Works.

The trenches themselves will be approximately 4 m wide and up to 8 m deep within the shingle berm and hinterland. In addition to the trench, the working area for storage and transport alongside installation of the cables will be at most 30 m wide.

Where the trench passes through the shingle berm, sheet piles will be installed to reinforce the side of the trench ensuring a safe working area and reducing the area impacted by the works.

Full details of the works required are provided in Table 2.1 below.

Table 2.1 - Trench Details

Description	Details	Comments
Number of trenches	2	Export Cable 1 (EC1) and Export Cable

² RPS Energy (2016) Beatrice Offshore Wind Farm Alternative Landfall Cable Installation Method Marine Licence Application – Environmental Report

³ Arcus Consultancy Services (2015) Beatrice Onshore Transmission Works Environmental Statement

⁴ Nexans (2016) Offshore – Direct Landing Contingency below SSSI, Rev E5, Doc. No. 60693-EILT-BD-33226

⁵ BOWL (2016) Geomorphological Assessment of Alternative Landfall Option, Rev 01.0, Doc No. LF000005-TCN-277

⁶ BOWL (2016) Cable Route Pre-construction Ecological Appraisal, Doc. No. LF000005-SOW-089

Description	Details	Comments
		2 (EC2)
Separation of trenches	Approximately 180 m	-
Dimensions of trenches	<p>Hinterland: rectangular trench EC1: 93 m x 4 m x 8 m EC2: 102 m x 4 m x 8 m</p> <p>Shingle berm: rectangular trench EC1: 33 m x 4 m x 8 m EC2: 34 m x 4 m x 8 m</p> <p>Intertidal: trapezoidal trench EC1: 39 m x 4 m x 3 m EC2: 40.4 m x 4.0 m x 3.0 m</p> <p>Sub-tidal: trapezoidal trench EC1: 255 m x 4 m x 2 m EC2: 244 m x 4 m x 2 m</p>	<p>Length x Width (at base) x Depth (min and max depth values are the same)</p> <p>Hinterland: assumes steel sheet pile supported trench walls</p> <p>Shingle berm: assumes steel sheet pile supported trench walls</p>
Plan area of trenches	<p>Hinterland: EC1: 372 square metres (m²) EC2: 408 m²</p> <p>Shingle berm: EC1: 130 m² EC2: 137 m²</p> <p>Intertidal: EC1: 157 m² EC2: 162 m²</p> <p>Subtidal: EC1: 1,020 m² EC2: 974 m²</p>	<p>Values for intertidal and subtidal (trapezoidal trenches) will be slightly greater as width at surface will be greater than width at base, however the differences will not be significant due to the shallow depths of these trenches.</p> <p>Total area affected from directional Direct Pipe entry points to MLWS is 1,366 m², of which 586 m² is within the SSSI, representing only 0.013% of the designated site.</p> <p>If only the 'sub-unit' of SSSI between Spey Mouth and Portgordon is considered (covering 44 hectares (ha)), then the total area represents only 0.13% of this 'sub-unit' of the SSSI.</p>
Volume of sediment extracted	<p>Hinterland: EC1: 2,979 cubic metres (m³) EC2: 3,261 m³</p> <p>Shingle berm: EC1: 1,043 m³ EC2: 1,098 m³</p> <p>Intertidal: EC1: 472 m³ EC2: 485 m³</p> <p>Subtidal: EC1: 2,039 m³</p>	<p>Total volume of material excavated from the Pipe Thruster Pits to MLWS = 9,337 m³, of which 3,097 m³ is within the SSSI.</p>

Description	Details	Comments
	EC2: 1,948 m ³	
Working areas	30 m width (including trench width)	Conservative estimate, with working area running parallel to the trench, from the Pipe Thruster Pits to MLWS.
Storage areas	Two 30 m x 30 m (approx.) areas	Located landward of the SSSI boundary and Mean High Water Springs (MHWS) mark.

There are two installation scenarios for the alternative open trench installation approach for the offshore transmission cables:

- Option 1 involves a phased approach, whereby the first export cable (EC1) would be installed in August/September 2017, with the second cable (EC2) installed in March/April 2018.
- Option 2 involves a simultaneous approach, whereby land excavation works for both EC1 and EC2 are carried out in 2017. However for the EC2 cable a suitable cable duct would need to be installed in the open trench and then back filled and the ground reinstated. Later in March / April 2018 the EC2 cable duct exit would be opened up on the beach and the cable pulled in, followed by nearshore burial works.

Under Option 1, the total duration for the installation of the export cables is nine months (EC1) and seven months (EC2) across two years. The last two **months of each cable's** installation would involve nearshore cable burial works only and the sheet piling and inter-tidal trench would be already completed and the areas fully reinstated.

Under Option 2, the works would predominantly take place during 2017 over nine months (EC1 and EC2 cable duct), with the remaining EC2 works taking place over four months in 2018. Similar to Option 1, the last two **months of each cable's installation would involve** nearshore cable burial works only and the sheet piling and inter-tidal trench would be already completed and the areas fully reinstated.

Exact timescales will be confirmed following appointment of the installation subcontractor.

3 EMBEDDED MITIGATION

Careful consideration of the design of the works means that any changes to the baseline situation as a result of trenching can be minimised. These embedded mitigation measures include:

- The use of sheet piling across the shingle berm to minimise the area affected and the volume of material being excavated, stored and reinstated.
- Placement of onshore infrastructure at least 50 m from the shingle berm to prevent exposure over the 25 year period due to expected erosion rates.
- Sufficient depth of the cable to prevent exposure over the 25 year period due to expected erosion rates.
- Selection of appropriate plant, i.e. a Menzi Muck within the offshore areas, to reduce the potential for over-excavation and time delays.
- Minimisation of working and stockpile areas to reduce the areas affected, with a particular focus on the SSSI.
- Storage of excavated materials in separate sediment layers for the respective cables.
- **Reinstatement of excavated materials on a 'layer by layer' basis, particularly within the SSSI.**

4 POTENTIAL CHANGE TO ENVIRONMENTAL BASELINE

Through consultation and examination of previous studies it is noted that the key areas which could be affected by the Trenching Works are ecology, geology, hydrology, noise, landscape and visual amenity, and recreation.

4.1 Ecology

Consideration of changes to the ecological baseline, due to the Trenching Works, has been undertaken for the landfall area within the consented boundary of the Development (the Study Area). The Study Area lies wholly within the Study Area reported for the assessment of the HDD method in the 2015 ES.

The 2016 Pre-Construction Survey confirmed that the Study Area predominantly comprises coastal farmland habitat with sand, coastal grassland and shingle adjoining the northern edge of the coastal farmland area. North of the shingle, brackish water comprises the main habitat.

A section of species-poor intact hedge runs along the western Study Area boundary and sections of scattered scrub are situated on the southern and eastern Study Area boundaries. Adjacent to the eastern and western boundaries of the Study Area lie the Burn of Tynet and a small unnamed watercourse, respectively.

It was confirmed during the 2016 Pre-Construction Survey that no protected species were found within the Study Area, however invasive non-native species were found along the western and south-eastern boundaries of the Study Area.

4.1.1 Receptors

The Trenching Work has potential to result in changes to the following ecological receptors:

- Designated sites;
- Habitats;
- Birds; and
- Invasive non-native species.

These receptors are considered for their:

- Nature conservation value;
- Potential connectivity to the Development; and
- Frequency/abundance recorded during the baseline and pre-construction ecology surveys.

The potential changes will occur primarily during construction. A number of changes will be brought about by the activities associated with HDD, however the following aspects are also considered here to ensure they can be appropriately dealt with during construction should trenching be required:

- Trenching excavations;
- Creation of additional working areas alongside the cable trenches;
- Vehicle and personnel movements; and
- Creation of temporary stockpiling areas used to store excavated material.

4.1.2 Ecological Receptors Specific to the Trenching Works

As the Trenching Works will have a limited footprint within the Study Area the nature of the works has limited potential to affect the following Ecological Receptors which have been scoped out of further assessment:

- Habitats which do not have direct connectivity to the Study Area; and

- Protected species outwith the Study Area.

It is therefore considered appropriate for inclusion of the following receptors in this appraisal:

- Spey Bay SSSI;
- Moray and Nairn Coast Special Protection Area (SPA)/Ramsar;
- Loch Spynie SPA;
- Sand and coastal grassland (Local Biodiversity Action Plan (LBAP) Habitat);
- Shingle (UKBAP);
- Brackish water;
- Hedgerows;
- Watercourses and ditches;
- Coastal farmland (arable);
- Benthic Ecology;
- Skylark (*Alauda arvensis*) (SBL, UKBAP, Red listed);
- Yellowhammer (*Emberiza citrinella*) (UKBAP, Red listed); and
- Corn bunting (*E. calandra*) (SBL, UKBAP, Red listed).

4.1.3 Designated Sites

4.1.3.1 Spey Bay SSSI

The Spey Bay SSSI is primarily designated for its geological importance. An appraisal of the potential disturbance to the geological features is discussed in Section 4.2 Geology and Coastal Geomorphology, details of which are not repeated here. Although primarily of geological importance, there are a number of notified natural features of biological interest (**'Biological Features'**) listed in the SSSI citation⁷: Shingle, Saltmarsh, Wet Woodland, Vascular Plant Assemblages and butterflies, Small blue (*Cupido minimus*) and Dingy skipper (*Erynnis tages*).

The Trenching Works will be undertaken within the SSSI boundary and therefore has potential to affect these Biological Features.

Through consultation with SNH, a sub-unit of the SSSI, extending between Spey Mouth and Portgordon, covering an area of 44 ha, was identified as appropriate for consideration in this appraisal.

The Biological Features are likely only to persist landward of the MHWS. The hinterland, landward of the SSSI boundary comprises coastal farmland (see Section 4.1.4.6) and is therefore unlikely to support Biological Features associated with the SSSI. Therefore the area of potential disturbance to the Biological Features is restricted to the area between the hinterland and the inter-tidal zone. The habitat between the hinterland and the inter-tidal zone is predominantly shingle. Wet woodland and saltmarsh are therefore excluded from further consideration. As a Biological Feature, shingle within the SSSI sub-unit is listed due to its potential to support Vascular Plant Assemblages.

Vascular Plant Assemblages were not recorded within the Study Area. However, due to the dynamic nature of the environment within which the shingle is situated within the Study Area, gradual encroachment of Vascular Plant Assemblage into the Study Area from adjacent areas is likely to occur. It is therefore reasonable to assume that sparsely distributed areas of Vascular Plant Assemblages may persist within the Study Area.

Butterfly species listed in the SSSI citation, Small blue and Dingy skipper, are dependent on their host plant species. These host plant species are likely to be present only at very low densities within the Study Area; as a result Small blue and Dingy skipper are also unlikely to be prevalent. Habitat compositions of far greater suitability for these butterfly

⁷ Citation (2012) Spey Bay Site of Special Scientific Interest. Scottish Natural Heritage.

species are likely present to the west of the Study Area, and the SSSI sub-unit, within sections of the SSSI towards the River Spey SSSI, designated as part of the Lower River Spey - Spey Bay Special Area of Conservation (SAC) and as part of the Moray and Nairn Coast Special Protection Area (SPA).

The creation of a trench across the hinterland, shingle barrier and inter-tidal zone will create a direct footprint of disturbance, including habitat loss, part of which will be within the SSSI. It is estimated that the total plan area affected by trenching from the transition joint point to MLWS will be 1,366 m², of which 586 m² is within the SSSI. This represents an area of only 0.13% of the SSSI sub-unit. Within the Study Area, Vascular Plant Assemblages are only likely present in the section between the hinterland and the MHWS. The plan area affected by trenching within this section represents only a small proportion of the total 144 m² of disturbance.

Within the working area, shingle habitat will be excavated in layers. Each layer will be stored separately on an area within the landfall (Figure 1, Annex 1). Shingle habitat will be backfilled in reverse order, thereby minimising disturbance impacts to Vascular Plant Assemblages which may be present within the shingle (See Section 4.2.3). Additional measures will be implemented to avoid compaction of the shingle during reinstatement (see Section 4.2.3.2), and will aid reestablishment of Vascular Plant Assemblages.

Due to the small scale of the works and the temporary and reversible nature of disturbance impacts to the shingle habitat, it is considered unlikely that the Trenching Works will result in a long term, negative effect on this notifying feature or the integrity of the SSSI itself. Additionally, the dynamic nature of the intertidal areas will aid the re-establishment and settlement of the reinstated shingle habitat, further reducing the potential for negative impacts.

4.1.3.2 Moray and Nairn Coast SPA/Ramsar

Trenching Works will not result in any direct impacts to the Moray and Nairn Coast SPA/Ramsar situated 2.8 km west of the Trenching Works. The SPA is designated for breeding osprey (*Pandion haliaetus*), overwintering bar-tailed godwit (*Limosa lapponica*), greylag goose (*Anser anser*), pink-footed goose (*A. brachyrhynchus*), redshank (*Tringa totanus*), and an assemblage of wintering waterfowl. **The Ramsar site's qualifying features include wintering greylag goose, pink-footed goose, redshank and an assemblage of wintering waterfowl, and for its wetland habitats including intertidal mudflats and sandflats, saltmarsh, sand dune, shingle and wet woodland.**

Baseline surveys recorded some connectivity between the SPA/Ramsar and the Trenching Works. Occasional osprey activity was sighted, however no nests or breeding birds were recorded within 1 km of the Study Area. It is expected that over-wintering greylag and pink-footed geese associated with the Moray and Nairn Coast SPA and Ramsar site could feed in suitable agricultural land within the Study Area.

The area of habitat loss within the Study Area associated with the Trenching Works is small, with the affected habitats of generally low value to the qualifying ornithology species of the SPA and Ramsar. SPA and Ramsar birds, if present during Trenching Works, would be exposed to temporary and short-term disturbance from construction activities. It is anticipated that temporarily displaced birds would occupy suitable habitat available in the surrounding area. The potential for additional disturbance to these species is considered minimal and therefore does not require further consideration.

4.1.3.3 Loch Spynie SPA

Trenching Works will not result in any direct impacts to the Loch Spynie SPA, designated for wintering greylag geese, and situated 13.8 km west of the Trenching Works.

There is potential connectivity between the SPA and the Trenching Works, as these works are situated within the core foraging range of greylag geese (15–20 km⁸). Habitats affected by the Trenching Works are not suitable for foraging greylag geese, however it is likely that geese feeding in adjacent agricultural fields are at risk to low levels of disturbance if construction occurs during the winter months.

Greylag geese were not recorded in the Study Area, however it is likely that greylag geese feed in surrounding agricultural fields to the works. Due to the short duration and temporary nature of the Trenching Works, any disturbance in addition to that assessed in the ES is considered to be minimal and therefore does not require further consideration.

4.1.4 Habitats

The Trenching Work will result in has a larger working footprint than the HDD method. The additional working area will directly affect three terrestrial habitat types:

- Sand and coastal grassland;
- Shingle/gravel above the MHWS; and
- Coastal farmland (arable).

A number of other habitats are situated within close proximity to the works and have therefore also been consideration in this appraisal.

4.1.4.1 Sand and coastal grassland

Sand and coastal grassland is a Local Biodiversity Action Plan (LBAP) habitat, narrow strips of which were recorded between shingle and arable habitats within the Study Area.

Trenching will require work to be undertaken within the sand and coastal grassland and as such will result in the removal of two, 30 m wide sections of sand and coastal grassland.

The area of habitat to be removed during the construction period is small in the context of the available habitat in the surrounding environment and is therefore unlikely to be of notable ecological value. The habitat will be reinstated to an original condition following construction and effects are therefore considered to be temporary only.

Although sand and coastal grassland is an LBAP habitat, the small size of the area of habitat to be removed, the short duration of the works and the temporary nature of the habitat loss mean any effects are likely to be of low impact. No further consideration is therefore necessary.

4.1.4.2 Shingle

The works to be undertaken within the shingle habitat (Plate 1) and the mitigation outlined to minimise potential changes to this habitat are discussed in detail in Section 4.1.3.1 and are therefore not repeated herein.

The total plan area affected by trenching from the Directional Direct Pipe entry points to MLWS will be 1,366 m², of which approximately 586 m² is within the SSSI. Approximately half of the area within the SSSI comprises shingle. This volume is a small proportion of the habitat present within the wider environment. Construction will be of short duration and all habitat will be reinstated to an original condition following installation of the cable.

Effects on this habitat will therefore be minor and no further consideration is required.

⁸ Scottish Natural Heritage, 2013: Guidance - Assessing Connectivity with Special Protection Areas (SPAs)



Plate 1: Shingle habitat in the north of the Study Area

4.1.4.3 Brackish Water

Trenching Works will be undertaken in areas of brackish water. Effects on brackish water will be restricted to the potential for pollution and siltation as a direct result of the works undertaken in these areas. Mitigation, including pollution prevention is proposed in the Overarching and Landfall CEMPs to sufficiently avoid negative effects to this habitat during construction.

The works will be of short duration and temporary and the dynamic nature of the intertidal areas will facilitate the reestablishment of any disturbed brackish water following construction.

4.1.4.4 Hedgerows

An intact species-poor hedgerow is situated on the western Study Area boundary in close proximity to the western-most transition joint bay. The footprint of the Trenching Works will not result in direct impacts to the hedgerow, including habitat loss and disturbance.

Should Trenching Works result in a requirement to remove sections of the hedge then measures proposed in the Overarching and Landfall CEMPs would be applied.

4.1.4.5 Watercourses and ditches

No additional watercourse crossings will be required to facilitate the Trenching Works.

A watercourse is situated on the western Study Area boundary in close proximity to western-most transition joint bay. No direct impacts on the watercourse are likely due to the small working footprint of the Trenching Works.

Indirect effects (pollution etc.) are discussed in details in Section 4.3 of this appraisal.

4.1.4.6 Coastal Farmland (Arable)

The majority of the additional working area required to accommodate the Trenching Works is located within coastal farmland habitat (Plate 2). Coastal farmland within the Study Area is considered of low ecological value and is common and widespread in the wider environment.

The additional areas of coastal farmland habitat loss (related specifically to the Trenching Works) are small and considered negligible in the context of the Development and the available habitat in the wider environment. Effects to this habitat will be short term and temporary; therefore no further consideration is required.



Plate 2: Coastal Farmland within the Study Area

4.1.4.7 Benthic Ecology (including Annex I habitats)

An assessment of the potential impacts of the Trenching Works on Benthic Ecology was undertaken by RPS. The assessment undertaken by RPS considered areas offshore of the MHWS, thereby covering the area between the MHWS and MLWS. Sections from the assessment undertaken by RPS of relevance to this appraisal are repeated below.

Cable Installation Activities May Result In Temporary Intertidal Habitat Loss/Disturbance

The excavation of two trenches (of approximately 40 m length x 4 m width) across the intertidal zone, together with the working/access area running parallel to each trench, will create a direct footprint of disturbance for intertidal benthic communities. Temporary habitat loss would lead to a removal of the key characterising species and its habitat. Re-

colonisation is likely to occur via recruitment from adjacent populations, and therefore recovery potential is considered to be high⁹.

Due to the small scale of the impact and the recoverability of the benthic communities, the effect of temporary habitat loss/disturbance is considered to be negligible.

Cable Installation Activities May Result In Temporary Subtidal Habitat Loss/Disturbance

The excavation of two trenches within the nearshore area and out to approximately 250 m offshore using a Menzi Muck and/or barge mounted excavator, will result in direct disturbance to subtidal benthic communities. The benthic communities in this area are likely to be tolerant of disturbance and will have a high recovery potential due to the nature of the dynamic environment within which they exist. Tube worms and encrusting bryozoans are noted to re-colonise an area within four months. Whilst reproduction may peak in spring or early summer, for some species, such as the tube worm *Spirobranchus triqueter*, reproduction can occur throughout the year¹⁰. Low/Medium resemblance Annex 1 cobble reef is considered to be of medium sensitivity to cable installation activities and given the highly localised extent of disturbance, and the distribution of similar habitat across the area, there is considered to be high recoverability.

Due to the small scale of the impact and the recoverability of the benthic communities, the effect of temporary habitat loss/disturbance is considered to be negligible.

Cable Installation Activities In The Intertidal Zone May Result In Temporary Increases In Suspended Sediment Concentration And Associated Sediment Deposition

The excavation of two trenches within the intertidal area involving the removal of up to 957 m³ of sediment may result in temporary elevations in suspended sediment concentration (SSC) in the water column in the event that these works are not undertaken at low water (i.e. in the dry). Increased SSC may also result in the deposition of sediment on the seabed leading to smothering of intertidal benthic communities. Benthic fauna characterising this habitat, such as amphipods, live within the sediment and are therefore unlikely to be directly affected by an increase in the concentration of suspended sediment in the water column and will be tolerant of light smothering by sediment. Heavy smothering could lead to a reduction in the available interstitial spaces and therefore cause a local decrease in abundance in the benthic fauna⁹. However, it is likely that most sediment will be re-mobilised and transported within one tidal cycle, and therefore any increases in sediment deposits will be short lived and temporary.

Due to the small scale of the impact, the potential for rapid dispersal of the sediments, and the high tolerance of associated benthic species, the effect of increased suspended sediment and associated sediment deposition is considered to be negligible.

Cable Installation Activities In The Subtidal Zone May Result In Temporary Increases In SSC And Associated Sediment Deposition

Trenching activities within the nearshore subtidal area may result in temporary elevations in SSC in the water column and subsequent deposition on the seabed resulting in smothering of subtidal benthic communities. The total volume of sediment potentially disturbed in the nearshore environment is minimal (up to 3,987 m³ with the amount released in any one day substantially less than this). The communities in the subtidal

⁹ Tillin, H.M. & Budd, G., (2016). *Pectenogammarus planicrurus* in mid shore well-sorted gravel or coarse sand. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. Available from: [<http://www.marlin.ac.uk/habitat/detail/151>]

¹⁰ Tillin, H.M. & Tyler-Walters, H., (2016). *Pomatoceros triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. Available from: [<http://www.marlin.ac.uk/habitat/detail/177>]

zone occur in a dynamic and scoured environment and are therefore tolerant to some degree of high sediment concentrations in the water column. In addition, it is likely that any sediment released will be re-mobilised and transported within one tidal cycle. Some increase in turbidity may be beneficial if the suspended particles are composed of organic matter although high levels could reduce filter feeding efficiency. Tube worms are tolerant of a wide range of SSC although bryozoans are less so¹⁰.

Due to the small scale of the impact, the potential for rapid dispersal of the sediments, and the tolerance of the associated benthic species, the effect of increased suspended sediment and associated sediment deposition is considered to be negligible.

4.1.5 Ornithology

4.1.5.1 Skylark and Yellowhammer

Skylark and yellowhammer were recorded throughout the Study Area. Trenching Works will result in the temporary loss of habitats associated with these species. The loss of this habitat has potential to cause temporary displacement and disturbance to skylark and yellowhammer during the period of Trenching Works and up until the point at which habitats are reinstated.

It is anticipated that displaced skylark and yellowhammer will readily occupy suitable habitat within the surrounding area. The addition of this small area of temporary habitat loss due to the Trenching Works is considered to be negligible in the context of the available habitat in the wider environment. The overall impact magnitude remains low and therefore no change is considered from the predicted not significant impact.

The avoidance of legal offenses in relation to breeding birds and Wildlife and Countryside Act 1981 (as amended) will be mitigated through measures provided in the Overarching and Landfall CEMPs.

4.1.5.2 Corn bunting

Corn bunting were recorded in the north of the Study Area in coastal grassland habitats. Trenching Works will result in the temporary loss of habitats associated with corn bunting. The loss of this habitat has potential to cause temporary displacement and disturbance to corn bunting using the coastal grassland habitats during the period of Trenching Works and up until the point at which habitats are reinstated.

It is anticipated that corn bunting using the coastal grassland habitats during the period of Trenching Works will be displaced into surrounding suitable habitat, in which abundant coastal grassland habitat is present. Displacement will be temporary and birds are expected to recolonise habitats following reinstatement.

The Trenching Works will be of short duration and habitat loss will be temporary, with all habitats reinstated to an original condition following construction. Although impacts are likely to be greater due to the additional Trenching Works, the overall impact magnitude remains low and therefore no change is considered from the predicted not significant impact.

The avoidance of legal offenses in relation to breeding birds and Wildlife and Countryside Act 1981 (as amended) will be mitigated through measures provided in the Overarching and Landfall CEMPs.

4.2 Geology and Coastal Geomorphology

The main focus for changes to geology resulting from the Trenching Works is the impact on the geomorphology of the Spey Bay SSSI. A geomorphological assessment of the Trenching Works was undertaken by Royal Haskoning DGV to determine what effects the Trenching Works would have on the qualifying features of the SSSI, including detailing

measures which should be implemented in the event that this method is employed. This section presents a summary of the finding of the Royal Haskoning DGV assessment; the full report is available in Annex 2.

4.2.1 Baseline

Throughout the previous studies of both the offshore and onshore elements of the transmission infrastructure for the Beatrice Offshore Wind Farm, a thorough understanding of the baseline physical processes and coastal geomorphology has been achieved. An update baseline site visit and desk based assessment was undertaken in August 2016.

The shingle berm through which the Trenching Works will pass first emerges at Porttannachy and extends westwards toward the mouth of the River Spey, becoming higher and wider towards the west. It is characterised by storm ridges and overwash fans along its length.

The intertidal area through which the Trenching Works will pass is relatively wide, known as the Tannachy Sands. The beach is comprised of patchy sand overlying a conglomerate rock base. The active shingle storm ridge is a low angled feature at this location, backed by a grassed bank which shows evidence of erosion and overtopping.

To the west and east of the Trenching Works can be found an unnamed burn and the Burn of Tynet respectively. For the past 40 years the mouth of the Burn of Tynet maintained a relatively consistent braided channel outfall to the sea, however recently it has been noted that the burn has taken a more easterly deflection before discharging into the sea. This change in morphology is due to a **new 'cut' being artificially created by** the landowner. Contrary to this, the unnamed burn to the west has no visible outflow, with water filtering through the shingle berm before emerging on the seaward side.

As detailed in full within Annex 2, it has been determined that the net longshore drift is in a westerly direction with a modelled potential annual transport rate of approximately 3,000 m³. Waves tend to provide the driving force behind the sediment transport processes as currents are generally too weak to exert much influence. It should however be noted that the rate and direction of transport can vary considerably depending on the wave climate indicating the dynamism of the coastal system.

Evidence from Ordnance Survey maps, and anecdotal evidence from the Spey Bay Golf Club, show that the coastline within which the Trenching Works are located has experienced a net recession over the past century. Based on an analysis of historic maps and charts, the average annual erosion rate is calculated to be 0.64 m per year. It is therefore noted that the cable burial at landfall will need to take due account of changes in beach levels that may be associated with individual storms (short term responses) and net landward migration of the nearshore beach profile and shingle barrier over the 25 year planned lifetime of the wind farm (longer term responses). A highly conservative set-back distance for the landfall works of 50 m is being adopted for the purposes of the construction works, to account for the longer term response of the shingle barrier.

4.2.2 Geomorphological Appraisal

Construction of the cable landfall via trenching has the potential to change the baseline environmental conditions as described below.

4.2.2.1 Trench Footprint

The creation of a trench across the hinterland, shingle barrier and inter-tidal zone will create a direct footprint of disturbance, part of which will be within the SSSI. It is estimated that the total plan area affected by trenching from the Pipe Thruster Pits to MLWS will be 1,366 m², of which 586 m² is within the SSSI. This represents an area of

only 0.0013% of the designated site, **and only 0.13% of the 'sub-unit' of the SSSI** between Spey Mouth and Portgordon.

The disturbance will be short term and temporary, since there are viable proposals to reinstate the morphology of the hinterland, shingle barrier and inter-tidal zone affected by the trench following installation of the cables.

4.2.2.2 Construction Working Area

The plant which will operate within the designated working area on the hinterland, shingle barrier and inter-tidal zone will have a direct footprint impact on these features, including compaction of the sediments. This is only of concern on the shingle barrier where the porosity of the landform is an important characteristic of its geomorphological character. The total potential construction working area across the shingle berm could extent to approximately 2,007 m² as a worst case and a further 2,370 m² across the intertidal zone. Additionally, not all of this area lies within the SSSI (a portion lies landward of the SSSI) and construction will also not take place across the full corridor for the full construction period, with many areas either un-impacted, or left undisturbed and able to recover for a period of time after initial impacts.

Disturbance across the working area will be short term and temporary. Following cessation of works it is expected that the behaviour characteristics of the directly affected areas will be reinstated naturally within a few tidal cycles (for the inter-tidal area) or after a few storm events (for the shingle barrier).

4.2.2.3 Temporary Storage Areas

It has been indicatively confirmed that the temporary storage areas will encompass a total plan area of 1,800 m², but that these sites will be located landward of the SSSI boundary.

Disturbance will be short term and will not affect the Spey Bay SSSI, lying landward of the SSSI barrier.

4.2.2.4 Impact of Cable Installation on Physical Processes

There is the potential that whilst the trench is present across the shingle barrier and inter-tidal area, it would interrupt alongshore sediment transport, which generally moves from east to west. However, given that the works are at the eastern end of this sediment transport pathway, that net transport rates are relatively low, the short duration of the works, and with such a vast volume of sediment available elsewhere within Spey Bay, any effects of the Trenching Works on sediment transport processes will be immeasurable. Further to this, in order to ensure that physical processes in terms of sediment transport are not disrupted, sediment levels will be monitored with a particular focus on the accumulation of sediment on either side of the trench. Sediment bypassing, in the form of an excavator removing and relocating accumulated sediment will enable continuous feed to the sediment transport process.

Due to the duration of the trenching and/or sheet piling works, there is the potential that one or more major landforming storms could occur while the trench or the sheet piles are in place. However, most storm waves approach relatively perpendicularly to the shore and over the shingle berm (where sheet piles will be present) these waves govern more the onshore to offshore transport of sediment, moving it up and over the crest of the ridge to create washover fans. This process will only be inhibited directly in the footprint of the trench and piles. It is theoretically possible, however, that a storm, or storms, could occur with a wave approach angle that is oblique to the shore. In this case there is potential for either the open trench or the sheet piles to interrupt modest rates of sediment transport. Under such events, sections of trench will likely become partially or

totally infilled in unsupported (open) sections (i.e. those areas that are open across the intertidal and shallow seabed during this process) and may interrupt longshore sediment transport where the sheet piling is present through physical 'blockage'. Due to this, the proposed additional mitigation measures recommended above, involving monitoring of sediment accumulation on either side of the trench/sheet piles, and the use of sediment bypassing operations, will ensure the continuous feed of the sediment transport system. Due to this mitigation, any effects of the trenching and presence of sheet piles during major landforming storms on sediment transport processes are likely to be minor and these effects will be mitigated a short time after the storm has passed.

Further to this, when the trench is backfilled, the morphology of the shingle ridge and inter-tidal will be reinstated and there is not expected to be any further effects.

4.2.2.5 Impact of Physical Processes on the Installed Cable

Cable burial depths have been based on a future landward transgression of the shingle barrier of 50 m over the next 25 years. This should ensure that the cable remains buried over this time period, preventing exposure and the need for reburial. Due to the tides and waves affecting the inter-tidal zone during 'normal' conditions, a sequenced approach to trenching, cable burial and reinstatement along the inter-tidal zone will be required as excavated trench sections may otherwise become naturally infilled with sediment.

4.2.2.6 Decommissioning

During the decommissioning phase the cable will either be left in situ (in which case there will be no impact) or replaced/removed. Should the first option be selected then there will be no impacts; in the second option, the potential impacts of decommissioning will be of a similar nature and magnitude to those discussed above for cable installation.

4.2.3 Mitigation

As part of the Trenching Works a series of mitigation methods have been incorporated in the design and planning of the works or will be executed during the construction of the works. These 'built-in' mitigations have resulted in the conclusion that there will be no likely significant effect on the geological features for which the Spey Bay SSSI is designated.

In addition to the proposed mitigation by design, further consideration is also given to timescales for excavation and reinstatement of the trench following cable laying.

4.2.3.1 Timescales

The timings of the trench excavations have been programmed to correspond to less active periods of sediment transport; if undertaken concurrently the trenches will be cut between June and August 2017, however if undertaken separately, EC1 would be excavated between June and August 2017, and EC2 would be excavated between March and April 2018. Timings of the final openings of each trench seaward can be fine-tuned to the required weather window for the installation and arrival of the cable vessel. Sediment transport processes will be fully reinstated once the trench has been infilled. This type and scale of potential interruption to a modest rate sediment transport at the very eastern extremity of the feature is well within the range of natural variability experienced in transport rate based on differences in wave height and direction.

4.2.3.2 Reinstatement

The proposed methodology allows for the trench to be backfilled with sediments in layers, in reverse order to the excavation sequence, and for each layer, or each 0.5 m depth of reinstated soil to then be compacted. It is recommended that reinstated sediments on the shingle barrier portion of the cable route are not compacted. This is

due to the structure of the sediments within the shingle barrier which are currently naturally sorted, leading to high porosity. This enables percolation of tidal water through the interstices between gravel and cobble clasts and is a fundamental reason why these geomorphological features are so good at attenuating incoming wave and tidal energy. The natural dynamism of a shingle barrier helps it to respond naturally to storm wave action by modifying its morphology through the washover process and, over time, **enables the landward 'rollback' processes of the feature as an entity to continue unabated.** If compacted, the grain size sorting and porosity of shingle barriers can be adversely altered, causing reflection, rather than absorption, of incoming energy and this **can lead to problems of 'cliffing' within the seaward face and seaward loss of material.**

There are no similar concerns on the inter-tidal area seaward of the gravel barrier, where compaction of the backfilled trench could occur.

4.2.4 Conclusions and Recommendations

Cable installation at the landfall is planned near the eastern extremity of the Spey Bay SSSI, where the shingle barrier is at its lowest height and narrowest width, and potential impacts are therefore minimised. Activities at this location will have minimal potential effect on the remainder of the SSSI, and is preferred when compared to the potential impact of undertaking work further to the west in the SSSI.

The Trenching Works will cause temporary, localised disturbance to the hinterland, shingle barrier, inter-tidal and shallow sub-tidal zones. This will primarily be in the form of **a direct 'footprint' of disturbance.**

However, there is considered to be no significant impact upon longshore sediment transport processes within Spey Bay as a result of the temporary presence of the trench. This is due to the relatively low longshore drift rates and the works will be temporary in nature and occur over short durations.

Appropriate mitigation has been built-in to the design/planning and will be adopted during the construction phase. This will further minimise any potential impacts.

The proposed mitigation by design is sufficient for the landfall cable installation activities to be considered unlikely to have a significant effect on the geological features for which the Spey Bay SSSI is designated.

In addition to the proposed mitigation by design, wider mitigation is being considered which will prevent compaction of sediment layers in the trench through the shingle barrier during reinstatement. This will contribute to ensuring that the porosity of the structure is not unduly affected by the reinstatement works and that the barrier retains its percolation properties.

Baseline and post-works topographic surveys of the affected hinterland, shingle barrier and inter-tidal will be considered to ensure that the reinstated morphology matches the baseline as closely as possible. Achievement of such reinstatement will mean that no long term impact on sediment transport patterns will be experienced.

4.3 Hydrology

The Study Area for the appraisal of changes to hydrological resources is identical to that used to describe the potential changes resulting from construction of the landfall and cable route for the HDD method of cable installation, as outlined in method in the ES.

4.3.1 Receptors

It is noted from previous studies that:

- The Burn of Tynet has already been considered and the implementation of pollution prevention measures outlined in the Overarching and Landfall CEMPs will avoid any effects on this receptor;
- No Private Water Supplies (PWS) were identified within 250 m of landfall area;
- No areas of contaminated land were identified within 250 m of the landfall area; and
- No Ground Water Dependent Terrestrial Ecosystems (GWDTE) were identified within the landfall area.

Therefore these receptors are not considered further.

It was however noted that the Trenching Work has potential to result in changes to the following hydrological receptors:

- Spey Bay SSSI;
- Unnamed tributary of Spey Bay coastal waters, to the west of the landfall; and
- Groundwater and near surface water.

Potential effects directly on the Spey Bay coastal waters, up to the MHWS, are considered within the Offshore Environmental Report (LF000005-REP-1338).

Potential changes differing from those identified for the HDD method will only occur during construction when construction plant, materials and security fencing will be present at the landfall site. Construction will last approximately 68 days with changes potentially resulting from:

- Trenching; and
- Creation of temporary stockpiling areas used to store excavated material.

4.3.2 Appraisal

4.3.2.1 Spey Bay SSSI

Potential direct effects on the integrity of the SSSI through the loss of strata and indirect effects on hydromorphological mire communities could occur through sediment and silt being transferred from excavations at the landfall to the SSSI.

The Spey Bay SSSI is located within the north of the consented boundary along the coastal stretch in which the landfall is located. It is designated for gravel coastal geomorphology, comprising fluvial-coastal interaction and sediment interchange of an actively braided gravel-bed river entering a high-energy coastal environment. This process is, however, largely confined to the discharge point of the River Spey, approximately 3.5 km west of the landfall and not the sub-unit in which the Trenching Works will occur.

It is anticipated that approximately 586 m² of the SSSI will be disturbed during the installation of the trenches. This equates to approximately 0.013% of the SSSI directly to the north of the landfall. **Even when considered over the 'sub-unit' within the SSSI** between Spey Mouth and Portgordon (covering 44 ha), then the total area directly affected by trenching represents only 0.13 %. Potential sedimentation effects within the intertidal zone are considered within the Offshore Environmental Report.

Due to the small scale of the works and the temporary and reversible nature of disturbance impacts to the fluvial-coastal interaction and sediment interchange within the Study Area, it is considered unlikely that the Trenching Works will result in any long term negative effects on this notifying feature or the integrity of the SSSI itself.

There may be a requirement to temporarily alter the gradient of the bank within the working area to facilitate safe access to the beach by vehicles. Good practice measures, such as silt fencing and silt matting will be placed between excavated areas at the landfall and the SSSI, limiting the potential for sediment to be transferred into the

hydrological environment. Any changes to the gravel bank will be carefully reinstated post-works.

Potential risks to the SSSI also exist from the spillage or leakage of chemicals, fuel or oil, during the installation of the cable trench through the SSSI. Good practice will be followed in all aspects of the cable installation, specifically through the CEMP, therefore reducing the potential for effects on the SSSI.

Working and stockpiling areas would be kept to a minimum size during the construction phase. This would reduce the potential for adverse effects associated with a direct footprint on the designated areas by keeping plant/stockpiles off the SSSI and minimising working/stockpiling within it.

4.3.2.2 Unnamed Tributary of Spey Bay Coastal Waters

The Trenching Works will create two open cut channels from which sediment could be transferred to the unnamed tributary of Spey Bay coastal waters. As such, measures to protect the hydrological environment during excavation works within the landfall, as identified within the Landfall CEMP, should be applied to the cable trench works.

Silt fencing and silt matting will be placed between excavated areas at the landfall and the unnamed tributary, limiting the potential for sediment to be transferred into the hydrological environment. Any dewatering during excavations works will directed to vegetated areas away from the unnamed tributary, limiting the potential for transfer of sediment to the wider hydrological environment.

Effects on the unnamed tributary of Spey Bay Coastal Waters will therefore be negligible.

4.3.2.3 Groundwater and Near surface water

The excavation of the cable trenches has the potential to interact with near surface water and potentially cause diversions within the hydrogeological environment.

As the landfall is underlain by superficial geological cover of storm beach deposits (gravel), groundwater and near-surface water is unlikely to be encountered at the depths of excavation for the cable trench (approximately 3.5 m depth). Borehole records within the landfall show that groundwater was encountered to a depth of 6.6 m¹¹. Good practice measures, to be applied to all excavations within the landfall, will be applied to the cable trenches. Should groundwater be encountered then dewatering will be pumped via surface silt traps and rough vegetation to ensure there is no net loss from the hydrological environment. Effects on groundwater and near-surface water will therefore be negligible.

4.4 Noise

In order to determine whether the Trenching Works will result in adverse noise impacts at the nearest noise sensitive properties, a noise appraisal has been undertaken, based on the methodology presented in the Noise Chapter of the ES.

4.4.1 Guidance

This appraisal assesses construction noise from the Trenching Works using BS 5228:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites*. This standard provides methods for calculating the levels of noise resulting from various construction activities, as well as source levels for various types of plant, equipment and construction activities.

¹¹ British Geological Survey (BGS) ID 636975 : BGS Reference: NJ36SE18 [online] Available at: http://scans.bgs.ac.uk/sobi_scans/boreholes/636967/images/12303823.html [Accessed 07/11/2016].

BS 5228 also includes a discussion of noise control targets, and example criteria for the assessment of the significance of noise effects, which are not mandatory

4.4.2 Appraisal Methodology

4.4.2.1 Receptor Locations

Potential noise sensitive receptors around the landfall area were identified using Address Base Plus; a database that combines Royal Mail address data with buildings identified on large-scale Ordnance Survey mapping and provides addresses, descriptions and grid references. The noise sensitive receptors identified are all residential properties.

Providing that noise levels are found to be acceptable at these properties, those receptors located further from the Development are also likely to be acceptable. Table 4.1 provides the name and location of each receptor location.

Table 4.1 Noise Receptors

Receptor	Easting	Northing
Ha' of Auchenreath	337587	863972
Mains of Tannachy	338592	863729
Mill House	338233	863677
Vimy Ridge	338832	864161

4.4.2.2 Construction Works

Construction is expected to occur over a period of approximately 17 months with noise-generating plant items expected to include excavators, dumpers, piling equipment and cranes.

The distance between each noise-sensitive receptor and the closest point at which each construction activity would occur has been identified, and used to calculate worst-case noise levels using the source data and methodology described in BS 5228-1.

The assessment has been undertaken assuming that plant will be situated at the closest point, within the nearest cable corridor (EC1 or EC2), to the receptors. In reality, noise sources are likely to be spread more evenly across the construction sites, resulting in lower noise levels.

4.4.2.3 Construction Traffic

Construction traffic was assessed previously as part of the Noise ES Chapter, where no significant effects were predicted. It is considered that levels of construction traffic are unlikely to change significantly as a result of the Trenching Works. As such, it is not considered necessary to undertake a re-assessment of construction traffic noise.

4.4.3 Assessment Criteria

BS 5228-1 provides several example criteria for the assessment of the significance of noise effects from construction activities. Of those available, "Example Method 2 – 5 dB(A) Change" has been selected for the current assessment as it offers a slightly less complex method than Example Method 1.

Using this method, noise levels generated by construction activities are deemed to be significant if:

- The $L_{Aeq,period}$ level of construction noise exceeds lower cut off values¹²; and
- The total noise level (pre-construction ambient noise plus construction noise) exceeds the pre-construction ambient noise level by 5 decibels (dB(A)) or more for a period of one month or more.

The standard states that noise levels in excess of the threshold values for a period of one month or more would result in potentially significant effects.

Construction working hours will be limited to reduce noise disturbance. Site working hours will be from 0700 to 1900, seven days a week. As the construction works are limited to daytime and evening periods, this assessment does not consider effects of noise during night-time periods.

For consistency with the ES, a threshold of 70 dB, $L_{Aeq,12hr}$ during the day and 60 dB, $L_{Aeq,12hr}$ for evening and weekend working has been applied in the current assessment. This threshold level is based on the noise criteria defined in AL72: *Noise control on building sites*¹³.

4.4.4 Noise Predictions

The location of each construction activity has been estimated from Figure 10f of Annex 1, which shows the locations of export cables, access roads, sheet piling etc. Table 4.2 details the distance between the noise assessment locations and the closest point that each construction activity would take place, depending on the closest export cable.

At this stage, detailed information on the type, number and noise emissions from equipment and plant items likely to be required during each construction activity is not available. As such, likely plant types and noise emission data for each construction activity have been estimated based on the information contained in Annex C and D of BS 5228-1, which presents current and historical sound level data on a wide range of site equipment and activities. As specific noise data on excavating, moving and dumping shingle is not available in BS 5228-1, noise levels have been from Tables C.9 and C.10, which provides noise levels from construction activities on hard rock quarries, being the most similar type of activity provided in the standard.

Details of the predicted construction noise levels are shown in Table 4.3.

It should be noted that the predicted noise levels are based on following assumptions, in line with those made during the 2015 EIA:

- All plant and machinery operating for 75% of the time during construction hours;
- Acoustically reflective ground between the source and receiver; and
- No reduction from noise as a result of screening due to nearby buildings or local topography.

As such, noise levels in practice are likely to be appreciably lower.

¹² Defined as 65 dB(A) during daytime (0700 – 1900 weekdays (includes 0700 to 1300 Saturday)), 55 dB(A) during evenings and weekends (1900 – 2300 weekdays, 1300 – 2300 Saturdays, 0700 – 2300 Sundays) or 45 dB(A) at night (2300 – 0700 every day);

¹³ AL72: Noise control on building sites, Department of the Environment, 1976.

Table 4.2 - Distance to Construction Activities

Receptor	Construction Activity										
	Access Road	Sheet Pile Installation	Shingle Excavation	Intertidal Excavation	PE Pipe Installation	Backfill of PE Pipe	Sheet Pile Removal	Land Trench	Pull-in Cable	Backfill Land Trench	Offshore Trenching
	Distance to Receptor, m										
Ha' of Auchenreath	420	425	460	460	475	475	425	375	375	375	580
Mains of Tannachy	800	805	815	815	860	860	805	820	820	820	935
Mill House	680	685	680	680	710	710	685	640	640	640	810
Vimy Ridge	850	855	820	820	865	865	855	850	850	850	885

Table 4.3 - Predicted Construction Noise Levels

Receptor	Construction Activity										
	Access Road	Sheet Pile Installation	Shingle Excavation	Intertidal Excavation	PE Pipe Installation	Backfill of PE Pipe	Sheet Pile Removal	Land Trench	Pull-in Cable	Backfill Land Trench	Offshore Trenching
	Predicted Noise Level, dB, L _{Aeq,12hour} (day)										
Ha' of Auchenreath	60	58	59	59	52	59	58	61	53	61	51
Mains of Tannachy	54	52	54	54	47	54	52	54	47	54	47
Mill House	56	54	56	56	49	55	54	56	49	56	48
Vimy Ridge	54	52	54	54	47	54	52	54	46	54	47

4.4.5 Assessment of Noise Effects

As can be seen from Table 4.3, the predicted levels of construction from the trenching method are lower than the daytime threshold of 70 $L_{Aeq, 1\text{hour}}$ in all cases.

It can be seen that from Table 4.3, that the predicted levels from the excavation and backfill of the land trench could result in an exceedance of the 60 $L_{Aeq, 1\text{hour}}$ threshold by 1 $L_{Aeq, 1\text{hour}}$. However, given the short timescales over which this exceedance could be experienced and that in reality noise levels are expected to be lower, no additional mitigation is required. It is however recommended that, where practicable, the work programme be phased to reduce effects arising from noisy operations.

It is therefore considered that the effects of noise from the alternative landfall method at the nearest residential properties will comply with appropriate guidance.

If night-time working is required, noise emissions will be limited to the consented 45 dB $L_{Aeq, 1\text{hour}}$ at night.

4.4.6 Mitigation

Whilst no mitigation is required in order to ensure the effects of noise are minimised to as low as reasonably practicable, the following good practice measures should be implemented:

- Noisy construction operations should be limited to daytime working hours where possible;
- The site contractors should be required to employ best practicable means of reducing noise emissions from plant, machinery and construction activities, as advocated in BS 5228;
- Where practicable, the work programme should be phased, which would help to reduce the combined effects arising from several noisy operations;
- Where necessary and practicable, noise from fixed plant and equipment should be contained within suitable acoustic enclosures or behind acoustic screens;
- Static noisy plant should be located as far away from the noise sensitive receptors as is feasible for the particular activity;
- Plant and equipment covers and hatches should be properly secured to ensure there are no loose fixings causing rattling;
- Silenced plant should be used where possible;
- Plant should be turned off when not in use; and
- Good public relations should be maintained with local residents that may be affected by noise from the construction works. Effective communication should be established, keeping local residents informed of the type and timing of works involved.

4.4.7 Conclusion

Construction noise for the Trenching Works has been assessed following the guidance of BS 5228-1, based upon construction activities. This appraisal has demonstrated that construction activities would be acceptable in terms of noise impact.

4.5 Landscape and Visual Amenity

The Study Area for the appraisal of changes to landscape and visual resources is identical to that used to describe the potential changes resulting from construction of the landfall and cable route for the HDD method of cable installation.

The Trenching Works has the potential to result in changes to the following landscape and visual amenity resources:

- Landscape features and elements – removal or alteration of physical features of landscape;
- Landscape character – physical change and change to perception and experience of landscape character; and
- Visual amenity – changes to the visual amenity of residents of nearby dwellings and of people using Core Paths and other footpaths.

The potential changes will occur primarily during construction when construction plant, materials and security fencing will be present at the landfall site. Changes will be caused by:

- Trenching;
- Creation of working areas within or alongside the cable trench; and
- Creation of temporary stockpiling areas used to store excavated material.

The Trenching Works has been designed and managed to reduce the amount of change that will occur on landscape and visual receptors. This embedded mitigation is taken into account in the description of changes to the environmental baseline.

4.5.1 Landscape Features and Elements

The cable route crosses a shallow sub-tidal zone, which is permanently submerged, an inter-tidal zone, a shingle ridge and a hinterland area. During trenching landscape features and elements within these four areas will be altered.

4.5.1.1 Shallow Sub-tidal Zone

Trenching will be undertaken using construction plant that is designed to work in 1-2 m of water avoiding the need for tracked excavators. Material, predominantly sand, will be removed within the trench line in the shallow sub-tidal area and backfilled on installation of the cable. These changes will occur beneath the water and will not be discernible.

4.5.1.2 Inter-tidal Zone

Within the inter-tidal zone existing material consists mainly of sand and gravel with a low cobble content and locally silty patches. This zone is regularly covered by seawater during tidal cycles. It slopes gently upwards at an even angle to the base of the shingle ridge. Material will be removed within the trench line and surrounding ground within the working width will be disturbed by construction vehicles. Material will be backfilled in flush with surrounding levels to maintain the slope angle of the beach.

4.5.1.3 Shingle Ridge

The shingle ridge consists of a broad asymmetric berm which is steeper on the seaward side than the landward side. The ridge runs parallel to the water edge in a sinuous irregular line. Material consists predominantly of cobbles and gravel with some sand. Sheet piles will be installed in the ridge on either side of the trench line. Part of the ridge, approximately 8 m in width, along the line of the trench will be temporarily removed. Material will be removed in layers and deposited in separate stockpiles. Material will be backfilled in reverse order to maintain the structure of the ridge. The material will be deposited flush with the surrounding ground to maintain the original shape and height of the ridge.

4.5.1.4 Hinterland

The hinterland behind the shingle ridge on the landward side consists of a fairly level area of unimproved grassland. Existing material is topsoil overlaying sand and gravel. Trenching will remove the turf layer, topsoil layer and subsoil layers separately and deposit these in separate stockpiles. A temporary track will be present running alongside

the cable trench. Material will be backfilled in the reverse order to which it was removed, turf will be replaced and the track route reinstated.

The changes to landscape features and elements in these four areas will be of short duration and temporary. Section 4.5.4 describes proposed measures to ensure successful re-establishment of features and elements of the baseline.

4.5.2 Landscape Character

The Trenching Works are located in the Soft Coastal Shore Landscape Character Area (LCA) a key feature of which are the distinctive shingle ridges that are found at the Development site. The landscape has a remote and tranquil character enhanced by its simple composition and proximity to the sea. The Spey Bay SSSI lies within the LCA and makes an important contribution to landscape character.

Construction and installation of the cable will result in temporary and localised change to the Soft Coastal Shore LCA. Construction activity at the Development site will temporarily become a key feature of the LCA and the changes to features and elements of landscape during construction will result in some localised change to landscape character.

The duration of such changes will be short occurring primarily during the construction period. Following construction the shallow sub-tidal and inter-tidal zones will be largely restored. Wave action over the disturbed areas will prevent any discernible change to landscape character beyond a very localised area.

The shingle ridge is a distinctive linear feature in the LCA contributing strongly to the composition of the landscape. During construction the shingle ridge will change along the line of the cable trench and its linear form will be temporarily interrupted. Following installation of the cable the shingle ridge will be restored to its pre-construction profile and it will again form a continuous, irregular ridge.

The hinterland represents a change within the LCA from sands, silts and gravels of the shore to soil and vegetation of the land. Construction and installation of the cable will temporarily change land cover from grassland to bare earth where areas are backfilled or partly restored.

Changes to the Soft Coastal Shore LCA will be of short duration, temporary and reversible occurring within a very localised area. Embedded mitigation in the design of the cable works and environmental construction management will ensure that any changes to the LCA will be minimised.

4.5.3 Visual Amenity

4.5.3.1 Residential Dwellings

The closest dwellings to the Trenching Works are located approximately 0.42 km to the **southwest at Ha' of Auchenreath** and approximately 0.82 km to the east at Vimy Ridge at the west end of Stewart Street in Portgordon. During construction and installation of the cable, construction plant and fencing around construction areas will result in some change to views from these dwellings. The changes will be temporary, of short duration and reversible.

4.5.3.2 Core Paths and Footpaths

Core Path SW01 follows the route of the Speyside Way passing adjacent the southern boundary of the Development site. The construction works and security fencing will be a noticeable feature within the open landscape that lies to the north of SW01. While the Development will be noticeable to people travelling east and west on SW01 changes to views from the Core Path will be of short duration, temporary and reversible. On completion of construction the ground will be reinstated to pre-construction levels and

where necessary vegetation will be re-established. There will be very little discernible change to views from SW01 following reinstatement of the cable route.

A footpath, shown as an 'existing footpath' runs in an east-west direction along the line of the shingle ridge, at times deviating slightly to the south. The footpath crosses the Development site and the area where the shingle ridge will be trenched. During construction walkers will not be able to use the footpath where it crosses the cable route. A temporary diversion will be signposted allowing the public to avoid the construction works while continuing using the footpath to the east and west of the works. Similarly, the public will not be able to use the beach and foreshore during construction for health and safety reasons and will be diverted along the same route.

The construction works will result in a large change to the visual amenity of those using the footpath. Seaward views along a short section will be interrupted by the construction works and fencing and on the approaches to the Development site from the east and west the works will be very noticeable in views. The change will be temporary, of short duration and reversible. On completion of construction, the cable trench and working area will be restored such that there will be very little discernible change to views. The change to those using the beach will be similar to that of individuals using the footpath.

4.5.4 Mitigation

In addition to aforementioned embedded mitigation, the following measures should also be implemented during installation of the cable to minimise any effects:

- Site working areas including storage areas should be positioned on level ground to avoid or minimise the amount of earthworks.
- Existing turf on areas to be used for site working and storage should be stripped and set aside for use in restoration of the site.
- Where subsoil is to be stored, the topsoil must first be stripped from the storage area and any waste material removed from the storage area. Soil must not be stored on a tarpaulin or other impermeable layer.
- Soil should not be stripped and stored in very wet conditions.
- Minimise handling of soils to avoid damaging soil structure.
- No storage of any turf, soil or material on the shingle ridge.
- All turf, soil and material storage areas should be protected by fences or warning tape to prevent contamination or disturbance from construction activities.
- Allow natural regeneration of turf and vegetation and avoid seeding unless agreed with SNH.
- Minimise the working width of construction between the shallow sub-tidal zone and the hinterland and particularly at the shingle ridge.

By adopting these measures through the CEMP, any changes to landscape and visual amenity can be minimised. A programme of monitoring will inform any remedial measures if required, for example, to ensure that re-establishment of vegetation is successful or to ensure successful integration of the restored shingle bank.

4.6 Footpath Diversion & Restrictions to the Foreshore

As previously noted a footpath runs in an east-west direction along the line of the shingle ridge, at times deviating slightly to the south. The footpath crosses the Development site and the area where the shingle ridge will be trenched. During construction walkers will not be able to use the footpath where it crosses the cable route. A temporary diversion will be signposted diverting users to the Speyside Way in order to avoid the construction works while continuing using the footpath to the east and west of the works.

There is a long held public right of access to the foreshore in Scotland and this is supported through the Land Reform Act 2003 and the Outdoor Access Code¹⁴. During construction works a temporary suspension of these rights will be required for health and safety purposes. The working area will be fenced off from the construction compound through the hinterland to the shallow sub-tidal zone in order to prevent access into the construction area. The area where access rights are to be suspended will be designed to tie in with any Marine Safety Zones in place for the offshore works to prevent any accidental access from shipping or other watercraft. Signage will be erected informing beach users that access to the working area is prohibited for the duration of the works and will direct them onto the footpath diversion via the Speyside Way. Safe access and egress points will be created to ensure that beach users can easily access the footpath diversion and will not be able to cross the working area at low tide.

5 CONCLUSIONS

As has been demonstrated within this appraisal, the Trenching Works will not result in any additional major changes to the environmental baseline that were not previously considered to result from the original method of HDD. The application of good practice techniques and measures outlined within the Overarching and Landfall CEMPs will reduce and avoid changes, meaning that the means of installing the cable via open trenching is acceptable.

¹⁴ Scottish Outdoor Access Code, Public access to Scotland's Outdoors, 2005,
<http://www.snh.org.uk/pdfs/publications/access/full%20code.pdf>

Figure 1 – Work Area Plan

**ANNEX 2 – GEOMORPHOLOGICAL ASSESSMENT OF ALTERNATIVE LANDFALL
OPTION**



Beatrice Offshore Wind Farm - Geomorphological Assessment of Alternative Landfall Option

November 2016

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Geomorphological Assessment of Alternative Landfall Option



Project Title	Beatrice Offshore Wind Farm
Date:	November 2016

Beatrice Offshore Wind Farm

Geomorphological Assessment of Alternative Landfall Option

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Glossary

Term	Definition
Cable	Beatrice Offshore Wind Farm's transmission high voltage (HV) alternating current (AC) 220 kV subsea export cable.
Back of the berm	Landward edge of the shingle berm, where the limit of the storm shingle washover fans meet the vegetation edge of the hinterland as measured by BOWL's 2016 topographic survey
Depth of Closure	The depth of water beyond which annually significant wave events will cease to contribute to beach sediment supply and morphological processes.
Direct Pipe	Direct Pipe® is a pipeline installation methodology pioneered by Herrenknecht which combines the advantages of micro tunnelling and HDD technology. This technique excavates the borehole using a micro tunnelling machine, pushed by the prefabricated final pipeline in one single step. The necessary thrust force is provided by the Pipe Thruster which pushes the micro tunnelling machine forward (or pulls it backward) together with the pipe – with a thrust force of up to 750 tonnes in increments of 5 metres. The push force is transferred to the Direct Pipe through the Pipe Thruster's clamping unit and then to the tunnelling machine's cutterhead.
EC1	Beatrice OWF's transmission subsea Export Cable 1 (Easterly cable)
EC2	Beatrice OWF's transmission subsea Export Cable 2 (Westerly cable)
Entry point	The onshore entry point for the pipe on completion of the Direct Pipe installation activities and after the pipeline has been cut to the required length. Typically the final pipe entry point corresponds to the front wall of the Pipe Thruster Pit.
Horizontal Directional Drilling (HDD)	A steerable, trenchless, method of installing an underground pipe, conduit or cable in a shallow area along a prescribed bore path by using surface-launched drilling equipment, with minimal impact on the surrounding area.
Landward transgression	A term used to describe the geomorphological behaviour of a landform under processes which lead to its landward movement over time.

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Term	Definition
Landward translation	A term used to describe an analytical process whereby a survey transect is displaced in the horizontal plane by a defined distance (in this case the 'set back distance')
MHWS	Mean high water spring tide mark is located part-way along the seaward face of the shingle berm. BOWL's 2016 topographical survey established the distance from MHWS to 'back of berm' was variable but approximately 25m
Pipe Thruster Pit	The onshore location of the Pipe Thruster unit. The Pipe Thruster Pit (sometimes known as the launch pit) is a temporary pit structure which provides the necessary structural anchorage for the Pipe Thruster Unit and is configured to allow the required ground entry angle for the pipe. The Pipe Thruster Pit is usually constructed from sheet piles and concrete which is fully removed on completion of the pipeline installation.
Set back distance	The distance by which landfall infrastructure will be set back from the shore so that projected future coastal erosion over the next 25 years can be accommodated without compromising the infrastructure. The set back distance is measured from the back of the berm. It has been established as a distance of 50m.
Shingle Berm	The wave-built, gently sloping, often sizable shingle or gravel barrier, between the seaward foreshore and landward backshore plane or hinterland. The barrier is usually characterised with a series of storm ridges on its seaward face and shingle wash over fans landward of its ridge.
Transition Joint Bay (TJB)	The onshore location where the 220 kV subsea cable is jointed to the 220 kV land cable. The TJB is part of the permanent cable infrastructure and is set some distance back from the onshore pipe entry points.
Vegetation edge	This is the edge of the hinterland vegetation where it meets the marine influenced beach topography. It is typically where shingle storm washover fans meet the vegetation edge of the hinterland. It is otherwise referred to as the 'erosion edge' or 'back of the berm'.

Geomorphological Assessment of Alternative Landfall Option

1 Introduction

Beatrice Offshore Wind Farm (OWF) is located in the outer Moray Firth, with a consented landfall to the west of Portgordon. Beatrice Offshore Windfarm Limited (BOWL) currently has a Marine Licence and planning permission for the pre-installation of two horizontal pipes or ducts for the landfall installation of the two offshore transmission HV 220 kV cables. The pipes or ducts are to provide safe conduits for the cables underneath the designated Spey Bay Site of Special Scientific Interest (SSSI) coastal area.

As a prudent project risk management measure, as the pre-installation of the landfall pipes could encounter unworkable ground conditions, BOWL needs to apply for a separate and additional Marine Licence to cover a potential alternative cable installation methodology at the landfall. The additional Marine Licence application will cover the alternative open trenching of the landfall extending out to circa 420 – 450 m offshore from the current planned onshore pipe entry points (at the Direct Pipe Thruster Pits) across the hinterland, shingle berm, inter-tidal beach and shallow nearshore. Some of these open trenching works will take place directly within the Spey Bay Site of Special Scientific Interest (SSSI).

However it should be noted that BOWL's preferred approach for cable installation at the landfall remains a form of HDD, called Direct Pipe®. This is a pipe installation methodology pioneered by Herrenknecht which combines the advantages of micro tunnelling and HDD technology. This technique excavates the borehole using a micro tunnelling machine, pushed by the prefabricated final pipeline in one single step.

The potential effects of the cable installation at the landfall using this preferred method were previously assessed within the Beatrice OWF Environmental Statement (Ref: BOWL, 2012) and its subsequent Addendum (Ref: BOWL, 2013). The project received Section 36 consent (Ref: Scottish Ministers, 2014) and two Marine Licences in 2014, as varied in 2016 (Refs: Marine Scotland, 2014 and 2016).

There remains high engineering confidence that cable installation using Direct Pipe will be possible, and further engineering assessments are underway to provide further reassurance that this is the case. However, some problems associated with the use of HDD have been encountered on at least one other OWF project in the UK, and during technical due diligence by BOWL's financiers the use of any HDD technique was identified as a high potential single source project risk for which there is currently no alternative consented option. Additionally within the legal finance documents there is an obligation on BOWL to consent an alternative approach to the HDD technique such that the programme of construction works is not compromised. BOWL considers it practical and good industry practice to consent an alternative approach that would be implemented only in the event that the preferred installation approach of Direct Pipe fails. The development of an acceptable alternative methodology is required and sensible to demonstrate appropriate project risk management during the planning and delivery phase for all stakeholders.

This Technical Note provides the Geomorphological Assessment necessary to determine the potential effects arising from an alternative open trenching installation method at the cable landfall on the geological (geomorphological) features of the Spey Bay SSSI. Details on the Notified Natural Features of the SSSI are discussed in Section 2 of this document.

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2 Baseline Environment

2.1 Physical Setting

The landfall location is located approximately 1.5km west of Portgordon harbour, directly within Spey Bay, Moray (Figure 1) and towards the eastern limit of the Spey Bay SSSI. It is proposed that 2 no. cables will make landfall approximately 350m to the west of the channel of the Burn of Tynet, with each cable separated by a distance of approximately 180m.

When considering the potential geomorphological effects of the proposed alternative installation method at the landfall, it is first necessary to understand the wider coastal setting within which the landfall is located. In this instance, an appropriate geographical extent for the geomorphological assessment is from Portgordon harbour in the east to Spey Mouth in the west (Figure 2).

This is deemed a suitable 'far field' study area because:

- at the eastern boundary, the eastern harbour wall at Portgordon harbour (Plate 1) provides an obvious barrier to the littoral¹ transport of beach sediment, which is generally from east to west along the frontage (although of course drift reversals can occur dependent upon the prevailing metocean conditions); and
- at the western limit, the hydraulic effect of fluvial discharge from the River Spey offers a partial barrier to this littoral transport of beach sediment, although it is acknowledged that sediment transport process can continue within the mouth and potentially beyond via complex process interactions between the beaches/spits, nearshore sea bed and tidal deltas at the mouth.

¹ Littoral sediment transport refers to processes of beach sediment particles moving predominantly alongshore within the littoral zone.
This covers the inter-tidal zone and part of the nearshore sea bed.

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Figure 1: Location Plan

Geomorphological Assessment of Alternative Landfall Option



Figure 2 – Study Area

2.2 Previous Baseline Characterisation

Extensive work has previously been undertaken to characterise the baseline physical processes and coastal geomorphology within this study area as part of the Beatrice OWF Environmental Statement (BOWL, 2012 & 2013). This previous work has drawn fully from all known available published and 'grey' literature sources (e.g. Ritchie *et al.*, 1978; Ritchie, 1983; Dobbie & Partners, 1990; Hansom & Black, 1994; Riddell & Fuller, 1995; HR Wallingford, 1997; Ramsay & Brampton, 2000; Gemmell, 2000; Gemmell *et al.*, 2001) and whilst the work is not repeated here in full, it can be made available upon request. This section draws from the previous work to summarise the key findings from the earlier baseline characterisation thus:

- The coastline is orientated west northwest to east southeast.
- Portgordon harbour intercepts the westerly littoral drift of shingle. To the east of the harbour is a significant accumulation of shingle against the eastern harbour arm. A shingle beach and, further east still towards Buckie, exposed bedrock shore platform characterise the coastline to the east of the harbour.
- West of the harbour there is a concrete seawall with a sloping apron which is also protected by rock armour. This coastal defence protects properties at the western end of Portgordon. At this location the foreshore is characterised by sandy sediments.

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- The rock armour extends some 50m beyond the seawall to provide protection to the eroding shingle bank, which sits at the top of the sandy foreshore.
- There are two outfall pipes which extend across the foreshore to discharge at sea.
- The shingle berm first emerges at Porttannachy and extends westwards from here to Spey Mouth, becoming progressively higher and wider with distance to the west.
- At Porttannachy, the beach is characterised by a relatively wide inter-tidal area named Tannachy Sands. This is composed of patchy sand overlying a conglomerate rock base. The active shingle berm is a low angled feature at this location, backed by a grassed bank which shows evidence of erosion and overtopping.
- At Tugnet, towards Spey Mouth, the sandy foreshore is entirely replaced by gravel and the coastline is characterised by a high shingle berm.
- The shingle berm has characteristic storm ridges on its seaward face and overwash fans landward of its crest along its entire length.
- Spey Bay is intersected by the outflow of the Burn of Tynet, located approximately 500m west of the eastern end of Tannachy Sands. At the time of the previous baseline assessment report (BOWL, 2012) it was stated that “the stream has maintained its present course since at least 1977”. However, since production of the report, the outfall at the mouth has taken a more easterly deflection before discharging to sea – see Section 1.2, which summarises the notes from a site visit undertaken on 24th August 2016, for further information].
- The previous baseline assessment report (BOWL, 2012) also states that “evidence of undercutting and recession of the [Burn of Tynet] river bend can clearly be seen at the site. This is most likely due to a combination of high fluvial discharges during periods of heavy rainfall and storm wave activity within the drainage outlet across the beach”.
- The net longshore drift direction is westerly, with a modelled potential annual transport rate of approximately 3,000m³ (BOWL, 2012). Waves tend to dominate in driving sediment transport processes as currents are generally too weak to exert much influence.
- However, the magnitude and direction of transport can vary considerably depending on wave climate, indicating the dynamism of the coastal system.
- Historic shoreline evolution, based on mapping of mean high water and mean low water marks from historic Ordnance Survey maps shows that the coastline to the east of the Spey has experienced net recession over the past century. This is consistent with anecdotal evidence of changes at Spey Bay Golf Club, but is in contrast to the coastline west of Spey Mouth which has experienced accretion over the same time period.
- Based on analysis of historic maps and charts, an average annual erosion rate of 0.64m per year was calculated over an 85 year period.
- The beach closure depth (the seaward limit beyond which the sea bed does not form part of the ‘active’ beach profile for sediment transport) was calculated to be at a water depth of 5.8m below lowest astronomical tide (LAT). [Agreement has been reached between BOWL and SNH that 6m water depth shall be used as a basis for assessment].

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2.3 Site Visit

To further develop baseline understanding of the characteristics of the study area, a site visit was undertaken on 24th August 2016 by Dr Nick Cooper (RHDHV) and Naomi Campbell (BOWL). The visit was planned around either side of low water to enable maximum exposure of the foreshore. The visit commenced at Portgordon harbour and proceeded westwards along the foreshore to Spey Mouth, returning to Portgordon along the backshore so that the full context of the environment could be appreciated.

The findings of the previous baseline assessment were corroborated, with one exception. At the time of the site visit, the outlet channel of the Burn of Tynet flowed for a short distance in an easterly direction before straightening at its exit to the beach (Plate 2). Previous maps (including OS Explorer 424) and aerial photographs (see Google Earth) show a braided channel with an initial westerly alignment before straightening and discharging (Figure 3), and the previous baseline assessment report (BOWL, 2012) stated that “the stream has maintained its present course since at least 1977”. It is now known that this localised change in alignment of the mouth is due to a new ‘cut’ being artificially created by the landowner. It is considered that whilst a dynamic process, the potential envelope of different mouth alignments is located within a relatively short length of frontage and that the landfall locations (starting around 350m to the west of the burn) will not be affected, nor will installation at the landfall, affect this dynamism.



Figure 3 – Changes in location of the outlet channel of the Burn of Tynet

During the site visit, it was also thought that storm waves, many of which approach normal (or near-normal) to the shore profile were important processes to consider. Due to the low levels of obliquity with the shore profile, most waves will generally move sediment along an onshore-offshore axis, rather than alongshore. This explains why the potential net longshore drift rates defined by previous modelling of the characteristic wave climate are relatively low at approximately 3,000m³ per annum (in many other areas in the UK dominated by sediment transport, net annual littoral drift can easily be one or two orders of magnitude greater). This

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understanding also helps explain the processes of storm-driven ‘washover’ at the crest of the shingle berm which leads to washover fans on the backshore (Plate 3), and the series of storm ridges which have formed at distinct levels on the seaward face of the shingle berm itself (Plate 4).

During the site visit, the opportunity was taken to record the morphology and sediments at a series of points along a shore-normal transect in the general vicinity of the proposed landfall of the two offshore transmission cables (Annex A). This clearly shows the shingle berm being a high and steep but relatively narrow feature sitting on top of a mid beach characterised by a mixed shingle and sand matrix, with a sandy lower foreshore and nearshore environment (Plate 5). This is in contrast to the shingle berm near to Spey Mouth, where the feature is a much wider structure, with shingle occupying the entire inter-tidal zone (Plate 6). In addition, the gravel clasts on the crest of the berm at the landfall location (Plate 7) are slightly smaller in general than those on the crest at Spey Mouth (Plate 8), although in both cases the clasts are relatively large pebble and cobble sizes and are well-rounded, indicating a relatively long residence time and having being part of an active transport system in the littoral zone. It should be noted, however, that some of the gravels on the delta deposits and berm at Spey Mouth may have been transported down river by fluvial flows in addition to the marine-derived sediments which undoubtedly are present in significant volumes.

With progression westwards along the study area from Porttannachy to Spey Mouth, it becomes apparent that the landfall location represents the approximate start of the shingle berm because the height, width and hence volume of pebble and cobble increases markedly towards Tugnet and Spey Mouth. Any short term disturbance during works would therefore be limited to the periphery of the feature.

2.4 Additional Data Sources

2.4.1 National Coastal Change Assessment for Scotland

The Scottish Government (SG) is currently undertaking a *National Coastal Change Assessment* for Scotland (Rennie *et al.* 2016). Between August and October 2016, Scottish Natural Heritage (SNH) provided BOWL with interim outputs from this study which were intended to inform BOWL about past and projected future projections of coastal change at the landfall site.

This information enabled BOWL to re-assess its previous engineering considerations of suitable set back distance of the Direct Pipe landfall infrastructure. This reassessment was based upon both the new information available from the *National Coastal Change Assessment*, and BOWL’s risk appetite through the 25 years lifetime.

The dialogue between BOWL and SNH on the topic of erosion projections took place on several occasions and concluded with a telephone meeting between Dr. Alistair Rennie (SG/SNH) and Dr. Nick Cooper (technical adviser to BOWL) on 4th October 2016. A record of the dialogue on the erosion projections is presented in a sequential manner in Annex B. A synopsis of the principal findings associated with erosion rates arising from interpreting the outputs from the *National Coastal Change Assessment* project is below:

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- The long term erosion rate for the landfall site is around 0.6m/year (1903 – 2014), measured as the change in Mean High Water Springs (MHWS). This matches well with a rate of 0.64m/year used to inform the engineering design considerations.
- The past epoch which is likely to provide the most appropriate analogue for the likely future changes over the next 25 years is the most recent 25 years. This is because the rates of recent past sea level rise, sediment supply and ground conditions are likely to be most similar to those projected for the next quarter-century.
- The average erosion rate in MHWS over the past 25 years (actually 24 years based on available data between 1990 and 2014) is around 1.24m/year. If this rate is projected over the next 25 years, then the erosion will affect 31m of land.
- As emerging information from the National Coastal Change Assessment project was refined between the first and second outputs, the erosion rate appears to have been altered (increased).
- When SNH were further updated with the most recent survey data provided by BOWL from 2016, the most recent rates of erosion (between 2003 and 2016) were calculated to be 0.9m/year at the western cable (EC2) and 0.6m/year at the eastern cable (EC1).
- If these most recent data are combined with data from 1990 to 2003, the average rates over the past quarter-century (actually 26 years) are 1.35m/year at EC1 and 1.05m/year at EC2.
- Recognising that there could be errors within the calculation of the erosion rates as an inherent consequence of inaccuracies in mapping the position of MHWS from historic data, a further sensitivity test was undertaken to consider the worst case of potential errors acting upon the worst case erosion rate established for any one given epoch.

Based on the above points, BOWL re-assessed its considerations of suitable set back distance for design and construction of the permanent landfall works, taking due account of a range of different projected rates, and sensitivities on those rates associated with uncertainties and errors in data mapping.

In addition and as part of the alternative cable installation methodology, BOWL has used the above to re-assess the depth of burial required to ensure that the cables do not become exposed by the ongoing landward coastal recession or storm-induced erosion events, over the 25 year design lifetime. This issue is further addressed in Section 4.

2.4.2 Geotechnical Investigation

A nearshore ground investigation was undertaken along the proposed export cable route of the Beatrice OWF by Fugro Seacore Limited from 13th February 2015 to 9th April 2015. The investigation was performed from the jack-up drilling platform Aran 120A and involved the drilling of 7 no. boreholes in water depths of between 2.59m to 9.20m. The location of the boreholes is shown in Figure 4 (reproduced from BOWL, 2015a). Borehole depths reached between 18.0m and 35.5m below sea bed level.

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Figure 4 – A reproduction of Fugro's Exploratory Borehole Location Map (source: BOWL, 2015a)

The ground investigation identified conditions which comprise discontinuous deposits of Holocene sand, gravels and silts, over Quaternary Glacial Tills and Outwash Deposits with rest on Devonian Old Red Sandstone (BOWL, 2015b). The particle size analysis of soil samples from the borehole logs, at the sea bed and at depth, resulted in soil descriptions mostly of 'sands' and 'gravels' with varying quantities of silts or cobbles, but there were also some gravelly and/or sandy 'silts' and some gravelly 'cobbles'. The geotechnical data arising from the ground investigations are currently being utilised by BOWL and its technical advisors in planning the cabling operations in the nearshore and at the landfall.

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3 Spey Bay SSSI

Spey Bay is designated as a SSSI, primarily because of its geological interest². This geological interest is specifically attributable to its outstanding geomorphology, representing a site of the highest importance to Scotland for a number of reasons. The Spey Bay citation (SNH, 2012) lists the geology features as follows:

1. The active shingle ridges are the finest in Scotland. These are developed on a massive scale over a distance of 8km and provide almost unique evidence for short and medium-term dynamic coastal processes. [Note the SSSI extends west beyond Spey Mouth a considerable distance towards Lossiemouth].
2. The delta at the mouth of the Spey is a complex and shifting area with a documented history of dramatic changes.
3. The magnificent strand plain of post-glacial shingle ridges records the progressive history of coastal development.

The scale of this development, juxtaposition and inter-relationships of the above three elements makes Spey Bay 'one of the most important coastal physiographic sites in Britain' (SNH, 2012). Full description of the geomorphology of the Spey Bay SSSI is provided by J.D. Hansom in the Geological Conservation Review site report for Spey Bay published by the Joint Nature Conservancy Committee (JNCC). This has been reviewed in detail to inform the present assessments.

The designated site is 458.8 hectares in area and encompasses the delta at the mouth of the River Spey and the gravel deposits to both the west and east. Its cross-shore extent covers the inter-tidal zone and inland beyond, to a variable distance ~10 - 20m landward of the high water mark to encompass the shingle berm.

The following operations which are relevant to the cable landfall works would require consent from SNH within the SSSI:

1. construction of roads, tracks, fences, hardstands, or other earthworks, or the laying or removal of pipelines and cables; and
2. use of vehicles or craft likely to damage or disturb features of interest.

² The Spey Bay SSSI also has designated biological interest features.

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4 Alternative Cable Installation Method

4.1 Background

The installation of the two High Voltage Alternate Current (HVAC) 220 kilo volts (kV) export cables from the Beatrice OWF to the onshore substation at Blackhillock, close to Keith, is expected to commence onshore in 2016. The installation of two pre-installed cable ducts (between 420 to 450 m in length), using Direct Pipe methodology, at the landfall at Portgordon is currently programmed to commence in January 2017 with site set-up, and complete by June 2017.

In support of the cable installation schedule an alternative methodology for an open trench installation method at the landfall has been developed by Nexans Norway, who has been commissioned to deliver and install the two export cables (BOWL, 2016). This alternative method has been developed following analysis of the geophysical and geotechnical surveys and the seismic refraction survey described at the end of this section. Key information relating to the proposed alternative methodology is provided below and in summary form in Table 1.

4.2 Alternative Open Trench Methodology

Under the alternative methodology, it is proposed that 2 no. cables would make landfall approximately 350m to the west of the Burn of Tynet, with each cable separated by a distance of approximately 180m (Figure 6). At each cable location, burial of the cable at landfall would be achieved through open trenching across four distinct zones, namely the hinterland, the shingle berm, the inter-tidal zone and the shallow nearshore (extending seawards to a depth of around 1m below LAT) (Figure 5). The trenching will continue offshore beyond this point, however that element of the cable route does not form part of this Technical Note and has previously been addressed separately as part of the original Marine Licence.

The sediment characteristics of the four zones differ as follows:

- **Hinterland** - comprising ~40cm of topsoil overlaying sand with some gravel.
- **Shingle berm** - predominantly gravel and cobbles, with some sand.
- **Inter-tidal** - characterised predominantly by sand and gravel, with low cobble content. and locally silty patches.
- **Shallow nearshore to 1m below LAT** – as above.

The zones are illustratively shown on Figure 5.

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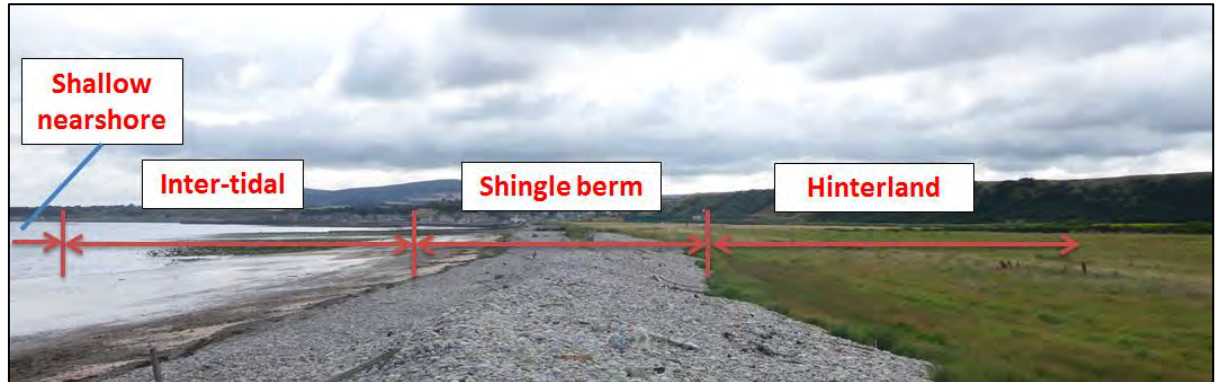


Figure 5 – The four sediment zones identified

4.3 Burial Depths

Cable burial at landfall needs to take due account of both: (i) changes in beach levels that may be associated with individual storms (short term responses); and (ii) net landward migration of the nearshore beach profile and shingle berm over the 25-year planned lifetime of the wind farm (longer term responses). As previously discussed, a highly conservative set back distance for the landfall works of 50m is being adopted for the purposes of the construction works, to account for the longer term response of the shingle berm, informed by the following:

- historic erosion rate including both localised nearshore seabed lowering and landward retreat;
- projected changes in MHWS over time;
- projected sea level rises;
- Scottish Environment Protection Agency (SEPA) flood maps (flooding in area); and
- changes to the river morphology, especially at the mouth of the Burn of Tynet.

Engineering design, which focused on ensuring the integrity of the cables over their 25 year design life, established depths of burial for each of the four distinct zones as follows:

- **Hinterland** – Up to 8m depth to allow landward transgression of the shingle berm, tapering to ~1.3m depth where the landfall cable will align with the land cable through the transition joint bay.
- **Shingle berm** – Up to 8m depth.
- **Inter-tidal** – Up to 3m depth
- **Shallow nearshore** – Up to 2m depth, aligning the landfall cable with the sea cable depth of 1.7m below mean low water (MLW) in a water depth of around 1m below LAT.

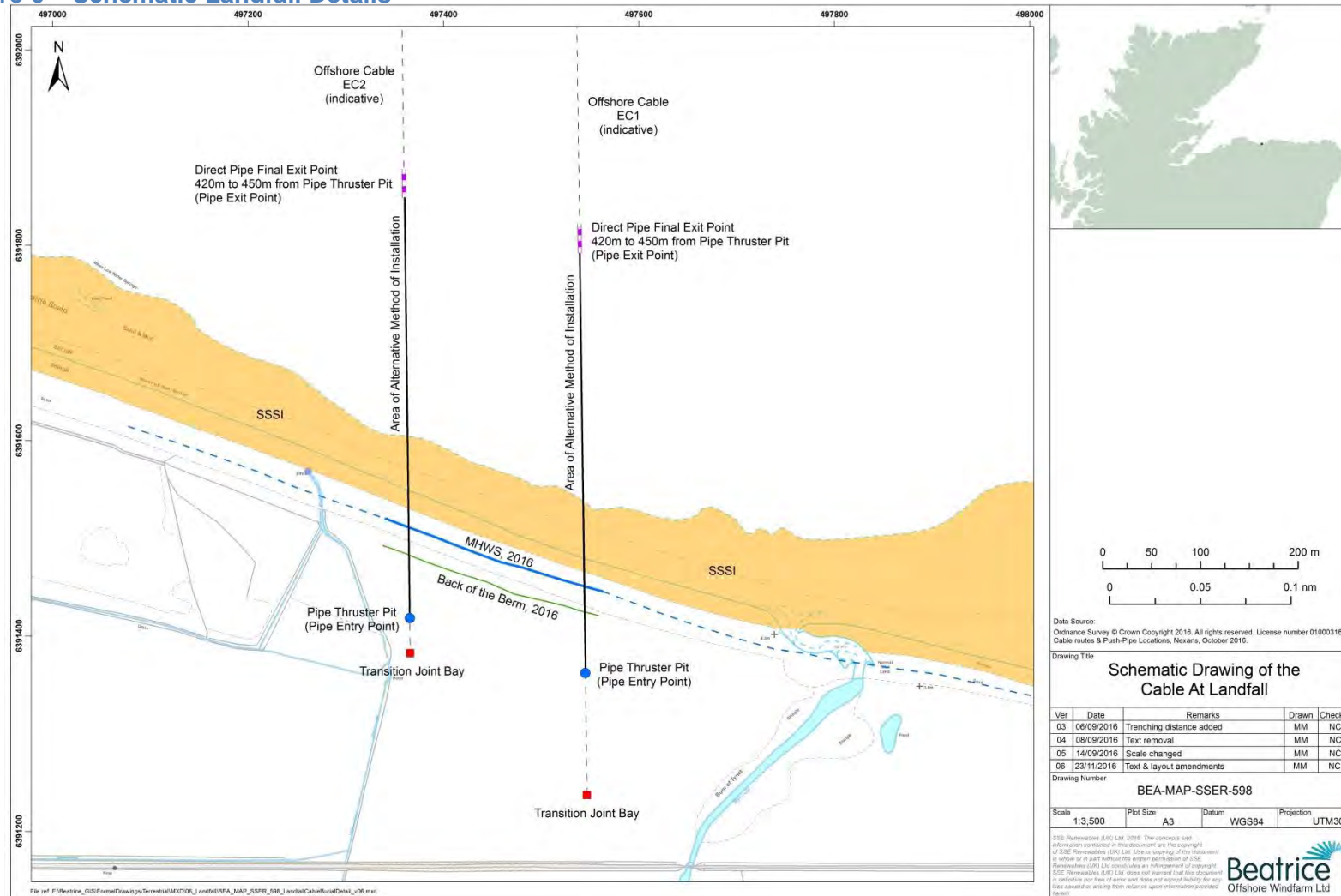
For the locations requiring modest cable burial depths (i.e. those across the inter-tidal and shallow nearshore), the trench is likely to be 1.0m in width at its base. The current thinking is that the trench would be trapezoidal in cross-sectional shape across these locations.

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However, where the trench needs to be considerably deeper (i.e. through the shingle berm and hinterland) two options have been considered: (i) an unsupported trench wall with a trapezoidal cross-section; and (ii) a sheet-pile supported trench wall with a rectangular cross-section. The selection of the preferred approach to burial through the hinterland and shingle berm is discussed later.

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Figure 6 – Schematic Landfall Details



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Table 1 – Summary Information on Construction Method for Open Trenching at Cable Landfall (all values rounded to nearest whole number)

Description	Details	Comments
Number of trenches	2	Export Cable 1 (EC1) (East) and Export Cable 2 (EC2) (West)
Separation of trenches	Approximately 180 m	-
Dimensions of trenches	<p>Hinterland: rectangular trench EC1: 93 m x 4 m x 8 m EC2: 102 m x 4 m x 8 m</p> <p>Shingle berm: rectangular trench EC1: 33 m x 4 m x 8 m EC2: 34 m x 4 m x 8 m</p> <p>Intertidal: trapezoidal trench EC1: 39 m x 4 m x 3 m EC2: 40 m x 4 m x 3 m</p> <p>Subtidal: trapezoidal trench EC1: 255 m x 4 m x 2 m EC2: 244 m x 4 m x 2 m</p>	<p>Length x Width (at base) x Depth (min and max depth values are the same)</p> <p>Hinterland: assumes steel sheet pile supported trench walls</p> <p>Shingle berm: assumes steel sheet pile supported trench walls</p>
Plan area of trenches	<p>Hinterland: EC1: 372 m² EC2: 408 m²</p> <p>Shingle berm: EC1: 130 m² EC2: 137 m²</p> <p>Intertidal: EC1: 157 m² EC2: 162 m²</p> <p>Subtidal: EC1: 1,020 m² EC2: 974 m²</p>	<p>Values for intertidal and subtidal (trapezoidal trenches) will be slightly greater as width at surface will be greater than width at base, however the differences will not be significant due to the shallow depths of these trenches.</p> <p>Total area affected from the Pipe Thruster Pits to MLWS = 1,366 m², of which 586 m² is within the SSSI, representing only 0.013% of the designated site.</p> <p>If only the 'sub-unit' of SSSI between Spey Mouth and Portgordon is considered (covering 44ha), then the total area represents only 0.13% of this 'sub-unit' of the SSSI.</p>
Volume of sediment extracted	<p>Hinterland: EC1: 2,979 m³ EC2: 3,261 m³</p> <p>Shingle berm: EC1: 1,043 m³ EC2: 1,098 m³</p> <p>Intertidal: EC1: 472 m³ EC2: 485 m³</p> <p>Subtidal: EC1: 2,039 m³ EC2: 1,948 m³</p>	<p>All values rounded to nearest whole cubic metre.</p> <p>Total volume of material excavated from the Pipe Thruster Pits to MLWS = 9,337 m³, of which 3,097 m³ is within the SSSI.</p>
Working areas	30 m width (including trench width)	Conservative estimate, with working area running parallel to the trench, from the Pipe Thruster Pits to MLWS.
Storage areas	Two 30 m x 30 m (approx.) areas	Located landward of the SSSI boundary and MHWS.

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4.4 Programme

There are two installation scenarios for the alternative open trench installation approach for the offshore transmission cables:-

- Option 1 involves a phased approach, whereby the first export cable (EC1) would be installed in August/September 2017, with the second cable (EC2) installed in March/April 2018.
- Option 2 involves a simultaneous approach, whereby land excavation works for both EC1 and EC2 are carried out in 2017. However for the EC2 cable a suitable cable duct would need to be installed in the open trench and then back filled and the ground reinstated. Later in March / April 2018 the EC2 cable duct exit would be opened up on the beach and the cable pulled in, followed by nearshore burial works.

Under Option 1, the total duration for the installation of the export cables is 9 months (EC1) and 7 months (EC2) across two years. The last 2 months of each cable's installation would involve nearshore cable burial works only and the sheet piling and inter-tidal trench would be already completed and the areas fully reinstated.

Under Option 2, the works would predominantly take place during 2017 over 9 months (EC1 and EC2 cable duct), with the remaining EC2 works taking place over 4 months in 2018. Similar to above, the last 2 months of each cable's installation would involve nearshore cable burial works only and the sheet piling and inter-tidal trench would be already completed and the areas fully reinstated.

Timescales will be confirmed following appointment of the installation subcontractor.

4.5 In-Built Mitigation

A number of 'mitigations through design' and 'mitigations during construction' have been considered in selection of the appropriate methodology for the open trench method, as discussed below.

- *Mitigation through design – selection of appropriate trenching method*

There are two possible solutions for installing the cable at the landfall through an open trench method. The first is to dig a trench with relaxed side slopes to provide a safe and manageable width within which to work without risk of collapse of the sides of the trench. The other is to use steel sheet piles to support trench walls and hence minimise the overall width of trench.

The second approach has been selected in preference to the first, throughout the hinterland and shingle berm, because the use of supported walls helps to minimise the extent of excavation that is needed in the loose and unconsolidated sediments, where the depth of cable burial needs to be considerably greater (up to 8.0m) than for the inter-tidal or shallow nearshore zones. For example, for each cable the total work area (trench plus transport area either side) for the unsupported wall option would be 75m wide, whereas for the supported wall option this is reduced to a 30m total work area width, with the trench itself through the sheet piled section only needing to be 8m wide at its base. Not only would this reduce the plan area of disturbance but it would also significantly reduce the volume of material that will need to be excavated, temporarily stored and then replaced. As the depth of burial in the inter-tidal and shallow nearshore areas is not so great, there are no such

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advantages in the use of steel sheet piles to support trench walls and hence they will be unsupported. In fact, the use of steel sheet piles in these areas would potentially have (minor) adverse effects on sediment transport within the littoral zone. Consequently the length of the sheet piles will extend across the hinterland and shingle berm, but terminate at the toe of the shingle berm. The sheet piles would stand proud of the land surface across the hinterland and shingle berm. There is, therefore potential for some interruption of longshore sediment transport (although longshore sediment transport rates are low and much of what occurs does so between MHWS and MLWS and less so on the shingle berm itself, which is more dominated by cross-shore sediment transport during storms which cause the longer-term 'rollback' of the berm over time).

- *Mitigation through design – landward set back distance*

An observed long term erosion rate of 0.64m per year has previously been derived from analysis of historic maps (BOWL, 2012). For the purposes of design of the landfall works, this rate was translated into a highly conservative set back distance for the landfall works of assuming 50m recession over 25 years, measured from where the landward limit of shingle washover fans meets the vegetation edge of the hinterland in the present day (2016). This was calculated as follows:

- Long term erosion rate = 0.64m/year, rounded up to 0.7m/year for conservatism
- 25 years x 0.7m/year = 17.5m erosion
- Factor of safety = 2.0
- $2.0 \times 17.5\text{m} = 35\text{m}$
- Additional contingency = 15m
- Total set back distance = $35\text{m} + 15\text{m} = 50\text{m}$ measured from the back of berm

In addition, there is a (variable) distance of circa 25m between this point and the mark of mean high water springs (MHWS) on the seaward face of the shingle berm.

Since establishing a 50m set back distance (from the back of berm) for the permanent landfall infrastructure, outputs have become available from the Scottish Government's National Coastal Change Assessment (as previously discussed in Section 2.4.1).

Due to this a re-assessment of the landward set back distance has been undertaken (see Annex B) in light of this emerging information, taking due account of a range of different projected rates and sensitivities associated with uncertainties and errors in data mapping. After this re-assessment BOWL remains confident that its use of a 50m set back distance measured from the back of berm is a suitably conservative approach given the inherent uncertainties in extrapolating past rates into future projections.

Re-analysis of BOWL's engineering design following establishment of the erosion rates and the set-back distance confirmed the suitability of the depths of burial across each of the four distinct zones. This is further described below.

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- *Mitigation through design – cable burial depth*

The cable burial depth has been designed to accommodate anticipated erosion over the 25 year lifetime of the development in terms of both vertical (downward) lowering and horizontal (landward) recession of the active beach profile.

To assess the suitable cable burial depth between the toe of the shingle berm and the closure depth of the active beach profile under storm wave action, it would be ideal to have bathymetric data covering the seabed over at least two (and ideally more) successive surveys separated by a suitable gap in time to capture seasonal, annual or decadal scale changes. However, in the absence of such data an alternative is to use widely adopted empirical 'rules of thumb' relating to the maximum potential depth of sediment disturbance (sometimes referred to as the 'mixing depth') at the shore or seabed caused by waves of a certain maximum theoretical height. This can be used as proxy for the maximum potential seabed lowering during short-term storm events.

However, just because the sediments could theoretically be disturbed to this depth does not mean that the shore or seabed will change its morphology and, in fact, more usually most disturbed sediment will settle rapidly back down with no net resulting lowering of the shore or seabed. Notwithstanding this, it is recognised that material infilling the cable trench between the toe of the shingle berm and the depth of closure may be less consolidated than the surrounding sediment and therefore may more readily be quarried by waves. Consequently, applying this approach provides a useful check on the indicative order of burial depth that may be required to avoid a cable being exhumed by storm waves.

The empirical approach considers the maximum attainable depth-limited wave in shallow water in flat seabed regions using the simple 'rule of thumb' developed by Nelson (1994):

$$h = d * 0.55$$

Where:

h = wave height (in m)

d = water depth (in m)

It then applies a further simple 'rule of thumb' to determine the maximum depth of disturbance (also known as mixing depth) under the maximum attainable wave height, based upon the research of Ferreira *et al.* (2000):

$$z = h * 0.23$$

Where:

z = depth of sediment disturbance (in m)

h = wave height (in m)

Note: The above relationship between wave height and depth of sediment disturbance is similar to other researchers' findings in areas with steep bed gradients, but yields results

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significantly greater than those observed on gentle bed gradient. It must therefore be considered highly conservative for the very gently sloping seabed between the exit point and closure depth of the active beach profile at Spey Bay. In fact Ferreira et al. (2000) found in their tests that the results from the equation were around 8 times greater than those observed in areas of gentle gradients.

Application of these simple empirical 'rules of thumb' to conditions at the exit point and at the closure depth provides the results shown in Table 2.

Table 2 – Maximum potential depth of sediment disturbance by waves

Location	Maximum attainable water depth at HAT (m)	Maximum attainable wave height (m)	Maximum depth of disturbance (m)
-1.1m LAT (EC1)	5.0 (EC1)	2.75 (EC1)	0.63 (EC1)
-1.0m LAT (EC2)	4.9 (EC2)	2.70 (EC2)	0.62 (EC2)
Closure depth			
-6.0m LAT (EC1 & EC2)	9.9	5.45	1.25

The water depth at Highest Astronomical Tide (HAT) represents the worst case for maximum attainable wave heights. The maximum attainable water depth at HAT has been calculated using the water levels presented in the UK Hydrographic Office's Admiralty Tide Tables for 2016. The nearest Standard Port to the landfall site is at Fraserburgh (where Chart Datum (CD) is 2.20 m below Ordnance Datum Newlyn. The water levels stated are:

- LAT = 0.4 m above CD
- MLWS = 0.8 m above CD
- MLWN = 1.5 m above CD
- MSL = 2.3 m above CD
- MHWN = 3.0 m above CD
- MHWS = 3.8m m above CD
- HAT = 4.3 m above CD

The above assessment shows that the target burial depths (3m across the inter-tidal, 2m across the nearshore subtidal to a water depth of around 1m below LAT and 1.7m thereafter to the closure depth) are considerably lower than the maximum theoretical depth of sediment disturbance at these locations.

Furthermore, a suitable factor of safety exists between the theoretical maximum depth of seabed disturbance and the depth of cable burial. This should ensure that the cable remains buried between the toe of the shingle berm and the depth of closure of the active beach profile throughout the 25 year operational life of the development in respect of storm wave action.

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The inter-tidal shore and seabed is understood, through site visits and bathymetric and geophysical surveys, to be relatively flat and featureless, but the formation of bar/swale features cannot necessarily be discounted during storm events. Nonetheless the wave heights of these features on the bed or shore are small (order of centimetres to a few tens of centimetres) and such features would not cause the cable to become exposed.

In order to assess maximum potential seabed changes in the longer term associated with landward transgression of the active beach profile, a digital ground model has been developed using the available topographic, bathymetric and geological data of the hinterland, shingle berm, inter-tidal and near-shore seabed along a transect for each offshore transmission cable, extending seawards to the closure depth at 6m water depth.

A translation approach has then been undertaken to relocate the whole transect, from back of the berm to the depth of closure, landwards by a distance of 50m. This translation distance was determined using the methods previously described and has been re-assessed in light of emerging evidence from the Scottish Government's National Coastal Change Assessment project in the manner previously described earlier in this section.

This approach represents a pragmatic means of assessing the profile response to landward transgression adopting the principles of conservation of mass and continuity of form and function. The fact that the approach does not incorporate longshore sediment transport is not considered a fundamental constraint on its applicability to Spey Bay because the longshore transport rates are relatively low, estimated at approximately 3,000m³ per annum (BOWL, 2012).

The landward translation model does simplify the processes which control the migration of the profile, and especially the shingle berm, but it is considered that these processes are inherently incorporated within the determination of long-term erosion rates. For example, the 'roll-back' of the shingle berm will not likely be associated with an ongoing, progressive change, but is more likely to be governed by episodic storm events that force pebbles and cobbles to wash over the crest of the berm and form wash-over fans on the landward side (Orford & Anthony, 2011). However, these processes will have occurred in response to storms in the past and therefore are inherently incorporated within a net average long term rate of recession.

Furthermore, the landward translation model is deemed conservative because only a horizontal component has been incorporated. The 'Bruun Rule' for coastal retreat under rising sea levels (Bruun, 1954; 1962; 1988), which forms the underlying basis of the landward translation model, assumes that as the recession occurs material eroded from the upper shore will become deposited on the lower shore and near-shore and thus the whole profile will experience a vertical shift upwards in its position as the landward translation occurs. This vertical component has been omitted from the landward translation model considered here, partly because the shingle berm will not necessarily behave in this manner (it is more likely to roll-back under storm wave action) and partly because the 'uplift' component in the Bruun Rule is due primarily to sea level rise. At Spey Bay the rates of sea level rise over the next quarter-century are projected to be relatively low and there is a good level of confidence in projections over such timescales. Confidence in climate change projections decreases with progression into the future, say 50 years and especially 100 years.

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With the above in mind, the landward translation model represents the most pragmatic (and arguably only technical feasible) means of assessing whether future changes in the seabed over a 25 year operation life will impact upon cable exposure. The important point is to recognise the uncertainties associated with the projections and ensure that a sufficient factor of safety is built into the design.

Reflecting this approach, it is possible to determine the change in seabed level between the present and future projected active beach profile after landward translation of the profile by a conservative distance of 50m. Along both EC1 and EC2 the change in sea bed level due to the landward translation is < 0.2m at any point between the final exit point and further seawards across the active beach profile over the 25 year operation life of the Development. Within the zone between MLWS and LAT there can be occasional 'high points' in the bathymetry due to the presence of minor swale or bar features, but these only protrude a height of approximately 0.3m above the sea bed and when combined with the general 0.2m (maximum) lowering over 25 years, the total change in sea bed level can be of the order of 0.5m locally within this nearshore zone. The above assessment shows that the target burial depths (3m across the inter-tidal, 2m across the nearshore subtidal to a water depth of around 1m below LAT and 1.7m thereafter to the closure depth) are well below the maximum theoretical extent of seabed change at these locations. This should ensure that the cable remains buried between the toe of the shingle berm and the depth of closure of the active beach profile throughout the 25 year operational life of the development in respect of storm wave action.

In addition to the need to ensure the cable remains buried between the toe of the shingle berm and the depth of closure of the active beach profile, it is also important to ensure that the cable remains buried below the shingle berm and hinterland as the shingle berm translates landward.

Figure 7 shows detail of the 50m landward translation of the active profile in the vicinity of the shingle berm. The maximum change in surface level at any point along these sections due to the translation is 5.3m (directly under the moving crest of the shingle berm). This value, plus a further minimum 1m residual burial sets the minimum burial depth to avoid re-exposure of cable to be 6.3m.

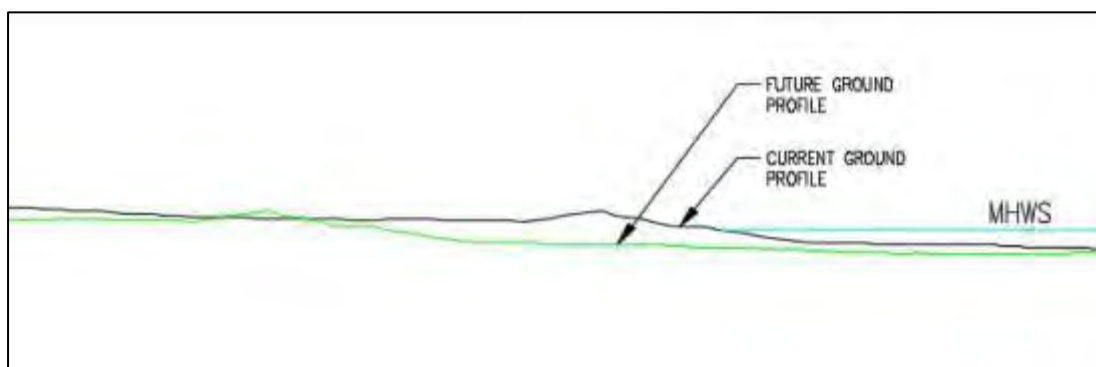


Figure 7 – Landward translation of the shingle berm by a set back distance of 50m

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The above assessment demonstrates that the cable is designed to be buried at a sufficient depth (8m) below the hinterland and shingle berm to accommodate the longer term landward transgression of the profile in the vicinity of the shingle berm without re-exposure of the cable.

- *Mitigation during construction phase – selection of appropriate construction plant*

Consideration has been given by Nexans Norway (construction contractor) to the plant that it may use during the trenching operations. Whilst the exact detail will not be known until subcontractors have been appointed, it is likely that a number of excavators, dumpers and cranes/winches would be required. In particular, there is an intention to use a Menzi Muck in preference to an excavator in the areas between (around) MLW and 1m below LAT. In this location, a Menzi Muck is more manoeuvrable and has the ability to work in 1- 2m water depth. Selection of appropriate plant would reduce the potential for over-excavation and reduce time delays during construction. Figure 8 below shows a Menzi Muck of a type similar to that proposed for the alternative installation method.



**Figure 8 – Menzi Muck of type proposed for excavation work in the lower shore
(image courtesy of Nexans Norway)**

- *Mitigation during construction phase – working and stockpiling areas*

Working and stockpiling areas would be kept to a minimum size during the construction phase. This would reduce the potential for adverse effects associated with a 'direct footprint' on the designated areas by keeping plant/stockpiles off the SSSI and minimising working/stockpiling within it. A preliminary estimate is that a stockpiling area for each of the two cables would need to be approximately 30m by 30m in plan area, with these temporary

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stockpile areas being located well inland of the SSSI boundary. The working area for transport/access would need to be 30m wide (including the trench width), running parallel to the trench.

- *Mitigation during construction phase – soil handling*

In so far as is practicable, excavation of material along each trench would be undertaken in separate sediment layers and material of different grades would be stored separately within the temporary stockpile area for the respective cables.

- *Mitigation during construction phase – reinstatement*

Reinstatement of the shingle berm, inter-tidal beach and shallow nearshore seabed is likely to be a key consideration when ensuring that SSSI is not significantly impacted in the medium to long term, despite the inevitable short term and localised disruption that will occur using this method of cable installation. Reinstatement will be undertaken on a 'layer by layer' basis in reverse order to the excavation sequence. This reduces potential for adverse effects on the sediment structure of the shingle berm within the affected area.

4.6 Surveys and Studies

In addition to the in-built mitigation above, a number of further surveys and studies have been undertaken to further inform understanding of the environment and in so doing influence the development of the installation methodology. These are:

- *Export Cable Geophysical and Geotechnical Survey*

A geophysical and geotechnical survey was undertaken along the proposed export cable route (and inter-array cable routes) of the Beatrice OWF by MMT in August and September 2015. The geophysical survey comprised bathymetric, side scan sonar and sub-bottom profiling data collection (also with transverse gradiometer for unexploded ordnance (UXO) detection). A Remotely Operated Vehicle (ROV) was also used to acquire video imagery of the sea bed. The geotechnical survey comprised vibrocore samples and cone penetrometer tests. The geophysical and geotechnical data arising from the survey are currently being utilised by BOWL and its technical advisors in planning the cabling operations in the nearshore and at the landfall.

- *Export Cable Seismic Refraction Survey*

A seismic refraction survey was undertaken along the landward section of the cable in May 2016 and along the marine section of the cable in June 2016 to inform cable installation design at the landfall.

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6 Geomorphological Assessment

Based on the available information presented in this document, the potential effects that may occur to the SSSI are described and assessed in relation to construction stage effects, operation & maintenance stage effects and decommissioning stage effects.

6.1 Construction Stage

- **Trenching activities may directly damage or disturb geomorphological features of the Spey Bay SSSI**

It is considered that this potential impact is not likely to have a significant effect on the environment, taking into account the criteria in Schedule 1 of the EIA Regulations, for the following reasons.

In terms of the extent of the impact, the total plan area affected by trenching from the Pipe Thruster Pits to MLWS will be 1,366 m², of which 586 m² is within the SSSI. This represents 0.013% of the designated site and therefore the extent of the impact is very small. Even when considered over only the 'sub-unit' within the SSSI between Spey Mouth and Portgordon (covering 44ha), then the total area directly affected by trenching represents only 0.13%. There is then a further very small area of shallow nearshore seabed affected (1,994 m²), but this will rapidly infill naturally with sediment under the routine daily tidal and wave regime.

In terms of duration, frequency and reversibility of the impact, disturbance will be relatively short term (up to 7 months in 2017 and an additional 5 months in 2018 as a worst case), occurring over one installation event per cable, and will be temporary, since there are viable proposals to reinstate the morphology of the shingle berm and intertidal zone affected by the trench following installation of the cables.

For these reasons, and due to the designed-in mitigation measures previously described, it is considered that there will be no likely significant effects on the geological features for which the Spey Bay SSSI is designated from this impact.

- **Construction working areas may directly damage or disturb geomorphological features of the Spey Bay SSSI**

It is considered that this potential impact is not likely to have a significant effect on the environment, taking into account the criteria in Schedule 1 of the EIA Regulations, for the following reasons.

In terms of the extent of the impact, the total potential construction working area across the shingle berm could extend to 2,007 m² as a worst case and a further 2,370 m² across the inter-tidal zone. However, construction will not take place across the full corridor for the full construction period, with many areas either un-impacted, or left undisturbed and able to recover for a period of time after initial impacts.

In terms of duration, frequency and reversibility of the impact, disturbance across the working area will be relatively short term (up to 7 months in 2017 and an additional 5 months in 2018 as a worst case), occurring over one installation event per cable, and temporary.

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Following cessation of works it is expected that the behaviour characteristics of the directly affected areas will be reinstated naturally within a few tidal cycles (for the intertidal area) or after a few storm events (for the shingle berm).

For these reasons, and due to the designed-in mitigation measures previously described, it is considered that there will be no likely significant effects on the geological features for which the Spey Bay SSSI is designated from this impact.

- **The presence of temporary storage areas may directly damage or disturb geomorphological features of the Spey Bay SSSI**

It is considered that this potential impact is not likely to have a significant effect on the environment, taking into account the criteria in Schedule 1 of the EIA Regulations, for the following reasons.

In terms of the extent of the impact, the temporary storage areas will occupy an indicative total plan area of 1,800 m² but these sites will be located landward of the SSSI boundary.

In terms of duration, frequency and reversibility of the impact, disturbance will be relatively short term (up to 7 months in 2017 and an additional 5 months in 2018 as a worst case), occurring over one installation event per cable, and will not affect the Spey Bay SSSI, lying landward of the SSSI boundary.

For these reasons, and due to the designed-in mitigation measures previously described, it is considered that there will be no likely significant effects on the geological features for which the Spey Bay SSSI is designated from this impact.

- **Cable installation activities may affect sediment transport processes**

The temporary presence of the trench and (where present across the shingle berm only) the temporary presence of the steel sheet piling both create the potential for some interruption of longshore sediment transport. (The sheet piling across the hinterland will not affect these processes but the sheet piling through the shingle berm, seaward to its toe, will be proud of the land surface). It is considered that this potential impact is not likely to have a significant effect on the environment, taking into account the criteria in Schedule 1 of the EIA regulations, for the following reasons.

The works are at the eastern end of this sediment transport pathway and net transport rates are relatively low. With the trench/sheet piles being present for up to 7 months in 2017 and an additional 5 months in 2018 as a worst case, additional mitigation measures are recommended, including monitoring of sediment levels and accumulation on either side of the trench/sheet piles, and the use of sediment bypassing in the form of an excavator removing and relocating accumulated sediment to enable the continuous feed of the sediment transport system. With such a vast volume of sediment available elsewhere within Spey Bay, any effects of the trenching on sediment transport processes are likely to be minor.

Due to the duration of the trenching and/or sheet piling works, there is the potential that one or more major landforming storms could occur while the trench or the sheet piles are in place. However, most storm waves approach relatively perpendicularly to the shore and over the shingle berm (where sheet piles will be present) these waves govern more the onshore to offshore transport of sediment, moving it up and over the crest of the shingle berm to create washover fans. This process will only be inhibited directly in the footprint of

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the trench and piles. It is theoretically possible, however, that a storm, or storms, could occur with a wave approach angle that is oblique to the shore. In this case there is potential for either the open trench or the sheet piles to interrupt modest rates of sediment transport. Under such events, sections of trench will likely become partially or totally infilled in unsupported (open) sections (i.e. those areas that are open across the inter-tidal and shallow seabed during this process) and may interrupt longshore sediment transport where the sheet piling is present through physical 'blockage'. Due to this, the proposed additional mitigation measures recommended above, involving monitoring of sediment accumulation on either side of the trench/sheet piles, and the use of sediment bypassing operations, will ensure the continuous feed of the sediment transport system. Due to this mitigation, any effects of the trenching and piling during major landforming storms on sediment transport processes are likely to be minor and these effects will be mitigated a short time after the storm has passed.

When the trench is infilled and, where present, when the sheet piles are removed, the morphology of the shingle berm and intertidal zone will be reinstated and there is not expected to be any further effects.

Taking into account the additional mitigation measures noted above, it is considered that there will be no significant impact upon longshore sediment transport processes within Spey Bay as a result of the temporary presence of the trench.

- **Cable installation activities in the intertidal and subtidal zones may increase SSC within the water column and deposit material on seabed**

It is considered that this potential impact is not likely to have a significant effect on the environment, taking into account the criteria in Schedule 1 of the EIA regulations, for the following reasons.

In terms of the extent of the impact, it will be limited in spatial extent to the length of the trench and, for deposition, a short distance either side. It will be limited in temporal extent to a short duration of trenching and backfilling activity.

Furthermore, the location of the trenching in the intertidal and subtidal zones is an area of breaking wave activity where sediment transport is most likely to occur (although this natural process is limited in magnitude) and hence there would be relatively high SSC levels in these zones under baseline conditions.

The temporary and localised increase in SSC and associated deposition is not likely to be beyond the range of conditions naturally experienced due to varying wave climate under the baseline conditions.

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6.2 Operation and Maintenance Stage

- **Cable exposure and the need for re-burial**

Cable burial depths have been determined based upon an understanding of both the maximum theoretic depth of seabed disturbance across the inter-tidal shore and nearshore seabed and a conservative estimate of future landward transgression (sometimes referred to as 'rollback') of the shingle berm across the hinterland. These considerations should ensure that the cable remains buried over this time period and exposure is not experienced and therefore re-burial is not required. There will therefore be no impacts arising from the cable during the 25 year operational lifetime of the development.

However, if in the future the cable is exposed or at risk of exposure at any point seaward of the toe of the shingle berm, the cable could be reburied by undermining the cable either using localised excavation or water jetting techniques. This would effectively lower the cable within the sediments.

6.3 Decommissioning Stage

After the 25 year operational life of the wind farm, the cable will then either be left in situ (in which case there will be no decommissioning impact) or replaced/removed. In the latter event, the potential impacts of decommissioning will be of a similar nature and magnitude to those discussed above for cable installation.

6.4 Summary

While there will be disturbance within the construction area, and a portion of that disturbance will also be within the SSSI, this disturbance will be short term, temporary (recoverable) and localised. Mitigation by design will be the main tool to manage impacts within the SSSI and in particular impacts to the shingle berm, through those measures detailed earlier, in Section 3. The adoption of wider best practice and construction mitigation practices will also help to minimise wider generic construction impacts on the hinterland, shingle berm, inter-tidal zone and nearshore seabed.

Due to appropriate cable burial depths, which take due consideration of both short-term changes (i.e. storm-induced shore or seabed lowering) and longer-term changes (i.e. landward transgression of the shingle berm and active beach profile), there will be no impacts throughout the 25 year operational lifetime of the development.

The proposed in-built mitigation is considered sufficient to allow prediction of no likely significant effect on the geological features for which the Spey Bay SSSI is designated, although as good practice wider mitigation should be considered.

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7 Wider Mitigation

The alternative cable installation methodology proposes a series of mitigation methods that have been incorporated in the design and planning of the works or will be executed during the construction of the works. These in-built mitigations have resulted in the conclusion that there will be no likely significant effect on the geological features for which the Spey Bay SSSI is designated. Despite this, it always remain appropriate to consider good practice approaches during construction that will further minimise any potential effects arising from the project.

The first recommended good practice mitigation relates to reinstatement of the trench following cable laying. The proposed methodology allows for the trench to be backfilled with sediments in layers, in reverse order to the excavation sequence, and for each layer, or each 0.5m depth of reinstated soil to then be compacted.

As a result of the review undertaken to produce this document, it is now recommended that reinstated sediments on the shingle berm portion of the cable route are not compacted. This is because the structure of the sediments within the shingle berm is presently naturally sorted, leading to high porosity. This enables percolation of tidal water through the interstices between gravel and cobble clasts and is a fundamental reason why these geomorphological features are so effective at attenuating incoming wave and tidal energy. The natural dynamism of a shingle berm helps it to respond naturally to storm wave action by modifying its morphology through the washover process and, over time, enables the landward 'rollback' processes of the feature as an entity to continue unabated. If compacted, the grain size sorting and porosity of shingle berms can be adversely altered, causing reflection, rather than absorption, of incoming energy and this can lead to problems of 'cliffing' within the seaward face and seaward loss of material.

There are no similar concerns on the inter-tidal or shallow nearshore areas seaward of the shingle berm or on the hinterland, where compaction of the backfilled trench could occur.

The second recommended good practice mitigation relates to monitoring of sediment accumulation against the eastern sheet piles, where and when present across the shingle berm, and sediment bypassing in the form of an excavator removing and relocating accumulated sediment beyond the trench to the west to enable the continuous feed of the sediment transport system. Although the effects of the temporary presence of the trench and (for the shingle berm only, the temporary presence of the sheet piling) are not likely to have a significant effect on the environment, the recommended actions are deemed good construction practice and will ensure any (low magnitude) impact that may arise is rapidly mitigated with no long-lasting adverse effects.

Geomorphological Assessment of Alternative Landfall Option

8 Conclusions and Recommendations

- Cable installation at the landfall is planned near the eastern extremity of the Spey Bay SSSI, where the shingle berm is at its lowest height and narrowest width, and potential impacts are therefore minimised. Activities at this location will have minimal potential effect on the remainder of the SSSI, and is preferred when compared to the potential impact of undertaking work further to the west in the SSSI.
- The installation method of open trenching will undoubtedly cause temporary, localised disturbance to the hinterland, shingle berm, inter-tidal beach and shallow nearshore seabed. This will primarily be in the form of a direct 'footprint' of disturbance caused by:
 - (i) trenching;
 - (ii) working areas; and
 - (iii) temporary stockpiling areas.

However, there is considered to be no significant impact upon longshore sediment transport processes within Spey Bay as a result of the temporary presence of the trench. This is because longshore drift rates are relatively low and the works will be for a temporary and short duration. Trenching activities directly on the hinterland and shingle berm will be for a small number of months. Sediment transport processes will be fully reinstated once the trench has been infilled. This type and scale of potential interruption to a modest rate sediment transport at the very eastern extremity of the feature is well within the range of natural variability experienced in transport rate based on differences in wave height and direction.

- Appropriate mitigation has been built-in to the design/planning and will be adopted during the construction phase. This will further minimise any potential impacts.
- The proposed mitigation by design is sufficient for the landfall cable installation activities to be considered unlikely to have a likely significant effect on the geological features for which the Spey Bay SSSI is designated.
- In addition to the proposed mitigation by design, wider good practice mitigation is recommended which will: (i) prevent compaction of sediment layers in the trench through the shingle berm during reinstatement. This will contribute to ensuring that the porosity of the structure is not unduly affected by the reinstatement works and that the berm retains its percolation properties; and (ii) monitoring accumulation of sediment against the eastern face of the sheet piling (where and when present) and the bypassing of any accumulated sediment across the trench/piling to the west to continue to feed the (low magnitude) sediment transport system.
- Baseline and post-works topographic surveys of the affected hinterland, shingle berm and inter-tidal will be considered to ensure that the reinstated morphology matches the baseline as closely as possible. Achievement of such reinstatement will mean that no long term impact on sediment transport patterns will be experienced.

Geomorphological Assessment of Alternative Landfall Option

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PLATES

Geomorphological Assessment of Alternative Landfall Option



Plate 1 – Gravel accretion on eastern side (left of image) of Portgordon harbour wall



Plate 2 The mouth of the Burn of Tynet

Note the initial eastward alignment behind the gravel ridge before discharging across the foreshore

Geomorphological Assessment of Alternative Landfall Option



Plate 3 – Washover fans to the rear of the gravel barrier



Plate 4 – Storm ridges on the seaward face of the gravel barrier
(note the rack marks to help distinguish the different storm ridges in the photograph)

Geomorphological Assessment of Alternative Landfall Option



Plate 5 – Narrow gravel barrier at landfall



Plate 6 – Wide gravel barrier near Spey Mouth

Geomorphological Assessment of Alternative Landfall Option



Plate 7 – Typical clast sizes on crest of gravel barrier at landfall location



Plate 8 – Typical clast sizes on crest of gravel barrier at Spey Mouth

Geomorphological Assessment of Alternative Landfall Option

Annex A: Morphology and sediments along a transect at the landfall location

- A** back of shingle berm
- B** crest of shingle berm
- C** upper seaward face of shingle berm
- D** mid seaward face of shingle berm
- E** lower seaward face of shingle berm berm
- F** upper inter-tidal (just seaward of toe of shingle berm)
- G** upper mid inter-tidal
- H** lower mid inter-tidal
- I** lower inter-tidal

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Annex B: BOWL and SNH discussions regarding erosion projections

B1 Background

The Scottish Government (SG) is currently undertaking a *National Coastal Change Assessment* for Scotland (Rennie *et al.* 2016). Between August and October 2016, Scottish Natural Heritage (SNH) provided BOWL with interim outputs from this study which were intended to inform BOWL about past and projected future projections of coastal change.

This information enabled BOWL to re-assess its previous engineering considerations of suitable set back distance, based upon both the new information and BOWL's risk appetite through the 25 year lifetime of the project.

The dialogue between BOWL and SNH on the topic of erosion projections took place on several occasions and concluded with a telephone meeting between Dr. Alistair Rennie (SNH) and Dr. Nick Cooper (technical adviser to BOWL) on 4th October 2016.

Both parties agreed that it would be useful to present the development of the thinking on the issue in a sequential manner, reflecting the evolving nature of the outputs. However, it was felt most appropriate that this information would be best presented in this manner in the form of a Technical Appendix to any submitted reports, with a brief synopsis of the approach and conclusion summarised in the main report.

This Technical Appendix presents the dialogue on the erosion projections in a sequential manner and each sub-section concludes with a re-appraisal of the set back distances used in BOWL's design of the infrastructure at the cable landfall based upon the information presented at that stage.

B2 National Coastal Change Assessment for Scotland (first outputs)

In August 2016, SNH provided an image to BOWL showing that project's interim historic erosion assessments from its *National Coastal Change Assessment* superimposed upon an aerial image of the cable landfall area taken from the onshore planning application (reproduced here as Figure B1). It is noticeable that SNH very usefully broke down the historic rates of change in position of Mean High Water Springs (MHWS) under different epochs, as shown in Table B1, rather than solely providing a long term average between the earliest and most recent dates.

Geomorphological Assessment of Alternative Landfall Option

Table B2 – SNH's Assessment of Historic Erosion Rates of MHWS at Landfall Location

Start Date	End Date	Retreat distance (m)	Average annual rate (m/yr)
1903 (historic maps)	1990 (OS map)	37	0.43
1990 (OS map)	2003 (Lidar)	20	1.54
2003 (Lidar)	2014 (aerial photo)	9.7	0.88
Additional calculations			
1990 (OS map)	2014 (aerial photo)	29.7	1.24 most recent 25 year period
1903 (historic maps)	2014 (aerial photo)	66.7	0.60 long term (century scale) average

* Note that all data have spatial errors (see figure for details)

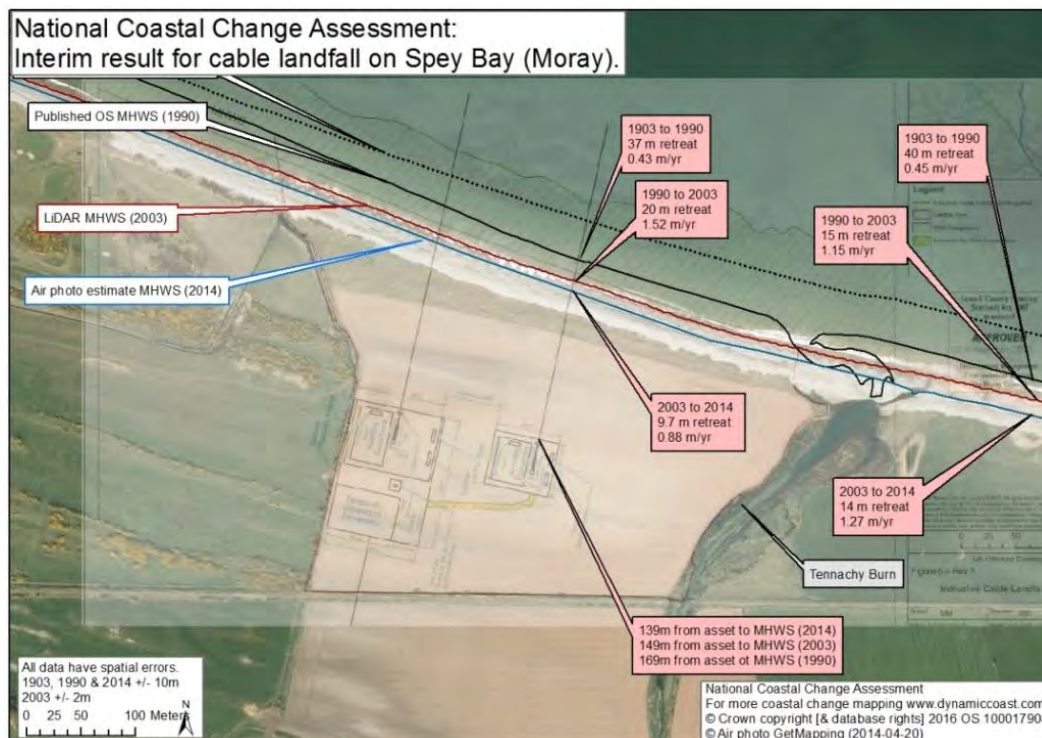


Figure B1 – A reproduction of SNH's First Assessment of Historic Erosion Rates of MHWS at the Landfall Location

Geomorphological Assessment of Alternative Landfall Option

In addition to the data provided by SNH, the long term recession rate of MHWS over the period 1903 to 2014 has also been calculated and presented in this table, together with a rate for the most recent quarter-century period, namely 1990 to 2014. The latter may be the most representative of the likely rates over the next quarter of a century, since the sea level, sediment supply and ground conditions will be most similar to those experienced during that period.

Whilst noting the inherent uncertainties and inaccuracies in the analysis, the resulting long term average value of 0.60m/year between 1903 and 2014 is highly consistent with a value of 0.64m/year determined from analysis of historic OS maps and bathymetric charts during assessments in relation to the Shetland HVDC Link project (ABPmer, 2009), which informed the BOWL Environmental Impact Assessment. It is also broadly comparable to slightly higher level estimates by Hansom and Black (1994) of 0.74m/year loss between 1960 and 1994 at Spey Bay Golf Club.

Even using the average rates from the most recent quarter century, which are higher than the long term average by a factor of approximately 2, the erosion of MHWS would be 31m over the next 25 years, with a sufficient remaining 'buffer' of over 30m between the landfall works (set back 50m from where the landward limit of shingle washover fans meets the vegetation edge of the hinterland in the present day) and the projected position of MHWS in 25 years' time, taking a width between this vegetation edge and MHWS of approx. 10m as a minimum (conservative) value.

Using the maximum average annual erosion rate calculated by SNH for any one time period, namely 1.54m/year between 1990 and 2003, the recession of MHWS over 25 years would be 38.5m, with a remaining buffer of over 20m between the landfall works (set back 50m from where the landward limit of shingle washover fans meets the vegetation edge of the hinterland in the present day) and the projected position of MHWS, taking a similar width between this vegetation edge and MHWS as above.

Based upon the above analysis, a landward set back distance of 50m for the landfall works is deemed suitably conservative by BOWL for the 25 year operational life of the Beatrice OWF even under the worst case recession over the short-term presented in Table 1 of 1.54m/year.

B3 National Coastal Change Assessment for Scotland (second outputs)

At a meeting in early September 2016, SNH presented to BOWL further outputs from its *National Coastal Change Assessment* (reproduced as Figure B2). In providing these outputs, SNH was clear to point out that it was provided as information and that BOWL should:

1. use this information to inform its own assessments of suitable set back distance, based on BOWL's risk appetite through the 25 years lifetime of the project; and
2. note that whilst the measurements imply precision, there is considerable uncertainty in future assessments and therefore all values are presented to aid discussions and should not be considered definitely as predictions.

Geomorphological Assessment of Alternative Landfall Option

BOWL acknowledges both of these points and accepts that the outputs are 'projections' to aid assessment on future erosion and help explore uncertainties and are not definitive predictions.

The historic changes in MHWS show an annual recession rate of $\sim 0.3 - 0.4\text{m/yr}$ in the vicinity of the cables between 1905 and 1990, increasing measurably to $\sim 1.5 - 1.8\text{m/yr}$ between 1990 and 2003. These rates are broadly consistent with the interim results presented in Table 1, although the upper envelope is slightly greater in magnitude. It should be noted that the 2003 data are derived from Lidar survey and such technology from over a decade ago was known to have lower accuracies than contemporary Lidar systems.

It is also noticeable that whilst the interim results updated the analysis to 2014, using aerial photography, the further analysis omits these data and bases its projections on the "worst case" rates from 1990 – 2003. Given potential concerns over the accuracy of Lidar data from 2003, it could be argued that the (lower) rates observed between 1990 and 2014 would be more representative of the likely future projections over the next quarter-century since they perhaps use more reliable datasets and they represent well the recent-past, contemporary and near-future sediment supply, ground conditions and rates of sea level rise.

It is also noted that data is presented to show up to 10m landward movement in the edge of vegetation on the hinterland, which marks the landward limit of the washover fans from the shingle berm, between 2009 and 2014. This is then averaged to suggest an average annual recession rate of up to 2m/year. Whilst acknowledging that the datasets do show such a change in places, there are two points worth noting:

1. The dataset is short term and would be expected to capture morphological changes due to storm-driven wash-over processes. The occurrence, magnitude and sequencing of storms over the period under consideration may play an important part in the observed changes and these may not necessarily be representative of storm-driven changes within a longer period of time, nor of longer term rollback of the ridge. For example, the winters of 2010 and 2013 were particularly noted for the severity of storms which affected large parts of the eastern UK coast.
2. There are some locations where there was no measurable change in position of the vegetation edge.

Notwithstanding these matters, BOWL acknowledges that the long term prognosis is for the shingle berm to transgress landwards over the lifetime of the Development. Due to this, the projections provided by SNH of future changes in MHWS (based on extrapolation of historic rates between 1990 and 2003) are extremely useful to inform considerations of set back distances for landfall infrastructure. Recognising the aforementioned limitations and uncertainties of the data, such projections are inherently conservative.

Results show that if past rates from between 1990 and 2003 are projected to the years 2025 and 2050, the landfall infrastructure is unaffected. In fact, at these rates the infrastructure would remain unaffected for between 91 years (EC1) and 99 years (EC2).

Using the same approach, if the erosion rate was lower, at say the 1.24m/year shown by the interim SNH outputs between 2003 and 2014, the infrastructure would remain unaffected for between 132 years (EC1) and 119 years (EC2).

Geomorphological Assessment of Alternative Landfall Option

SNH also presented a sensitivity analysis to aid discussions, whereby the past rates from between 1990 and 2003 were increased in the future projections by factors of 25% and 50%. This showed that under these scenarios the projected '2050 erosion line' would actually be reached by 2041 (25 years) and 2034 (18 years) respectively.

A back-calculation approach along the same lines as before shows that under a 25% increase in past rates from between 1990 and 2003, the infrastructure would remain unaffected for between 73 years (EC1) and 79 years (EC2). Even with a 50% increase in past rates from between 1990 and 2003, the infrastructure would remain unaffected for between 61 years (EC1) and 66 years (EC2).

BOWL concludes therefore that even under the highest observed past historic rates (with all the inaccuracies and uncertainties noted) and with a highly conservative approach of a 50% increase in these, the infrastructure would remain unaffected through its operational lifetime of 25 years.

It is envisaged that sea level rise changes over the next 25 years would only have a minor influence on coastal rollback of the shingle berm and therefore remains confident in the 50m set back (measured from where the landward limit of shingle washover fans meets the vegetation edge of the hinterland in the present day) used in its design.

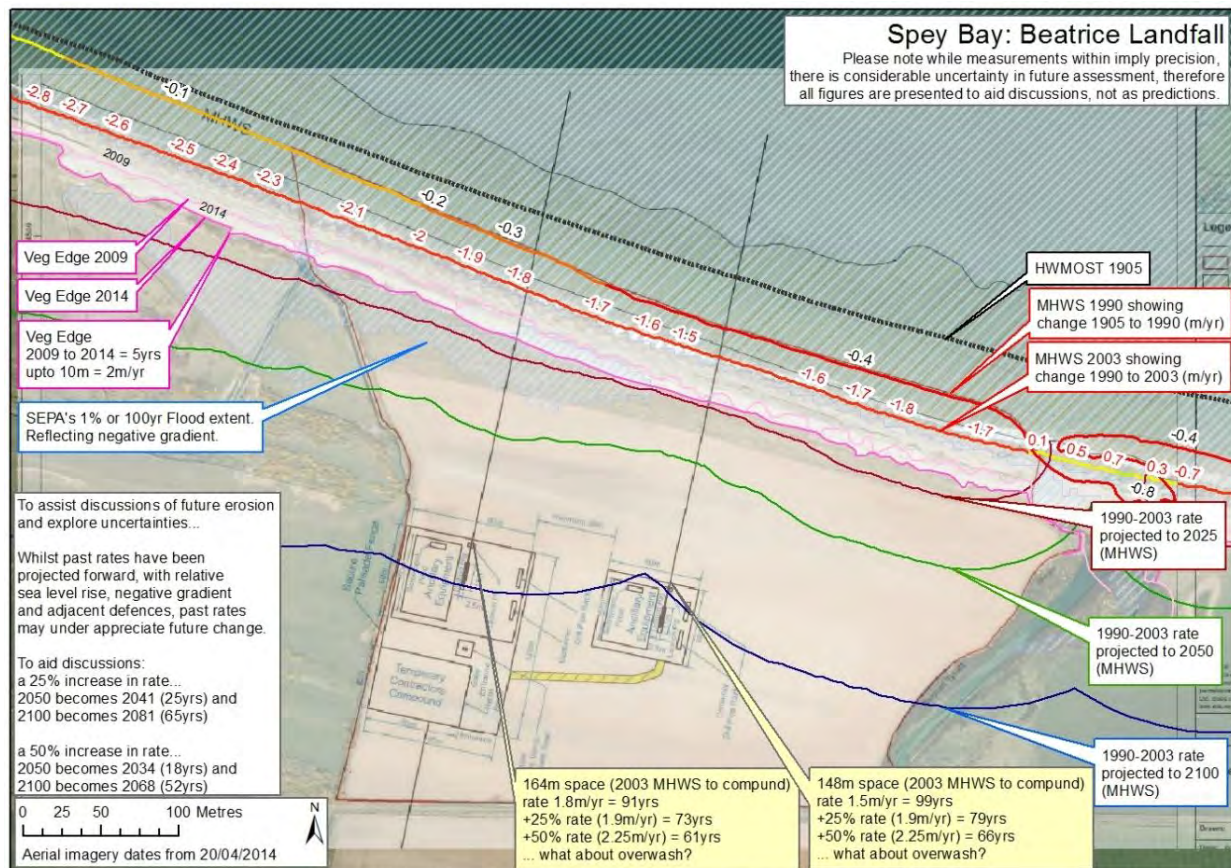


Figure B2 – A reproduction of SNH's Second Assessment of Historic Erosion Rates of MHWS' at the Landfall Location

Geomorphological Assessment of Alternative Landfall Option

B4 National Coastal Change Assessment for Scotland (third outputs)

Following BOWLs interpretation of the first and second outputs from the *National Coastal Change Assessment*, SNH provided a third set of outputs on 12th September 2016 (reproduced as Figure B3). This updated the second outputs with beach topographic survey data provided to SNH by BOWL from 2016.

SNH's analysis showed that between its 2003 survey (using Lidar) and BOWL's 2016 survey (topographic) some 11.6m and 8.4m retreat of MHWS was recorded at EC1 and EC2 respectively. These erosion distances equate to average annual rates over the period 2003 to 2016 of 0.9m/year and 0.6m/year respectively. This shows that the most recent observed changes are within the bounds of the previous conservative assessments and, in fact, are nearer to the long term average value of 0.60m/year observed between 1903 and 2014 than some of the higher values considered in the sensitivity tests described previously.

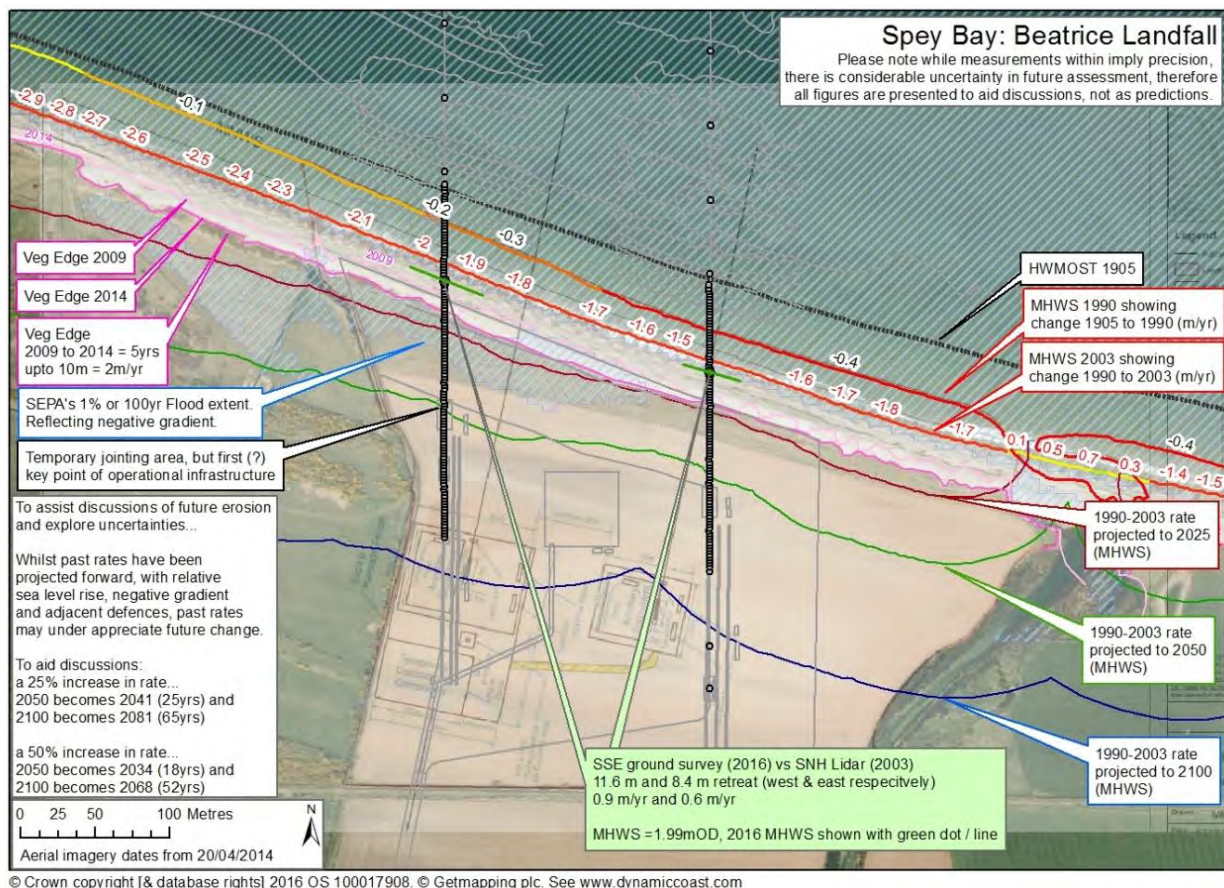


Figure B3 – A reproduction of SNH's Third Assessment of Historic Erosion Rates of MHWS' at the Landfall Location

Geomorphological Assessment of Alternative Landfall Option

Figure B3 does infer that the projected erosion of MHWS by 2050 will begin to impinge on some areas of 'operational infrastructure' at the landfall, but these locations are actually where Pipe Thruster Pits will temporary be sunk during the construction phase to enable cable laying rather than being more permanent operational infrastructure (such as Transition Joint Bays). Assessment of suitable depths for these Pipe Thruster Pits and the associated burial depths for the export transmission cable at its landfall has taken into consideration the landward transgression of the cross-shore profile, assuming it maintains its present morphology (form, function and level), to ensure it remains buried over the 25 year operational life.

Given that these most recent data between 2003 and 2016 show annual average erosion rates that are well within the conservative estimates used in determining a suitable set back distance, BOWL remains confident that a 50m set back (measured from where the landward limit of shingle washover fans meets the vegetation edge of the hinterland in the present day) of the landfall infrastructure is a conservative engineering decision.

Furthermore, if one was to consider the observed annual average erosion over the past 26 years (1990 to 2016) as a valid indicator of the likely projected rates over the next 25 years, the rate would be 1.35m/year at EC1 (1.8m/year between 1990 and 2003 and 0.9m/year between 2003 and 2016) and 1.05m/year at EC2 (1.5m/year between 1990 and 2003 and 0.6m/year between 2003 and 2016). Again, under this sensitivity test the 50m set back distance (measured from where the landward limit of shingle washover fans meets the vegetation edge of the hinterland in the present day) remains conservative.

B5 National Coastal Change Assessment for Scotland (fourth outputs)

Dr. Alistair Rennie (SNH) and Dr. Nick Cooper (technical adviser to BOWL) held a telephone meeting on 4th October 2016 to discuss the methods used to assess past and projected future coastal recession at the landfall location in producing the SNH outputs. There was common understanding on the science and discussion particularly focused on the associated inherent uncertainties in mapping erosion rates from historic datasets given the mapping scales used.

Using the erosion rates observed at the western cable (which are higher than those at the eastern cable), Dr. Rennie presented an envelope of potential erosion rates around the average (or 'central') estimates previously provided. This envelope was based on maximum negative error and maximum positive error in mapping. Negative error would result in lower than central estimates, and positive error would result in greater than central estimates.

Geomorphological Assessment of Alternative Landfall Option

To explore the sensitivities of the potential positive errors, an updated figure was produced (reproduced as Figure B4). This took a base date for construction of 2019, and considered erosion projections after the planned operational life of 25 years from this date (i.e. by 2044) under four erosion rate scenarios at the western cable, namely:

- Average erosion rate 2003 to 2016 (central estimate) = 0.9 m/year
- Above plus maximum positive error in mapping = 1.21 m/year
- Average erosion rate 1990 to 2003 (central estimate) = 2.07 m/year*
- Above plus maximum positive error in mapping = 2.99 m/year

* This is higher than the rate presented by SNH in the project's second outputs for the western cable.

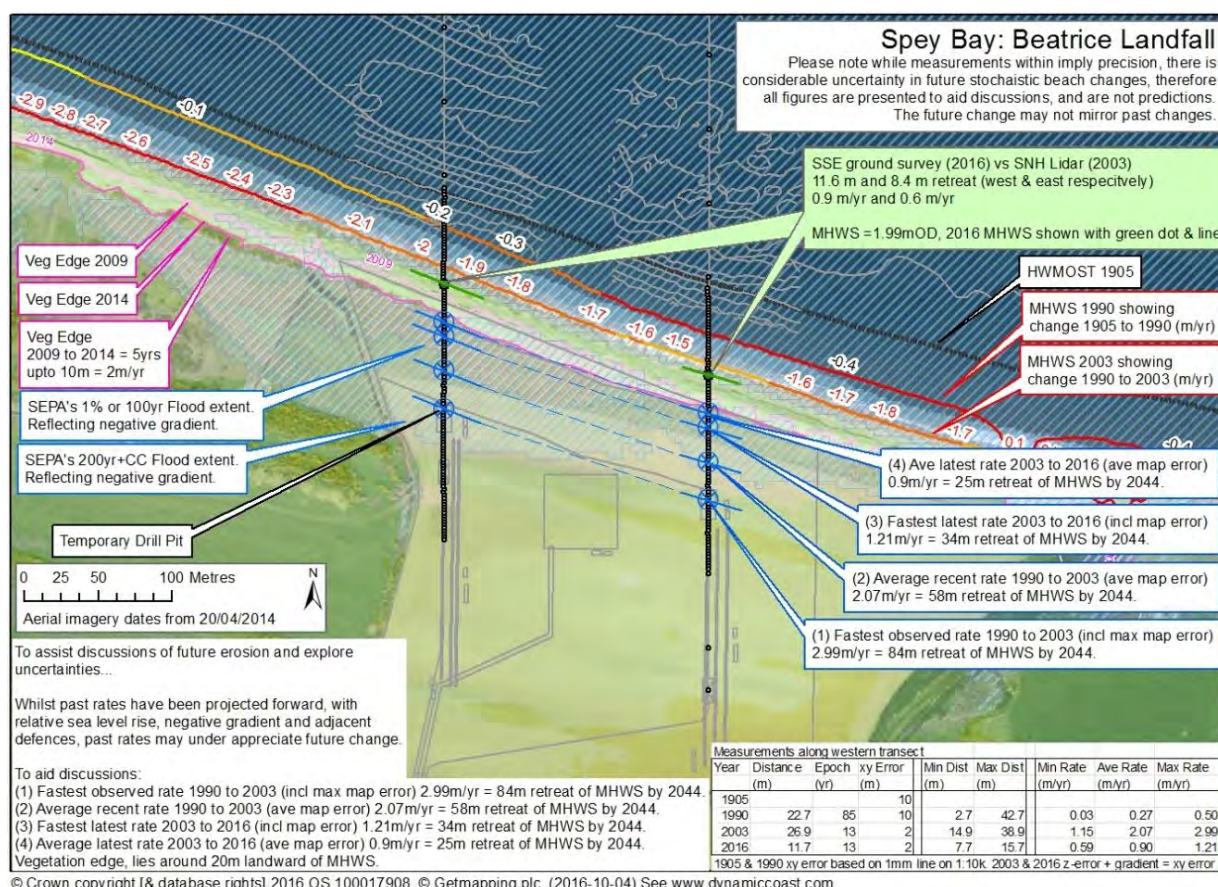


Figure B4 – A reproduction of SNH's Fourth Assessment of Historic Erosion Rates of MHWS' at the Landfall Location

Based on these outputs, under all but one scenario the infrastructure shown in the figure at the landfall is unaffected by the projected coastal erosion over the 25 year operational life.

Geomorphological Assessment of Alternative Landfall Option

The one scenario which does show some impingement on the infrastructure shown in the figure is the one which takes the following:

- Cable location with the highest past erosion rates of the two cables;
- Worst case erosion rate (1990 – 2003) for that location; and
- Worst case maximum positive error.

However, even under this scenario it is only the temporary Pipe Thruster Pits which become affected by erosion by 2044. The permanent infrastructure (such as Transition Joint Bays) remains considerably further landward. Furthermore, the landfall infrastructure has been further refined since the above image was produced and the updated details are provided in Figure 1 of the main NSCERA report.

Acknowledging that the cable needs to be buried to a sufficient depth across the hinterland to ensure that it does not become exposed by the coastal erosion, BOWL remains confident in its use of a 50m set back distance (measured from where the landward limit of shingle washover fans meets the vegetation edge of the hinterland in the present day) as used in its engineering design for the permanent landfall works.

Appendix 4A:

MOH0001-PRO-00001 – Training and Development

GROUP PROCEDURE

TRAINING AND DEVELOPMENT

					
Mike Purcell Group Training Manager	Stephen Marr Group Environmental Manager	Tony Moten Group Health & Safety Manager	Chris Titterton Group Quality Manager	Jackie Brennan Group HSQE Manager	James O'Callaghan Main Board Director
MAIN AUTHOR	REVIEWER	REVIEWER	REVIEWER	REVIEWER	APPROVER

02	23 Nov 10	Revised to incorporate the new Maxcel cost code contract number only.
01	01 Feb 10	Updated to include:- gaining of new employee records, company induction, new appraisal, organisation of training, CITB Grant record retention systems, deletion of Group Training Programme,
00	5 Feb 02	Revised to include comments
AA	13 Nov 01	Issue for comments
REV	DATE	STATUS / DESCRIPTION OF CHANGES

DOCUMENT NO.	MOH0001-PRO-00001 Rev 02
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2. Scope
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4. Definitions
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 - 5.3. Company Induction
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 - 5.6. Identifying Company Training
 - 5.7. Identifying Contract Specific Training
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 - 5.11. Providing Training
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APPENDICES

A	Personal Performance Appraisal	MOH0001-FOR-00002
B	Training Needs Matrix	MOH0001-FOR-00003
C	Training Attendance	MOH0001-FOR-00004
D	Training Feedback	MOH0001-FOR-00005
E	Training Request Form	MOH0001-FOR-00164

1.0 PURPOSE

The purpose of this Procedure is to describe the processes employed in the identification and organisation and recording of training.

2.0 SCOPE

This Procedure shall apply to all Murphy Group Departments, Divisions and Regions.

Where Client or Joint Venture requirements dictate this procedure may be deviated from by recording required deviations in the Contract Quality Plan or Contract specific procedure and gaining approval of the Group Quality Manager.

3.0 REFERENCES

- | | | |
|------|----------------------|--|
| i. | BS EN ISO 9001:2008 | Quality Management Systems: Requirements |
| ii. | BS EN ISO 14001:2004 | Environmental Management System Requirements |
| iii. | BS OHSAS 18001:2007 | H&S Management System Requirements |
| iv. | MOH0001-PRO-00005 | Document and Data Control Procedure |
| v. | MOH0001-PRO-00006 | Document Numbering Procedure |
| vi. | MOH0001-PRO-00011 | Selection & Appraisal of Professional Services |

4.0 DEFINITIONS

All terms used in this Group Administrative Procedure shall be as defined in the Group Quality Manual.

Personal Performance Appraisal	A review between the Line Manager and their Employee on past performance, present and future objectives and identification of any necessary training requirements to enable them to carry out their duties in a competent manner
Appraisee	Any employee (member of staff) within the company, who is appraised.
Appraiser	The employee's Line Manager who carries out the appraisal
Group Appraisal Co-ordinator	Person employed at Head Office to administer and facilitate the organisation and completion of Personal Performance Appraisals of employee's.
Competence	A collection of experience, knowledge, skill, training and attitude to enable an employee to carry out their duties.
Group Training Co-ordinator	Person employed at Head Office to administer and facilitate the organisation and completion of training and development of employee's. Liaise with Regional Training Co-ordinators
Qualifications	An achievement awarded on the successful completion of a course of training or passing of an examination
Regional Training Co-ordinator	Person employed at a Regional Office to administer and facilitate the organisation and completion of training and development of employee's. Liaise with the Group and Site Training Co-ordinators.
Site Training Co-ordinator	Person employed by a Site to administer and facilitate the organisation and completion of training and development of employee's. Liaise with Regional Training Co-ordinators.
Toolbox Talks	A training briefing dedicated to a specific task
Training	The process of bringing an employee to an agreed proficiency by practice and instruction
Training Provider	A person / company who have been engaged to carry out training. They shall be selected on their own ability to demonstrate that they are experienced and qualified in the activity to be performed.

5.0 PROCEDURE

TASK	RESPONSIBILITY
5.1 Nominating a Training Coordinator	
5.1.1 The Group Training Manager shall nominate a Group Training Coordinator to maintain training records and to liaise with the Regional Training Coordinators	Group Training Manager
5.1.2 Each Division, Region and Department shall nominate a Regional Training Coordinator to maintain training records and to liaise with the Group Training Coordinator	Divisional/Regional Manager/Director / Department Manager
5.1.3 A person shall be nominated, at site / project / contract level, as the Site Training Coordinator who shall be responsible for maintaining the training matrix for the Contract.	Contract / Project Director / Manager
5.2 New Starters	
5.2.1 The new employees Application Form shall be reviewed to identify any shortfalls in training requirements.	Interviewer
5.2.2 A copy of the Application Form shall be forwarded to the Group Personnel Manager (Staff) and Group Wages Manager (Operatives)	Divisional/Regional Manager/Director / Project/Contracts Manager/Director / Department Manager
Form: MOH0001-FOR-00114 – Application for Employment (Operatives) MOH0001-FOR-00115 – Application for Employment (Staff)	
5.2.3 Section 3 - Training, of the Application for Employment (Staff) shall be distributed to the Group / Regional / Site Training Coordinator (as appropriate).	Group Human Resources Manager/
Section 10 - Training, of the Application for Employment (Operatives) shall be distributed to the Group / Regional / Site Training Coordinator (as appropriate)	Group Wages Manager
5.2.4 New employee details shall be input into the Training Database by the HR Department.	Human Resources Manager
5.3 Company Induction	
5.3.1 All newly employed staff and operatives shall attend a Company Induction within one month of their start date; this also includes Agency / Temporary staff. The induction is to include as a minimum details of company structure, policies and management systems.	Line Manager
5.3.2 The names of each new starter shall be forwarded to the Group / Regional / Site Training Coordinator.	Human Resources Manager (employees) / Line Manager (temp staff)
5.3.3 Carry out Induction Training	Group Trainer / Nominated Person
5.4 Site Specific - Induction	
5.4.1 All site personnel shall attend a Site Specific Induction	Line Manager

TASK		RESPONSIBILITY
5.4.2	Induction records shall be forwarded to the Site Training Coordinator for inclusion on the Site Specific - Induction Training Register.	Line Manager
5.4.3	The Site Specific Toolbox Talk - Induction shall cover Health & Safety, Environmental and Quality requirements that are key to the contract.	Training Provider
5.4.4	Copies of the Training Attendance form shall be forwarded to the Regional Training Coordinator within 1 month of completion of the training session.	Training Provider
5.4.5	On receipt of the Training Attendance form the individuals training records shall be updated on the Training Database.	Regional Training Coordinator
<i>Note</i>	<i>All 'Training Attendance' forms need to be forwarded to the Group / Regional / Site Training Coordinator so they can claim a grant from CITB. (Only training sessions over 30 minutes duration are valid for Grant Funding)</i>	Training Provider
5.5 Identifying Individuals Training		
5.5.1	Individuals training requirements shall be identified during: <ul style="list-style-type: none"> • Management and Contract Reviews • New Employee Review • Annual Personal Performance Appraisals – refer to clause 5.7 of this procedure 	Various
5.5.2	Training needs shall be recorded on the Training Needs Matrix Form: MOH0001-FOR-00003 – Training Needs Matrix	Line Manager
5.5.3	Training requirements shall be reviewed at a minimum of every 6 months to ensure certification does not expire.	Group / Regional Training Coordinator
<i>Note</i>	<i>Employee's should also notify line managers if their certification is due to expire.</i>	
5.6 Identifying Company Training		
5.6.1	The following points shall be considered when reviewing training requirements during the Safety Executive, Safety Advisors Committee, and Management Review Meetings: <ul style="list-style-type: none"> • Legal requirements • Objectives & Targets • Risk Assessment Findings • Accident investigations • Environmental incidents • Trends in Nonconformance • Audit findings • Awarding body requirements (e.g City & Guilds, CITB) • Industry / Professional training standards and qualifications • Requirements of Group Procedures 	Main Board / Regional / Divisional Directors

5.7 Identifying Contract Specific Training

- 5.7.1 Identify training needs during the Pre-start Contract Review Meeting - by reviewing requirements of: **Project Manager**
- Contract Scope of Works
 - Contract Programme
 - Contract Health & Safety Plan
 - Contract Environmental Plan
 - Contract Quality Plan
 - Method Statements (incl. Risk Assessment)
 - Works Package Plans (Network Rail only)
 - Available personnel
- 5.7.2 Training allocation shall be considered dependent on the resources available **Divisional/Regional Manager/Director / Project/Contracts Manager/Director / Department Manager**
- 5.7.3 Training needs shall be recorded on the Training Needs Matrix **Site Training Coordinator**
- Form:**
MOH0001-FOR-00003 – Training Needs Matrix

5.8 Request for Training

- 5.8.1 All training must be arranged by, or in conjunction with, the Regional Training Coordinator and details confirmed in writing. **All Managers**
- Form:**
MOH0001-FOR-00164 – Training Request Form

5.9 Toolbox Talks

- 5.9.1 Toolbox Talks shall be provided as needed throughout the contract and shall be planned as appropriate to the works being undertaken **Contracts / Project Manager / Director**
- 5.9.2 A record shall be maintained of all staff and operatives who have attended each tool box talk. These records shall be forwarded to the Group Training Coordinator **Training Provider**
- Form:**
MOH0001-FOR-00004 - Training Attendance Form
- 5.9.3 The Tool Box Talk Attendance form shall be forwarded to the Group / Regional / Site Training Coordinator to be able to claim a grant from CITB. **Training Provider**

5.10 Staff Personal Performance Appraisals

- 5.10.1 Staff training shall be identified through appraisal exercises conducted on an annual basis
- 5.10.2 Appraisals shall be carried out at least once a year for each permanent member of staff.
- 5.10.3 Issue Staff Appraisal Form to the relevant member of staff at least 10 days prior to the Staff Training Appraisal meeting **Line Manager**

- | | | |
|--------|---|-------------------------------------|
| 5.10.4 | Complete Staff Appraisal Form and return a copy to the Line Manager at least 2 days prior to the Staff Training Appraisal meeting | <i>Appraiseef</i> |
| 5.10.5 | Meet and discuss training achievements and training needs for the next year | <i>Line Manager /
Appraiser</i> |
| 5.10.6 | Review and agree the Appraisal Form, making any necessary changes to training suggested at the Staff Training Appraisal meeting | <i>Line Manager</i> |
| 5.10.7 | Copy to Line Manager, Regional Training Coordinator and Group Appraisal Co-ordinator | |
| 5.10.8 | Ensure training approved in appraisal is arranged with the Group Appraisal Coordinator. | <i>Line Manager</i> |
| 5.10.9 | <i>Note: The Group Training Coordinator must be informed of training courses that qualify for CITB grant funding.</i> | |

5.11 Providing Training

- | | | |
|--------|---|---|
| 5.11.1 | Determine who is carrying out the training – first available resource. | <i>Group / Regional
Training Coordinator</i> |
| 5.11.2 | All trainers shall be approved by the Group Training Centre | <i>Group / Regional/
Site Training
Coordinator</i> |
| 5.11.3 | A List of Internal Trainers shall be maintained at Head Office by the Group Training Coordinator | <i>Human Resources
Manager</i> |
| 5.11.4 | Ensure that training courses are organised and completed as required. | <i>Training Provider /
Training Coordinator</i> |
| 5.11.5 | Prepare material, including Handouts, for the training course | <i>Training Provider</i> |
| 5.11.6 | Ensure that staff attend training courses as required | <i>Line Manager</i> |
| 5.11.7 | Provide all attendees with handouts providing full details of the training provided, for future reference. | <i>Training Provider</i> |
| 5.11.8 | To ensure training is effective and to identify improvements to be incorporated into future training courses Training Feedback Forms shall be completed by all attendees. | <i>Training Provider</i> |

Form:

MOH0001-FOR-00005 -Training Feedback Form

- | | | |
|--------|--|-----------------------------|
| 5.11.9 | External training providers shall be approved in accordance with the Selection & Approval of Professional Services Procedure | <i>Training Coordinator</i> |
|--------|--|-----------------------------|

Procedure:

MOH0001-PRO-00011 – Selection & Appraisal of Professional Services

5.12 Subcontractors

- 5.12.1 All Subcontractors working for J Murphy & Sons Ltd shall be responsible for ensuring that their operatives are competent, both in the context of performing work that affects the environment, product quality and in Health & Safety performance on site.
- 5.12.2 Subcontractors shall not commence work on site without first attending the Site Specific Induction. *Project Manager*
- 5.12.3 Copies of the Subcontractors Training Certificates shall be forwarded to the Site Training Coordinator prior to work commencing *Project Manager*

5.13 Reviewing & Improving Training.

- 5.13.1 Where Training Feedback forms have been completed, review and evaluate the forms and incorporate appropriate measures and suggestions into the future training courses where possible. *Training Provider*
- 5.13.2 Provide summary/key points raised in feedback to the Training Coordinator *Training Provider*

5.14 Control of Documents and Records

- 5.14.1 Copy all attendance records and feedback forms, shall be forwarded to the Regional Training Coordinators for entry onto the Group Training Database. *Training Provider*
- 5.14.2 Records are to be Archived in accordance with the Records and Archive Procedure

5.15 Training Database

- All records of training i.e. certificates, copies of competency cards shall scanned and input into the Group Training Database *Group / Regional Training Coordinator*

Appendix 4B:

MOH0001-PRO-00002 – Internal Audits

GROUP PROCEDURE

INTERNAL AUDITS



Eric Loh
Head of SHESQ Systems and Assurance

15th June 2016



Shane Fay
Head of SHESQ South

15th June 2016



Alan McDonough
Head of SHESQ North

15th June 2016



John Kinirons
SHESQ Director

15th June 2016

MAIN AUTHOR	REVIEWER	REVIEWER	APPROVER
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DOCUMENT No.	MOH0001-PRO-00002 REV 03

REVISION HISTORY

REVISION	STATUS CODE	DATE	REVISION DESCRIPTION
03		15.06.16	Revised to reflect new process & organisational structure
02		22.11.10	Revised to incorporate the new Maxcel cost code contract number only. The content of the procedure will be revised and issued in due course.
01		21.02.03	Revised and re-issued for implementation
00		05.02.02	Revised to include comments

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1 Purpose

This Procedure defines how audits shall be conducted by the Murphy Group to provide assurance that company activities comply with the Groups documented management system.

Audits are used as part of our process for evaluating compliance to relevant legislation and regulations.

2 Scope

This Procedure applies to all audit activities managed and controlled by the Murphy Group within the UK and Ireland

3 References

ISO 9001	Quality management systems – Requirements
ISO 14001	Environmental management systems – Specification with guidance for use
OHSAS 18001	Occupational health & safety management systems – Specification
ISO 14010	Guidelines for environmental auditing - Auditing of environmental management systems
ISO 19011	Guidelines for Quality and/or Environmental Management System Auditing

4 Definitions and Abbreviations

Audit	A systematic, independent and documented process, undertaken by suitably qualified staff, for obtaining evidence to verify and determine whether activities conform with specified requirements
Auditee	Person or organisation being audited
Auditor	Person designated to undertake audits on behalf of J Murphy & Sons
Audit Evidence	Records, statements of fact, or other information that is relevant to the audit criteria and verifiable
Audit Findings	Results of the evaluation of the collected audit evidence against the audit criteria. Audit Findings may be in the form of a: Major non-conformance Minor Non-conformance Observation
Audit Scope	The extent and boundaries of the audit, e.g. physical location, activities and processes to be audited, time period covered by the audit.
Audit Team Leader	Person competent to manage the audit and supervise the Audit Team
Client Audit	Audits undertaken on Murphy Group activities by another organisation, e.g. By Transco, Network Rail etc

Corrective Action Request	Corrective Action Requests are issued when a Major non-conformity or Minor Non-conformity has been identified during an audit. Corrective Action Requests can be categorised dependent upon the level of priority that should be given to correct the non-conformance and prevent re-occurrence
Internal Audit (First Party)	Audit undertaken by a Murphy Audit Team on Murphy activities
Major non-conformance	<p>Either:</p> <ul style="list-style-type: none"> the absence of one or more required system elements or a situation which raises significant doubt that products or services will meet specified requirements a number of minor nonconformities indicating inadequate implementation or effectiveness of the system relevant to an element of the standard a minor nonconformity that is persistent (or not corrected as agreed by the organisation)
Minor non-conformance	A lapse of either discipline or control during the implementation of system/procedural requirements, which does not indicate a system breakdown or raise doubt that products or services will meet requirements. Overall system requirement is defined, implemented and effective
Observation	<p>Either:</p> <ul style="list-style-type: none"> something that could lead to a nonconformity if allowed to continue uncorrected an existing condition without adequate supporting evidence to verify that it constitutes a nonconformity
Opportunity for Improvement	An audit finding where there is an opportunity to make an improvement to the management system or a process, but there has not been a non-compliance identified. An opportunity for improvement can be used to highlight where a best practice could be adopted
Positive Comment	Where the auditor can highlight areas of good practice that have been evidenced during the audit and will be recorded in the main body of the audit report.
Second Party Audit	Audit undertaken by a Murphy Audit Team on the activities of another organisation, e.g. subcontractor, supplier, consultant, designer
Third Party Audit	Audit carried out by external independent organisations that provide certification or registration of conformity with requirements such as ISO 9001, ISO 14001 and OHSAS 18001

5 Procedure

5.1 Assurance Framework

5.1.1 The company has developed an Assurance Regime as outlined in the following table.

This procedure details the process for managing Tier 1 – Internal audits and Tier 2 Operations Audits.

Assurance Activity	By whom	Frequency
External Audit	Certification Body	6 Monthly
Tier 1- Internal Audits	Head of SHESQ Systems and Assurance	As per the Corporate Audit Programme
Tier 2 – Operations Audits	Head of SHESQ North / South	As per North / South Operations Audit Programme
Management Tours	Senior Managers Directors	2 per month 1 per quarter – as per schedule
Monthly Site Inspection	Project Managers / Business Unit/Regional SHESQ Advisors	Once a month*
Weekly Site Inspection	Supervisors	Once a week on own contract*
Office / Yard HSQE Inspections	Nominated Person	Quarterly*

*Note: these are minimum inspection frequencies and additional inspections may be undertaken if required

5.2 Audit Programme

- 5.2.1 Tier 1 Audits - A corporate audit programme shall be produced by the Head of SHESQ Systems and Assurance, detailing the audits to be conducted and the month/year in which they are planned to be completed. The programme shall be issued to all relevant personnel and auditees.
- 5.2.2 The corporate audit programme shall be designed so that all functions and businesses shall be covered over a 2 year period. Additional audits may be added to the programme as the business requires
- 5.2.3 Tier 2 Audits - The North and South Operations shall produce audit programmes detailing the audits to be conducted on their own operations (e.g. processes, projects, yards, workshops and depots). The audit programmes shall be also be issued to the Head of SHESQ Systems and Assurance.
- 5.2.4 The North/South Operations may take into account the following when developing the programme:
- Results of previous audits / inspections
 - Project Activity in their areas
 - Project risk registers

Form: MOH0001-FOR-00001 Audit Programme

5.3 Audit Plans

- 5.3.1 The Lead Auditor shall produce Audit plans outlining the scope and the arrangements for the audit. The audit plans should generally be issued to the auditee(s) 2 weeks before the date of the audit. When planning the audit, the company's procedure for meeting the requirements of any relevant legislation shall be reviewed and taken into consideration for developing the audit plan.

There may be circumstances where internal audits are requested at short notice and the 2 week requirement above cannot be met.

- 5.3.2 Where there are more than 1 auditor conducting the audit, then the Lead Auditor shall consult with the other Audit Team Members with regards to scope and availability.
- 5.3.3 An audit checklist may be prepared prior to the audit to help the auditor to plan, to ensure that the audit meets the audit scope and, when completed, provide a record of what was seen and discussed during the audit.

Form: MOH0001-FOR-00006

Audit Plan

Form: MOH0001-FOR-00007

Audit Checklist

5.4 Conducting the Audit

- 5.4.1 The member of staff with responsibility for the area being audited is deemed to be the auditee. For example:

- Function / Department – Function / Department Head
- Projects – Project / Site Manager
- Depot / Yard - Yard Manager / Site Manager

Although the auditee may delegate some of their responsibility for the audit to their team, they should attend the opening and closing meeting as a minimum.

- 5.4.2 An opening meeting shall be held at the start of the audit confirming the audit objectives, scope, process and arrangements.
- 5.4.3 The audit shall be conducted as per the audit plan, except where changes have been discussed and agreed during the opening meeting.
- 5.4.4 The Auditor(s) shall take notes during the audit of what has been seen and discussed, with audit evidence referenced. The audit checklist may be used for this.
- 5.4.5 Where Audit Findings have been highlighted these shall be discussed with the auditee at the time of identification as well as during the closing meeting. Category 1, 2 and 3 Audit findings (CARs and Observations) shall be recorded on the appropriate form prior to the closing meeting. Category 4 Audit Findings and Positive Comments shall be referenced in Audit Report is written.

Form: MOH0001-FOR-00009 Corrective Action Request

Form: MOH0001-FOR-00010 Audit Observation

- 5.4.6 At the end of the audit, a closing meeting shall be held, providing a summary of the audit activity and findings and a record made of the attendance. Auditors may advise on appropriate corrective action and action to prevent recurrence.
- 5.4.7 Additional evidence may also be presented by the Auditee during the closing meeting if they consider that Audit Findings are incorrect.
- 5.4.8 The Lead Auditor should ensure that the Auditee signs for acceptance of the Category 1, 2 and 3 Audit findings during the closing meeting as minimum.
- 5.4.9 If plans for corrective action and action to prevent recurrence (including timescales for completion) cannot be agreed during the closing meeting, then the Auditee shall complete these post-audit and the completed forms sent to the Lead Auditor within 5 business days of the completion of the audit (or 10 days for Second Party audits)
- 5.4.10 Auditors shall keep original CARs and Observations, leaving copies with the Auditee (where possible)

5.5 Audit Reports

- 5.5.1 Each audit Team Member shall write up the relevant sections of the audit report for the areas they covered and send to the Lead Auditor within 5 working days of the end of the audit.

Form: MOH0001-FOR-00077 Audit Report Form

- 5.5.2 The Lead Auditor shall compile and complete the audit report, including CARs and Observations (with completed action plans). The completed audit report shall be issued to relevant personnel within 10 working days of the completion of the audit (15 days for Second Party Audits).
- 5.5.3 Details of the audit and any audit findings shall be recorded on the relevant Audit / CAR Tracker. Copies of Audit reports and findings shall be kept as records. This is the responsibility of the Head of SHESQ Systems and Assurance.

5.6 Completing Audit Actions

- 5.6.1 The auditee shall ensure that actions for CARs and Observations are completed as per the agreed action plans and within agreed timescales. Evidence of completion shall be sent to the auditor who raised the Audit Finding.
- 5.6.2 Each originating auditor shall review the evidence supplied in support of the action completion. Further evidence may be requested if the evidence supplied is considered to be insufficient.

The auditor may also undertake a follow-up visit to confirm the implementation of the agreed action and its completion.

- 5.6.3 When the Auditor is satisfied that the actions to close the CAR or Observation have been completed sufficiently, then they shall close the Audit Finding and issue copies of the closed Audit Finding to the auditee(s).
- 5.6.4 The completion of the CARs and Observations shall be recorded on the Audit / CAR Tracker and copies shall be kept as records. This is the responsibility of the Head of SHESQ Systems and Assurance.
- 5.6.5 Progress of CARs and Observations completion shall be monitored. Where actions remain open past their agreed closure date, then these shall be reported and escalated to the SHESQ Performance Meeting and, if necessary to the SHESQ Performance Committee.

5.7 Auditor Selection and Competence


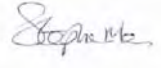


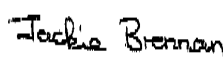

- 5.7.1 Auditors should be selected on their competence and their independence from the area being audited to ensure objectiveness (e.g. Auditors should not audit their own work).
- 5.7.2 Those performing audits on the corporate audit programme should have one of the following audit qualifications as a minimum:
- Lead Auditor course certified by the International Registration of Certified Auditors (IRCA)
 - Occupational Health & Safety Lead Auditor certified by the International Registration of Certified Auditors (IRCA)
 - A Lead Environmental Auditing course approved by the Institute of Environmental Management & Assessment (IEMA).
- 5.7.3 Those performing audits on the North/South operations audit programme (Tier) 2) audits) should have completed a trained Internal Auditor Course as a minimum.
- 5.7.4 Relevant competence and experience of the area / activity being audited shall be taken into consideration when programming audits. Technical experts in the operation/activity/process being audited, may also be utilised for the audit, so long as they are independent of the department / project that is under review.

Appendix 4C:

MOH0001-PRO-00005 – Document and Data Control

GROUP PROCEDURE

DOCUMENT & DATA CONTROL

					
Mark Mitchell Group Document & Data Manager	Stephen Marr Group Environmental Manager	Tony Moten Group Health & Safety Manager	Chris Titterton Group Quality Manager	Jackie Brennan Group HSQE Manager	James O'Callaghan Main Board Director
MAIN AUTHOR	REVIEWER	REVIEWER	REVIEWER	REVIEWER	APPROVER

02	22.11.10	Revised to incorporate the new Maxcel cost code contract number only.
01	09.11.09	Issued for implementation
00	10.02.03	Issued for implementation
AB	09.10.02	Issued for comment following incorporation of changes from initial review
AA	27.07.02	Issued for Comment
REV	DATE	STATUS DESCRIPTION

DOCUMENT NO.	MOH0001-PRO-00005 Rev 02
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 - 5.1.2 Logging Incoming Correspondence
 - 5.1.3 Determining Distribution of Copies
 - 5.1.4 Document Circulation
 - 5.1.5 Outgoing Correspondence
 - 5.1.6 Logging Outgoing Correspondence
 - 5.1.7 E-mail
 - 5.2 **Control of Client-Issued Documentation**
 - 5.2.1 Receipt and Registration of Documents
 - 5.2.2 Review of Client Documentation
 - 5.2.3 Issue of Client Drawings/Specifications internally and to Suppliers/Subcontractors
 - 5.3 **Control of Murphy Documentation**
 - 5.3.1 Document Numbering
 - 5.3.2 Document Registration
 - 5.3.3 Document Review Prior to Issue
 - 5.3.4 Controlled Issue and Distribution
 - 5.3.5 Document Revision
 - 5.3.6 Superseded, Cancelled and Withdrawn Documentation
 - 5.4 **Method Statements**
 - 5.5 **Filing, Retention and Retrieval**
 - 5.6 **Subcontractor / Supplier Documentation**
 - 5.6.1 Document Schedule
 - 5.6.2 Document Receipt and Registration
 - 5.6.3 Document Review
 - 5.6.4 Distribution and Issue
 - 5.7 **British and International Standards and other Technical Publications**
 - 5.7.1 Request for Technical Publications
 - 5.7.2 Publication Ordering and Issue

APPENDICES

A	Department / Division / Regional Codes	MOH0001-FOR-00025
B	Document Codes	MOH0001-FOR-00026
C	Method Statement Register	MOH0001-FOR-00027
D	Document and Drawing Register	MOH0001-FOR-00028
E	Outgoing Correspondence Register	MOH0001-FOR-00029
F	Incoming Correspondence Register	MOH0001-FOR-00030
G	Document Review Decal	MOH0001-FOR-00031
H	Document Transmittal Note	MOH0001-FOR-00032
I	Template Filing Index	MOH0001-FOR-00087
J	Site Personnel Document Issue Record	MOH0001-FOR-00116
K	Publication Requisition Form	MOH0001-FOR-00160
L	IT Contract Setup	MOH0001-FOR-00168
M	IT Multi User Contract Folder Permission Allocation	MOH0001-FOR-00169
N	Electronic Contract Folders Guidance Note	MOH0001-GDN-00006

1.0 PURPOSE

The purpose of this Procedure is to describe the processes for the management and control of all documentation and data generated, issued and received by Murphy.

2.0 SCOPE

This Procedure shall apply to the contracting activities of all Murphy Group Departments, Divisions, Regions and Contracts.

Where Client or Joint Venture requirements dictate this procedure may be deviated from by recording required deviations in the Contract Quality Plan or Contract specific procedure and gaining approval of the Group Quality Manager.

3.0 REFERENCES

BS EN ISO 9001:2008	Quality Management Systems: Requirements Clause 4.2.3 Control of Documents and 4.2.4 Records
BS EN ISO 14001:2004	Environmental Management Systems: Specification with guidance for use. Clause 4.4.5 Document Control and Clause 4.5.3 Records
BS OHSAS 18001:2007	Health and Safety Management Systems: Clause 4.4.5 Control of Documents and Clause 4.5.4 Control of Records

4.0 DEFINITIONS

All terms referred to within this Group Procedure shall be as defined in the Group Quality Manual.

5.0 PROCEDURE

TASK	RESPONSIBILITY
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5.1 ADMINISTRATION

5.1.1 Incoming Correspondence

(Letters / Faxes / Document Transmittal Notes) (for E-mails see 5.1.7)

*Department /
Regional / Divisional /
Project Manager*

A nominated person, eg. Departmental Secretary, Site Manager, Document Controller, or 'Post Room' as appropriate, shall be appointed as the document controller for all incoming correspondence.

5.1.2 Logging Incoming Correspondence

Document Controller

- i. Incoming correspondence marked 'Private & Confidential' shall be passed, unopened, to the Addressee.
- ii. All contractual faxes shall be logged and passed to the Addressee immediately upon receipt. Where faxes are received directly by the Addressee and are of a contractual nature, a copy shall be handed to the Document Controller for logging.
- iii. Invoices shall be sent directly to the Purchase Ledger Department for registering.
- iv. Incoming correspondence in the form of a letter, fax or memo, shall be date-stamped and recorded by means of the Incoming Correspondence Register. Junk mail does not require to be stamped or logged and may be destroyed.
- v. Registers shall be set up for Incoming documentation :

Client :	a. Letters
	b. Faxes
	c. Document Transmittal Notes
Note	One single register / spreadsheet may be used for all of the above.

Supplier /	a. Letters
Subcontractor /	b. Faxes
Other Third Party	c. Document Transmittal Notes
Correspondence	Note One single register / spreadsheet may be used for all of the above.

An internal memo register shall also be set up.

Form: **MOH0001-FOR-00030 Incoming Correspondence Register**

5.1.3 Determining Distribution of Copies

Determine any additional distribution, assign "Action" or "Information" status, and apply the file reference from the filing index.

*Department /
Regional / Divisional /
Project Manager /
Project Manager's
Delegate*

TASK	RESPONSIBILITY
<p>5.1.4 Document Circulation</p> <p>The Document Controller shall arrange for the copying and distribution of the original document following instruction from the applicable Manager, as necessary.</p>	Document Controller
<p>5.1.5 Outgoing Correspondence (for E-mails see 5.1.7)</p> <p>i. The originator of outgoing correspondence shall ensure that any contractual letter, fax or memo includes a unique, sequential reference number. This shall be allocated to all outgoing correspondence (refer to Procedure MOH0001-PRO-00006 – Document Numbering). The next sequential number on the Outgoing Correspondence Register shall be obtained from the Document Controller / Secretary or from the contract's shared network drive.</p> <p>Form: MOH0001-FOR-00026 Document Codes MOH0001-FOR-00029 Outgoing Correspondence Register</p> <p>ii. The numbering sequence to be employed shall be comprised of the following three parts :</p> <p>Part 1 Department / Division / Region / Contract Number Part 2 Document Code Part 3 Sequential Number Optional Author's Initials – where it may be useful for ease of retrieval, the author's initials may be applied prior to the document reference.</p> <p>CAT-LCI0046-LOC-00001</p> <p>iii. All outgoing correspondence of a contractual nature should be routed through the Project Manager or authorised signatory for review and signature prior to return to the originator for sending.</p> <p><i>Note: - Correspondence of a commercially sensitive or contractual nature transmitted externally (outside the company) by electronic means should be converted to Adobe Acrobat PDF format (Portable Document Files).</i></p>	<p>Originator</p> <p>Project Manager / Authorised Signatory</p>
<p>5.1.6 Logging Outgoing Correspondence</p> <p>i. Any hand written distribution shall be recorded on the copies but not on the original document.</p> <p>ii. Outgoing correspondence in the form of a letter, email, fax or memo shall be recorded by means of the Outgoing Correspondence Register. Registers shall be set up for :</p> <p>♦ Client :</p> <ul style="list-style-type: none"> a. Letters b. Faxes c. Document Transmittal Notes 	<p>Document Controller / Divisional / Regional / Project Manager</p>

TASK	RESPONSIBILITY
	<i>Note</i> One single register / spreadsheet may be used for all of the above.
<ul style="list-style-type: none"> Supplier / Subcontractor / Other Third Party Correspondence 	<ul style="list-style-type: none"> a. Letters b. Faxes c. Document Transmittal Notes
	<i>Note</i> One single register / spreadsheet may be used for all of the above.
<ul style="list-style-type: none"> Outgoing internal memo register. 	
<i>Form: MOH0001-FOR-00029 Outgoing Correspondence Register</i>	

5.1.7 E-mail

Email Sender / Addressee

- Contractual or critical e-mails are to be saved electronically in the relevant electronic correspondence folder as an msg file. E-mails shall be saved with the correct title or with a correspondence number as the file name. E-mails given a correspondence number shall be recorded on a register. On completion of a contract all electronic records, including e-mails, shall remain on the F Drive.

Note: - Hard copies of e-mails may be stored in correspondence files. If this is the case they shall be registered in the correspondence register as per 5.1.2.v. A register is recommended for electronically saved e-mails for ease of retrievability but not mandatory.

- It is the responsibility of the addressee for incoming e-mails or sender for outgoing e-mails to ensure that any formal / contractual or critical information conveyed by means of email is dealt with as above.

Note: - It is essential that all contractual e-mails are captured as, during or following completion of a contract, they may be required as documentary evidence to protect the company's interests in the event of any claims, disputes, court proceedings or other investigations.

5.2 CONTROL OF CLIENT-ISSUED DOCUMENTATION (Drawings / Specifications / Contract Documents)

5.2.1 Receipt & Registration of Documents

Document Controller

Specifying Documents such as drawings, specifications and contract documents received from the Client or the Client's representative shall be received as incoming correspondence in accordance with 5.1.1.

5.2.2 Review of Client Documentation

Divisional / Regional / Project Manager / Project Manager's Delegate

- Stamp the documents with the Murphy Document Review Decal, review the documents and sign the Decal. If, on review, the documents are not considered appropriate to carry out construction, contact the Client or his representative with comments / queries or remarks.

TASK	RESPONSIBILITY
5.2 CONTROL OF CLIENT-ISSUED DOCUMENTATION <i>continued</i>	
ii. If the documents are considered acceptable, mark the required distribution for the controlled issue of the documentation on the covering Document Transmittal Note or Letter and pass to the Document Controller for controlled issue.	<i>Divisional / Regional / Project Manager / Project Manager's Delegate</i>
<i>Form: MOH0001-FOR-00031 Document Review Decal</i>	
5.2.3 Internal Issue of Client Drawings/Specifications to Suppliers / Subcontractors	<i>Document Controller</i>
All drawings, specifications, contract documents shall be individually registered on the Document & Drawing Register and issued internally to Suppliers / Subcontractors with a Document Transmittal Note.	
<i>Form: MOH0001-FOR-00028 Document & Drawing Register MOH0001-FOR-00032 Document Transmittal Note</i>	
5.3 CONTROL OF MURPHY DOCUMENTATION (Drawings / Specifications / Contract Documents / Method Statements / Procedures / Plans / Programmes / Reports / CVI's / Technical Queries)	
5.3.1 Document Numbering	<i>Document Controller</i>
All documents generated and issued (internally or externally) by the Murphy Group shall be allocated a number in accordance with Group Procedure MOH0001-PRO-00006 – Document Numbering.	
5.3.2 Document Registration	<i>Document Controller</i>
Add or update documents to the "Document and Drawing Register" each time they are issued or revised.	
<i>Form: MOH0001-FOR-00028 Document & Drawing Register</i>	
<i>Note:- Individual registers should be set up for each document type e.g. Drawings / Procedures / Plans / Reports.</i>	
5.3.3 Document Review Prior to Issue	<i>Author / Reviewer / Approver</i>
i. Documents produced by Murphy personnel shall be subject to an internal review and checking prior to formal issue for use. Document "Reviewers" shall be selected according to their technical expertise, seniority or experience. ii. It is the responsibility of the document Author to ensure the document is reviewed, any comments are incorporated and that the document is revised and updated. iii. Prior to issue, documents to be made for use shall display the approval signatures of the Author, Reviewer and Approver as necessary.	

TASK
RESPONSIBILITY
5.3 CONTROL OF MURPHY DOCUMENTATION *continued*

Note:- Refer to Group Procedure for Preparation of Procedures (MOH0001-PRO-00015); Quality Plans (MOH0001-PRO-00016; Method Statements (MOH0001-PRO-00007) for the standard template which includes space for document preparation, review and approval sign-off. These procedures also refer to the numbering system for each type of document.

5.3.4 Controlled Issue and Distribution
Document Controller

- i. Distribute documents to the nominated recipients identified by the Divisional / Regional / Department or Project Manager.
- ii. Ensure the formal distribution of identified documents to selected recipients by means of a Document Transmittal Note.
- iii. Nominated holders of the document to be issued shall be entered on to the Document & Drawing Register.
- iv. The recipient shall acknowledge receipt of the document by returning a signed copy of the Document Transmittal Note to the Document Controller. Where documents are distributed by hand, the recipient's signature on the Site Personnel Document Issue Record is sufficient.

Form: **MOH0001-FOR-00032** **Document Transmittal Note**
 MOH0001-FOR-00116 **Site Personnel Document Issue Record**
 MOH0001-FOR-00028 **Document & Drawing Register**

Note:- Documentation of a commercially sensitive or contractual nature transmitted externally (outside the company) by electronic means should be converted to Adobe Acrobat pdf format (Portable Document Files) e.g. tenders, estimating data, method statements.

5.3.5 Document Revision
Document Controller

- i. Documents that have been revised shall clearly indicate the reason for the change. This may be achieved by the use of a vertical line in the right-hand margin of the document adjacent to the amended text, or by means of a "cloud" or triangle.
- ii. Revised documents shall follow the same routing of submission, review and approval as their previous version. See 5.3.2 to 5.3.3

5.3.6 Superseded, Cancelled and Withdrawn Documentation

- i. Documents that require to be withdrawn from circulation or cancelled, shall be controlled in the following manner :
 - a. The authority to cancel or withdraw a document shall be the same as the authority to issue.
 - b. The document author shall raise the revision number of the document. e.g. 00, 01, 02 etc.
 - c. The document shall clearly indicate the reason for withdrawal or cancellation.

Document Controller

TASK	RESPONSIBILITY
5.3 CONTROL OF MURPHY DOCUMENTATION <i>continued</i>	
<ul style="list-style-type: none"> ii Parties that receive updated versions of documents shall destroy the previous version and replace it with the current version. Where obsolete documents are required for reference purposes, the document shall be clearly marked <i>SUPERSEDED</i>, withdrawn from use and retained separately. 	<i>Document Recipients</i>
5.4 METHOD STATEMENTS	<i>Document Controller</i>
<ul style="list-style-type: none"> i. The generation, registration and numbering of Method Statements shall follow the Document Numbering Procedure, MOH0001-PRO-00006, and the Production of Method Statements Procedure, MOH0001-PRO-00007, and be registered on the 'Method Statement Register'. ii. The distribution of 'Controlled' copies shall be determined by the relevant Project/Site/Contracts Manager, delegated recipients shall be identified and recorded on the 'Method Statement Register' Method Statements subject to distribution and issue shall be copied as many times as required prior to forwarding under cover of a 'Document Transmittal Note'. (Except locally on a site where signature on the Site Personnel Document Issue Record is sufficient). 	
<i>Forms:</i> MOH0001-FOR-00027 – Method Statement Register MOH0001-FOR-00032 – Document Transmittal Note MOH0001-FOR-00116 – Site Personnel Document Issue Record	
5.5 FILING, RETENTION & RETRIEVAL	
5.5.1 General	
<ul style="list-style-type: none"> i A common Filing & Indexing System shall be established for the retention of correspondence, contract / project documentation. This system shall either be in hard copy, electronic or both. For the hard copy system produce a Contract / Divisional / Regional / Yard Filing Index. Where practicable, records shall be retained within access restricted, fire proof containers and cabinets. 	<i>Document Controller</i>
<i>Form:</i> MOH0001-FOR-00087 Template Filing Index	
<ul style="list-style-type: none"> ii Documents and data in electronic form shall be retained within delegated folders that shall be structured to mirror the filing system, in an abbreviated form, of their hard-copy counterparts. 	
5.5.2 Contract	
<ul style="list-style-type: none"> i The 'Electronic Contract Folders' shall be created on the 'F Drive' in the 'Contracts' folder under the 'Contract Number' in the 'Murphy' folder (e.g. F:\Contracts\LWA0112\MURPHY). The folder shall be created within 5 working days of the 'Contract Award Notification' being issued. The Project Manager (or Delegate) shall be notified when complete. 	<i>IT Department</i>
<ul style="list-style-type: none"> ii The 'IT Multi User Contract Folder Permission Allocation' form and the 'IT New Site Setup Configuration' form shall be completed and the IT Department shall be notified by e-mail. These forms shall be kept in folder '0.0 IT Forms' and updated as necessary. IT shall be notified each time the forms are updated. 	<i>Project Manager / Project Manager's Delegate</i>
<i>Forms:</i> MOH0001-FOR-00168 IT Contract Setup MOH0001-FOR-00169 IT Multi User Contract Folder Permission Allocation	

TASK	RESPONSIBILITY
<p>iii. Document retention periods shall follow in accordance with the durations described by the Group's Procedure for Records & Archiving, MOH0001-PRO-00017, or specified contractual / Client requirements.</p> <p><i>Note:- The name and number of the 'Electronic Contract Folders' shall not be changed. Folders not required on a contract shall be left empty.</i></p> <p><i>Sub-folders may be added to the 'Electronic Contract Folders', however to prevent data loss the file path shall not exceed 150 characters. This includes all characters starting with F:\ and finishing with the file name, including spaces, punctuation and numbers. Additionally a file name or folder name cannot contain any of the following characters \ / : * ? " < > . This applies to all files on the F Drive.</i></p> <p><i>To prevent duplication of data the 'Electronic Contract Folders' shall not be copied into other folders including 'My Documents', regional folders or divisional folders.</i></p> <p><i>To ensure contract data is captured in one secure location, contract data shall only be stored in the 'Electronic Contract Folders' and not stored in personal or departmental folders. The 'Electronic Contract Folders' shall be used to store the final contract documents.</i></p> <p><i>The File Transfer Area (FTA) folders are for the temporary transfer of files only and shall not be used to store working files, contract files or archive files. The FTAs are not backed up by IT.</i></p> <p><i>If electronic documents are stored in the contract folders hard copies are not required. Signed documents are required to be kept as hard copy or scanned images.</i></p> <p><i>Electronic Document Management Systems (also known as Extranets) may be used in conjunction with, or instead of, the standard 'Template Filing Index' and the 'Electronic Contract Folders'. The use of Extranets shall be determined by the Project Manager on a contract by contract basis.</i></p>	<p><i>Document Controller</i></p>
<p>5.6 SUBCONTRACTOR / SUPPLIER DOCUMENTATION</p>	
<p>5.6.1 Document Schedule</p>	<p><i>Project Manager</i></p>
<p>Where applicable, a list of documentation required from the Supplier / Sub-contractor / Designer shall be included in the requisition and subsequently in their Order. (Refer to Group Procedures for Purchasing Materials, Subcontractors and Designers MOH0001-PRO-00009, 10 & 19)</p>	
<p>5.6.2 Document Receipt & Registration</p>	<p><i>Document Controller</i></p>
<p>i. Subcontractor documentation shall be registered upon initial receipt and at subsequent revisions, on the Document & Drawing Register.</p> <p><i>Form: MOH0001-FOR-00028 Document & Drawing Register</i></p> <p>ii. A document review decal, shall be applied to each Subcontractor / Supplier document submission as appropriate.</p> <p><i>Form: MOH0001-FOR-00031 Document Review Decal</i></p> <p>iii. Distribute Subcontractor / Supplier documentation to the selected Murphy Reviewers.</p>	<p><i>Document Controller</i></p>

TASK	RESPONSIBILITY
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5.6.3 Document Review
*Project Manager /
Reviewers*

- i. All document deliverables produced by the Subcontractor / Supplier shall be subject to review and checking by delegated Murphy personnel prior to authorisation for use.
- ii. Document Reviewers shall be selected according to their technical expertise, seniority or experience.
- iii. Sign, date and annotate the affixed decal to indicate the appraisal status of the document and return to the Document Controller.

Reviewers
5.6.4 Distribution & Issue
Document Controller

- i. Return reviewed, approved or rejected submissions by means of a Document Transmittal Note to the Subcontractor / Supplier requesting incorporation of comments and re-submission if necessary.
- ii. Document distribution shall follow in accordance with an agreed Distribution Matrix / Listing, refer to 5.3.4 of this procedure.
- iii. Distribute approved Subcontractor / Supplier documents to selected recipients by means of a Document Transmittal Note.
- iv. Pursue acknowledgement of receipt of the document by obtaining a signed copy of the Document Transmittal Note.

Form: **MOH0001-FOR-00032 Document Transmittal Note**

5.7 BRITISH OR INTERNATIONAL STANDARDS AND OTHER TECHNICAL PUBLICATIONS
5.7.1 Request for Technical Publications
Project Manager

Use the IHS website link on MurphyOnline to search for British or International Standards and other Technical Publications. Publications not found on the IHS website shall be requested from the Quality and Environment Administrator located in Head Office using the 'Publication Requisition Form'.

Form: **MOH0001-FOR-00160 Publication Requisition Form**

5.7.2 Publication Ordering and Issue
Quality Administrator


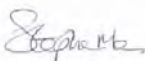
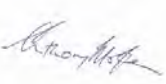

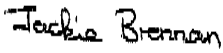

- i. The Quality Administrator shall source the document.
- ii. The publication once received shall be issued to the person requesting the document as 'Uncontrolled'.

Note: It is the responsibility of the recipient to check the validity and issue status of the document requested prior to use.

Appendix 4D:**MOH0001-PRO-00007 – Method Statements and Safety Risk Assessments**

GROUP PROCEDURE

PREPARATION AND ISSUE OF METHOD STATEMENTS & SAFETY RISK ASSESSMENTS

					
Eric Loh Systems Improvement Manager	Stephen Marr Group Environmental Manager	Tony Moten Group Health & Safety Manager	Chris Titterton Group Quality Manager	Jackie Brennan Group HSQE Manager	James O'Callaghan Main Board Director
MAIN AUTHOR	REVIEWER	REVIEWER	REVIEWER	REVIEWER	APPROVER

REV	DATE	STATUS DESCRIPTION
01	23.11.10	Revised to incorporate the new Maxcel cost code contract number only. The content of the procedure will be revised and issued in due course.
00	04.03.03	Issued for Implementation
AA	18.11.02	Issued for Comment

DOCUMENT NO.	MOH0001-PRO-00007 Rev 01
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- 1.0 **Purpose**
- 2.0 **Scope**
- 3.0 **References**
- 4.0 **Definitions**
- 5.0 **Procedure**
 - 5.1 Preparation
 - 5.2 Format and Numbering
 - 5.3 Checking and Approval
 - 5.4 Distribution
 - 5.5 Revision
 - 5.6 Subcontractor Method Statements

APPENDICES

A	Method Statement Register	MOH0001-FOR-00027
B	Document Transmittal Note	MOH0001-FOR-00032
C	Method Statement Document Template	MOH0001-FOR-00090
D	Safety Risk Assessment	MOH0001-FOR-00091
E	Site Personnel Document Issue and Briefing Record	MOH0001-FOR-00116

1.0 PURPOSE

The purpose of this document is to describe and define the procedure for the planning, preparation, approval and issue of Method Statements and associated Safety Risk Assessments, and to ensure that the construction operations are executed in accordance with the required specifications and legal Health, Safety and Environmental requirements.

- 2.0 This Procedure shall apply to all construction activities and operations of Departments, Divisions and Regions of the Murphy Group, and shall include the activities of any appointed Subcontractors.
- Where Client or Joint Venture requirements dictate this procedure may be deviated from by recording required deviations in the Contract Quality Plan or Contract specific procedure and gaining approval of the Group Quality Manager.

3.0 REFERENCES

BS EN ISO 9001:2008	Quality Management Systems: Requirements – Clauses 6.3 Infrastructure, 6.4 Work Environment, 7.5.1 Control of production & 7.5.2 Validation of processes for production.
BS EN ISO 14001:2004	Environmental Management Systems – Specification with guidance for use. Clause 4.4.6 Operational Control
BS OHSAS 18001:2007	Health and Safety Management Systems: Clause 4.31 Hazard Identification, Risk Assessment and Determining Controls.

4.0 DEFINITIONS

All terms referred to within this Group Administrative Procedure shall be as defined in the Group Quality Manual.

5.0 PROCEDURE

TASK	RESPONSIBILITY
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5.1 PREPARATION

5.1.1 Method Statement Requirements

*Divisional / Regional
Manager
Contracts / Project
Manager*

- i. The purpose of any Method Statement is to identify and plan and record the activities that shall be undertaken within the agreed Scope of Work. The Method Statement shall describe the techniques and working practices, resources and controls that shall be employed in the execution of the identified tasks.
- ii. The Murphy Group shall develop Method Statements specific to the scope of work in a narrative format that translates proposed strategies into a plan of activities to be undertaken.

5.1.2 Pre-Tender / Tender Phase

*Divisional / Regional
Manager / Estimator*

- i. If required by the 'Instructions to Tenderer' a Method Statement shall be prepared.

Form: MOH0001-FOR-00090 – Method Statement Template

- ii. When preparing Method Statements consideration must also be given to those activities likely to be carried out by Subcontractors. It is imperative that any hazard or risk (including environmental impact) associated with an identified activity is clearly detailed within the Method Statement produced by the Murphy Group or that a Subcontractor's Method Statement is prepared. Input should be obtained from the Health and Safety Adviser, Environmental Adviser and Quality Manager as necessary.
- iii. Tender enquiries to Subcontractors must include all relevant, Client-supplied information, and detail any hazards and risks (including environmental impact) associated with the works that may influence the Subcontractor activities.
- iii. A copy of the Method Statement shall be retained and filed in conjunction with pertinent Tender documentation.

TASK	RESPONSIBILITY								
5.1 PREPARATION <i>continued</i> 5.1.3 Post Award	<i>Project / Site Manager</i>								
<ul style="list-style-type: none"> i. Method Statements are required for all work activities to be undertaken on Site. ii. When preparing Method Statements consideration must also be given to those activities likely to be carried out by Subcontractors. It is imperative that any hazard or risk (including environmental impact) associated with an identified activity is clearly detailed within the Method Statement produced by the Murphy Group or that a Subcontractor's Method Statement is prepared. Input should be obtained from the Health and Safety Adviser, Environmental Adviser and Quality Manager as necessary. iii A programme of identified and required Method Statements shall be produced by analysing the Construction programme and discussing at the Prestart Contract Review Meeting. It shall be updated throughout the duration of the Contract. 									
<i>Form - MOH0001-FOR-00027 – Method Statement Register</i>									
<ul style="list-style-type: none"> iv. The suitability of existing Method Statements or the identification and generation of new ones, shall be reviewed and actioned as necessary during scheduled Project / Contract Reviews (<i>Pre-Start Review and Periodic</i>). 									
5.1.4 Selection and Appointment of Author	<i>Author / Document Controller</i>								
<ul style="list-style-type: none"> i. The selection of personnel tasked with the production and issue of Method Statements shall be the responsibility of each Divisional / Regional Manager or Project / Site Manager. ii. Prior to the generation of any Method Statement, the nominated 'Author' shall contact the site Document Controller and obtain the next available sequential number. 									
5.2 FORMAT & NUMBERING									
5.2.1 Format	<i>Author</i>								
<ul style="list-style-type: none"> i. Method Statements shall be created using a standard template. 									
<i>Form: MOH0001-FOR-00090 – Method Statement Template</i>									
5.2.2 Numbering	<i>Author</i>								
<p>All Method Statements generated and issued by the Murphy Group shall be allocated a number in accordance with MOH0001-PRO-0006 – Document Numbering Procedure</p>									
<p>The numbering sequence shall be comprised of the following four parts :</p>									
<table> <tr> <td>Part 1</td><td>Department / Division / Region / Contract Number</td></tr> <tr> <td>Part 2</td><td>Document Code – 'MST' for Method Statement</td></tr> <tr> <td>Part 3</td><td>Sequential Number</td></tr> <tr> <td>Part 4</td><td>Revision Indicator</td></tr> </table>	Part 1	Department / Division / Region / Contract Number	Part 2	Document Code – 'MST' for Method Statement	Part 3	Sequential Number	Part 4	Revision Indicator	
Part 1	Department / Division / Region / Contract Number								
Part 2	Document Code – 'MST' for Method Statement								
Part 3	Sequential Number								
Part 4	Revision Indicator								

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TASK	RESPONSIBILITY
5.5 REVISION	<i>Project / Site Manager / Contracts Manager</i>
<ul style="list-style-type: none"> i. The Project / Site / Contracts Manager shall continually assess the suitability of all Method Statements during the contract period. Method Statements that no longer address the scope of work and activities being performed shall be subject to revision and re-issue where necessary. ii. Method Statements subject to revision and update shall undergo the same review, approval and distribution process as the previous revision. iii. Amendments shall be identified and recorded within the 'Status Description' box of the 'Document Status Panel'. 	
5.6 SUBCONTRACTOR METHOD STATEMENTS	<i>Project / Site Manager / Contracts Manager</i>
<ul style="list-style-type: none"> i. Approval Prior to commencing works obtain and approve suitable, sufficient Method Statements and Risk Assessments from Murphy Group appointed Subcontractors, or provide the Subcontractor with Murphy Method Statements and Risk Assessments specific to the scope of work. 	


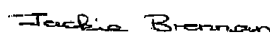
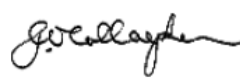
Appendix 4E:

MOH0001-PRO-00008 – Quality Observations

GROUP PROCEDURE

Quality Observations

(Formerly Control of Non-conformance)

				
Eric Loh Group Quality Manager			Jackie Brennan Group HSQE Manager	James O'Callaghan Main Board Director
MAIN AUTHOR	REVIEWER	REVIEWER	REVIEWER	APPROVER

03	19.11.14	Updated to allow for collective analysis of multiple Quality Observations and scope change allowing use of Client's system where mandated
02	19.10.13	Updated to reflect change to Quality Observations and roll-out of Culture Change Programme & to remove Complaints process which will be a separate procedure
01	22.11.10	Revised to incorporate the new Maxcel cost code contract number only. The content of the procedure will be revised and issued in due course.
00	24.02.03	Issued for Implementation
AB	18.11.02	Issued for General Comment
AA	16.09.02	Issued for Comment
REV	DATE	STATUS / DESCRIPTION OF CHANGES

DOCUMENT NO.	MOH0001-PRO-00008
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D	Quality Observation Register	MOH0001-FOR-00055
E	Concession Request Register	MOH0001-FOR-00056
F	Concession Request	MOH0001-FOR-00058

1.0 Purpose

The purpose of this Procedure is to describe the processes for the management and control of nonconforming product or processes (termed “Quality Observations” within the Murphy System), to prevent their unintended use, delivery or handover. The procedure includes the process for the implementation of corrective action, action to prevent recurrence, and the process for applying for and authorising concessions.

2.0 Scope

This Procedure shall apply to all operating Departments, Business Units and Regions of the Murphy Group organisation.

Where the Client has mandated the use of their own process and/or forms for the management of non-conformance, then this shall take precedence over the Murphy Group system.

3.0 References

BS EN ISO 9001	Quality Management Systems – Requirements
BS EN ISO 14001	Environmental Management Systems – Requirements and Guidance for Use

4.0 Definitions

Action to Prevent Recurrence	The action identified and taken to eliminate the cause(s) of a Quality Observation (non-conformance) in order to prevent recurrence.
Corrective Action	The action identified and taken to correct a detected non-conformance of product or system.
Preventive Action	The action identified and taken to eliminate the cause(s) of potential nonconformities in order to prevent their occurrence.
Quality Observation	<p>A non-compliance with product or management system requirements i.e. Contract Terms and Conditions, Code of Practice, Standard or Specification.</p> <p>Typically, a quality observation detected as a result of product or management system deficiencies can be defined as, but not limited to, the following:</p> <ul style="list-style-type: none">• materials delivered are not to specification• use of incorrect processes and/or procedures• damage to equipment and materials• absence of verifying documentation/inadequate certification• defective/deficient inspection, measuring and test equipment,• poor workmanship / workmanship not to specification• abuse/incorrect handling and storage of materials & equipment

5.0 Procedure

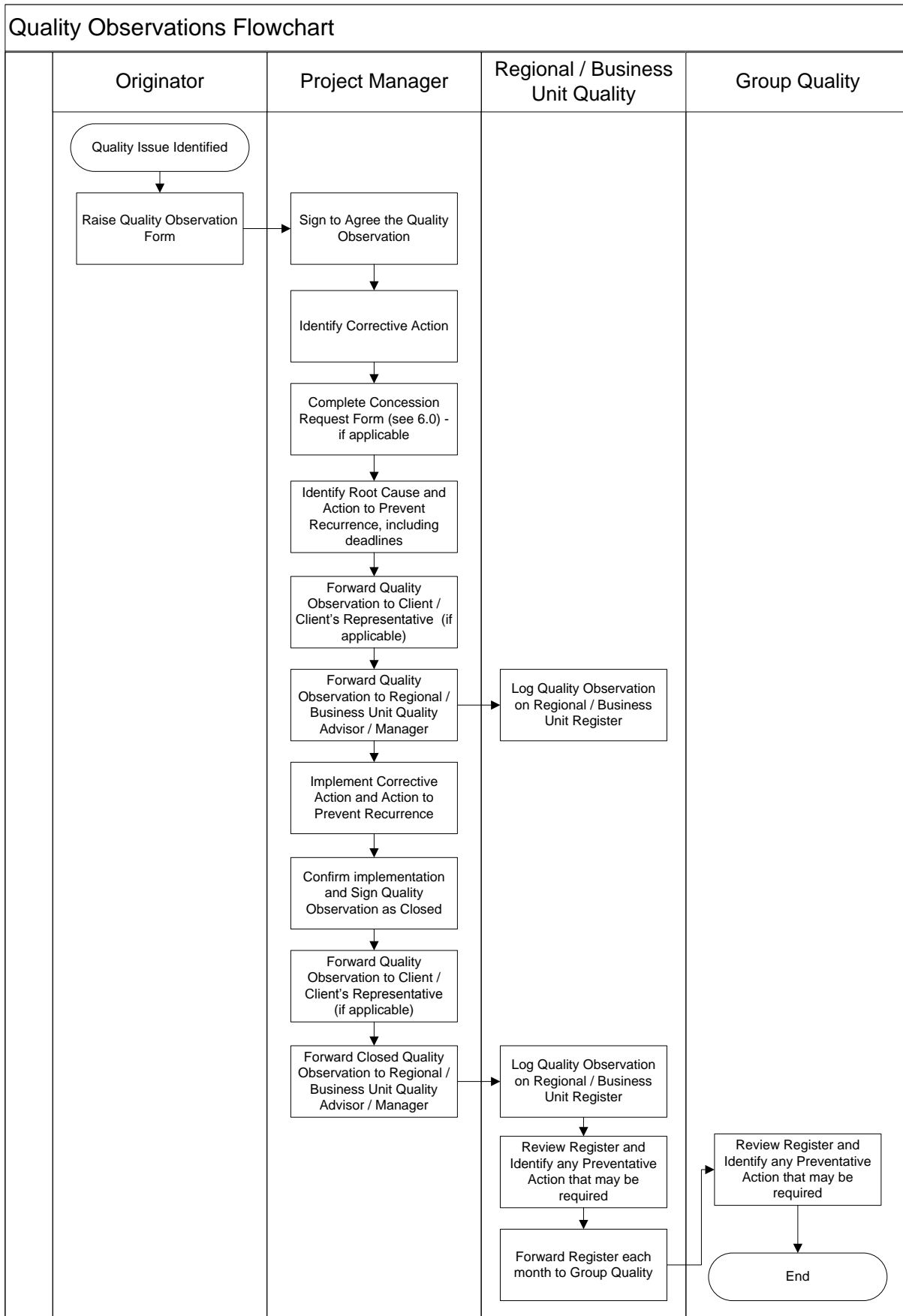
TASK	RESPONSIBILITY
5.1 Identification and Reporting of Quality Observations	
5.1.1 Once a Quality Observation has been identified, details of the Quality Observation should be passed to a member of the project management team. Typically this is the Project/Site Manager, Engineer, Storeman, Inspector or Material Controller. These details can be passed on verbally or through a Feedback Card.	<i>All</i>
5.1.2 The Project Management team member who receives these details shall raise a Quality Observation Form. Form: MOH0001-FOR-00054 Quality Observation Form	<i>Originator</i>
5.1.3 At this stage the originator of the Quality Observation shall ensure that the following information is recorded: <ul style="list-style-type: none"> Contract Name & Number Name of the sub-contractor or suppliers (if the Quality Observation concerns products or services provided by a sub-contractor supplier) Description of the issue being raised Identification of the Code, Standard, Specification, Procedure, Drawing, Purchase Order that the issue is in non-compliance with 	<i>Originator</i>
5.1.4 The Quality Observation form shall be signed by the originator and passed to the Project Manager for agreement.	<i>Originator</i>
5.1.5 The Project Manager shall review the Quality Observation, amend if necessary, and, when satisfied it is valid, sign to agree the Quality Observation	<i>Project Manager</i>
5.2 Identification of Corrective Action (Part 2A of the Quality Observation Form)	
5.2.1 The Project Manager shall determine the immediate course of action to be taken to remedy the situation and advise the Originator of the Quality Observation of the corrective actions to be performed.	<i>Project Manager</i>
5.2.2 The following corrective action(s) shall be implemented, where appropriate, to remedy the identified Quality Observation: <ul style="list-style-type: none"> the marking or identification of nonconforming materials, equipment, workmanship or documentation reject, rework/repair or replacement of the nonconforming item(s) obtain formal approval from the appropriate authority by means of Concession/Deviation Request to use the non-conforming item(s) disposal of the nonconforming item(s) 	<i>Project Manager</i>
5.2.3 Where it is proposed to 'leave as is', a Concession Request shall be completed in accordance with Section 6.0 of this Procedure and referenced on the Quality Observation Form.	<i>Project Manager</i>

TASK	RESPONSIBILITY
<p>5.2.4 Where the issue identified concerns materials, products or services supplied by a supplier or sub-contractor, the Project Manager shall issue the Quality Observation to the relevant supplier/sub-contractor to identify and implement the appropriate corrective action and action to prevent recurrence.</p> <p>In such cases, the Project Manager shall not sign Part 2 of the form until they agreed the action proposed by the supplier / subcontractor.</p>	<i>Project Manager</i>
5.3 Quarantine of Non-conforming Materials or Equipment	
<p>5.3.1 Where non-conforming materials or equipment have been identified, these shall be segregated and clearly identified as being in quarantine so as to prevent use. This should be done either through storage in a designated quarantine area or through clear marking / tagging of the material or items as quarantined.</p>	<i>Project Manager</i>
5.4 Identification of Action to Prevent Recurrence (Part 2B of the Quality Observation Form)	
<p>5.4.1 Following identification of the Corrective Action, the root cause of the issue shall be identified. This may be done using the guidance on the reverse of the Quality Observation form (5 Why).</p>	<i>Project Manager</i>
<p>5.4.2 The Action to Prevent recurrence shall then be identified. <u>The Action to Prevent Recurrence must aim to remove the identified Root Cause.</u></p> <p>Where the Action to Prevent Recurrence requires action at Regional/Business Unit or Group Level, then the Project Manager shall liaise with the appropriate staff (for example Regional/Business Unit/Group HSQE Managers) to agree actions and deadlines.</p>	<i>Project Manager</i>
<p>5.4.3 Where required by the Contract, the Project Manager shall forward the Quality Observation to the Client / Client's Representative to obtain approval of the proposed corrective action(s).</p>	<i>Project Manager</i>
<p>5.4.4 A copy of the Quality Observation shall be forwarded to the Regional / Business Unit Quality Advisor / Manager once the Corrective Action and Action to Prevent Recurrence has been agreed.</p>	<i>Project Manager</i>
<p>5.4.5 The Regional / Business Unit Manager / Advisor shall enter the details of the Quality Observation on the Regional / Business Unit Quality Observation Register and track to completion.</p> <p>Each newly generated Quality Observation shall be assigned the next available sequential number from the Register.</p>	<i>Regional / Business Unit Quality Manager / Advisor</i>
Form: MOH0001-FOR-00055 Quality Observation Register	
Note: on large contracts, a Quality Observation Register may need to be maintained at Project Level in addition to Regional/Business Unit Level.	
5.5 Close-Out of Quality Observation	
<p>5.5.1 Once the Corrective Action and Action to Prevent Recurrence has been implemented, the Project Manager shall verify the implementation and complete section 3 of the Quality Observation Form.</p>	<i>Project Manager</i>
<p>5.5.2 Where applicable, the completed Quality Observation shall be forwarded to the Client / Client's Representative to obtain approval of the close-out.</p>	<i>Project Manager</i>

TASK	RESPONSIBILITY
5.5.3 A copy of the closed Quality Observation shall be forwarded to the Regional / Business Unit Quality Advisor / Manager.	<i>Project Manager</i>
5.5.4 The completed Quality Observation shall then be closed out on the Regional / Business Unit Quality Observation Register.	<i>Regional / Business Unit Quality Manager / Advisor</i>
5.5.5 Where the Client has mandated the use of their own process and/or forms for the management of non-conformance, then this shall take precedence over the Murphy Group system.	<i>Project Manager</i>
6.0 Concessions	
6.1 Concession Requests	
6.1.1 Where the Project Manager determines that the proposed corrective action may be that of "Repair" or "Accept as is", a Concession Request shall be generated and forwarded to the approving authority (for example the Client or Client's Representative) for consideration and review.	<i>Project Manager</i>
Form: MOH0001-FOR-00058 Concession Request	
6.1.2 The Concession Request number shall be referenced on the Quality Observation to which it relates and both forms shall be submitted to the Client / Designer (as appropriate) for review and approval.	<i>Project Manager</i>
6.1.3 A Concession Request Register shall be developed and maintained by the Project Manager or nominee.	<i>Project Manager / Nominee</i>
6.1.4 Each newly generated Concession Request shall be assigned the next available sequential number from the Register that shall record the following: <ul style="list-style-type: none"> • Concession Request Number • Brief description • Date raised • Response date • Status (Accept or Reject) 	<i>Project Manager / Nominee</i>
Form: MOH0001-FOR-00056 Concession Request Register	
6.2 Concession Request – Approval	
6.2.1 Following submission and approval of the Concession Request by the appropriate authority, the relevant Manager shall ensure the implementation of the agreed corrective action (if any).	<i>Project Manager / Nominee</i>
6.2.2 The Concession Request Register and Quality Observation Registers shall be updated. Copies of the Concession Request and the Quality Observation Report shall be issued to the Originator for information.	<i>Project Manager / Nominee</i>
6.3 Concession Request – Rejection	
6.3.1 If the Concession Request is rejected by the appropriate authority, then the Proposed Corrective Action shall be revised and the Concession re-submitted for approval.	<i>Project Manager</i>

TASK	RESPONSIBILITY
6.3.2 If, following instruction from the appropriate authority that the nonconforming item(s) is to be rejected, it shall be suitably identified and/or marked "Rejected", and segregated/withdrawn from use.	<i>Project Manager</i>
6.4 Sharing of Quality Observations	
6.4.1 Copies of Regional / Business Unit Quality Observation Registers shall be forwarded each month to the Group Quality Department with the HSQE KPIs to facilitate analysis (see section 8 of this procedure).	<i>Regional / Business Unit Quality Manager / Advisor</i>
7.0 Preventative Action	
7.1.1 Regional / Business Unit and Group Quality Managers shall analyse the Quality Observation Registers to identify any trends that may be apparent and to identify any preventative actions or best practices that should be adopted across the Region / Business Unit / Group.	
7.1.2 Any agreed preventive actions shall be recorded as part of the Management Review.	
7.1.3 Examples of preventive actions that may be identified include:	
<ul style="list-style-type: none"> • Procedure revision • Awareness training • Introduction of new working practices • Review of Quality Plans • Introduction of additional quality checks 	

Appendix A – Quality Observations Flowchart



Appendix B – Quality Observations Categories

Category

Sub Category

Quality Control

Inspection & Testing (including ITP)
Workmanship not to spec / drawing
Damage to infrastructure / Customer Property
Control of Temporary Works
Setting out
Document Control

Subcontractor

Sub-Contract - Workmanship not to spec / drawing
Inspection & Testing
Damage to Infrastructure / customer property
Setting out
Plant Defect
Poor Service
Plant Not To Order
Plant maintenance/certification

Design

Design Management
Drawing Control (including incorrect revision used)
Lack of approved design
Red-lining of drawings

Environment

Invasive Species
Waste Management
Risk Management
Site Set-Up (Environment)
Audits
Construction
Housekeeping

Materials

Damaged on delivery
Incorrect Materials, not to specification
Late/non deliveries

Health and Safety

Site Set-up (H&S)
Security
Traffic Management
Welfare
Accident/incident reporting
Risk Assessments & Method Statements (RAMS)
Permits to work

Other

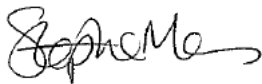
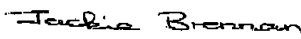
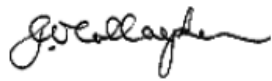
Failure to follow management system process

Appendix 4F:

MOH0004-PRO-00003 – Environmental Aspects and Impacts

GROUP PROCEDURE

**Environmental
Aspects & Impacts**

			
Stephen Marr Group Environmental Manager		Jackie Brennan Group HSQE Manager	James O'Callaghan Main Board Director
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

05	02 Nov 14	Revised to incorporate a combined Yard HSE Management Plan
04	31 Jan 11	Revised to incorporate the new Maxcel cost code contract number only
03	30 Oct 09	Revised to incorporate post control assessment of impacts
02	01 Apr 03	Issued for implementation
01	10 Mar 03	Draft issued for comment
00	14 Aug 01	Issued for implementation
REV	DATE	STATUS / DESCRIPTION OF CHANGES

DOCUMENT NO.	MOH0004-PRO-00003
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CONTENTS

- 1.0 **Purpose**
- 2.0 **Scope**
- 3.0 **References**
- 4.0 **Definitions**
- 5.0 **Procedure**
 - 5.1 Contract Start-Up / Yard Planning
 - 5.2 Document Review
 - 5.3 Identifying Significant Impacts
 - 5.4 Changes to Work Activities
 - 5.5 Permanent Yards

APPENDICES

- | | | |
|---|---|-------------------|
| A | Aspects & Impacts Register | MOH0004-FOR-00029 |
| B | Environmental Impacts Checklist for Minor Works | MOH0004-FOR-00019 |

1.0 PURPOSE

The purpose of this Procedure is to describe the processes for identifying what aspects of an activity may impact on the environment; evaluating the significance of those impacts and identifying appropriate controls to reduce the severity of those impacts.

2.0 SCOPE

This Procedure shall apply to all operating Departments, Business Units and Regions of the Murphy Group organisation.

3.0 REFERENCES

- | | | |
|----|----------------------|--|
| i. | BS EN ISO 14001:2004 | Environmental Management Systems: Requirements |
| | Clause 4.3.1 | Environmental Aspects |
| | Clause 4.4.6 | Operational Control |

4.0 DEFINITIONS

All terms used in this Group Procedure are as defined in the .

Environmental Aspect is an element of an activity that can interact with the environment e.g. discharge of effluent to a watercourse. An Aspect will cause an Impact.

Environmental Impact is a change to the environment (adverse or beneficial) that wholly or partly results from activities e.g. pollution of a watercourse. An Impact will be caused by an Aspect.

Significant Impact is one which is considered to represent a high risk of causing harm to the environment

5.0 PROCEDURE

TASK	RESPONSIBILITY
5.1 Contract Start-Up / Yard Planning	
5.1.1 Visit site/yard to identify impacts of works/ activities.	<i>Environmental Adviser (or input to another member of staff)</i>
5.2 Document Review	
5.2.1 Review the following to identify impacts: <ul style="list-style-type: none"> i Scope of works/activities ii Contract iii Environmental Impact Assessment iv Any other relevant documents e.g. archaeological/ecological surveys, contaminated land investigations, consents. 	<i>Environmental Adviser with input from Project/Yard Manager</i>
5.3 Identifying Significant Impacts	
5.3.1 Produce Aspects and Impacts Register and calculate significance of each aspect and impact.	<i>Environmental Adviser</i>
5.3.2 Identify control measures to reduce the likelihood of occurrence and/ or the severity of the impact and re-calculate evaluation of significance. Form: MOH0004-FOR-00029 Aspects and Impacts Register	
5.3.3 Include the control measures identified in Contract Environmental Management Plan/ Site Waste Management Plan/Local Yard Procedure.	<i>Environmental Adviser</i>
5.3.4 If work lasts for a few days and the location of works varies all the time, complete Aspects and Impacts Register for typical activities and in addition complete Environmental Impacts Checklist for Minor Works prior to starting works at each new location. Include requirement & responsibilities for completion in Contract Environmental Management Plan. Form: MOH0004-FOR-00019 Environmental Impacts Checklist for Minor Works	<i>Project Manager (with input from the Environmental Adviser)</i>
5.4 Changes to Works/Activities	
5.4.1 Inform Environmental Adviser of any changes to the scope of works/activities that may have a significant impact on the environment.	<i>Project/Yard Manager</i>
5.4.2 Review changes to works/activities to identify any new significant impacts. Update Aspects and Impacts Register if impacts are significant. Add controls for significant impacts to Contract Environmental Plan/ Method Statements/ Local Yard Procedure or Yard HSE Management Plan. Form: MOH0004-FOR-00029 Aspects and Impacts Register	<i>Environmental Adviser</i>

TASK	RESPONSIBILITY
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5.5	Permanent Yards
-----	------------------------

- | | | |
|-------|---|---|
| 5.5.1 | Review Aspects and Impacts Register for permanent Yards at least once a year to ensure that they are still correct. Update Register to address any changes and sign and date. | <i>Environmental Adviser
with input from Yard
Manager</i> |
|-------|---|---|

Form: MOH0004-FOR-00029 Aspects and Impacts Register

For further information see:

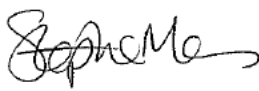
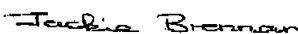
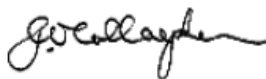
Group Environmental Control - How to Assess Environmental Aspects and Impacts (MOH0004-INS-00009)

Appendix 4G:

MOH0004-PRO-00017 – Environmental Responsibilities

GROUP PROCEDURE

Environmental Responsibilities

			
Stephen Marr Group Environmental Manager		Jackie Brennan Group HSQE Manager	James O'Callaghan Main Board Director
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

04	31 Jan 11	Up-dated to incorporate additional roles with environmental responsibilities and new Maxcel cost code number
03	30 Oct 09	Up-dated to incorporate additional environmental responsibilities and Group format
02	11 Mar 09	Up-dated to incorporate additional roles and additional environmental responsibilities
01	06 Mar 06	Up-dated to incorporate additional roles with environmental responsibilities
00	02 Apr 03	Issued for implementation
REV	DATE	STATUS / DESCRIPTION OF CHANGES

DOCUMENT NO.	MOH0004-PRO-00017
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CONTENTS**1.0 Purpose****2.0 Scope****3.0 References****4.0 Definitions****5.0 Responsibilities**

- Main Board Director for Health, Safety, Quality and Environment
- Regional/ Divisional Heads (i.e. Director/ Managers)
- Group HSQE Manager
- Group Environmental Manager
- Group EMS Adviser
- Regional/ Divisional HSQE Managers
- Regional/ Divisional Environmental Managers/ Lead Environmental Advisers.
- Environmental Advisers
- Project Managers
- Method Statement Authors
- Waste Reps
- Quantity Surveyors/ Commercial Managers
- Site Office Manager
- Requisitioners
- Drivers
- Regional Waste Managers
- Regional Waste Administrator
- Purchase Ledger Managers
- Subcontract Buyers
- Yard Managers
- Group Training Coordinator
- Group HSQE Auditors
- Environmental Auditors
- Audit Team Leader
- Auditees
- Group Audit Administrator
- All Staff

1.0 PURPOSE

The purpose of this Procedure is to identify those with responsibilities for implementation of the Group Environmental Management System and to define those responsibilities.

2.0 SCOPE

This Procedure shall apply to all operating Departments, Divisions and Regions of the Murphy Group organisation.

3.0 REFERENCES

- | | | |
|----|----------------------|--|
| i. | BS EN ISO 14001:2004 | Environmental Management Systems: Requirements |
| | Clause 4.4.1 | Structure and responsibility |

4.0 DEFINITIONS

As below.

5.0 RESPONSIBILITIES

Note – Most of the responsibilities in this Procedure are covered in more detail in individual Group Procedures. **Those marked* are not covered by other Procedures, and only appear here.**

Main Board Director for Health, Safety, Quality and Environment

- 1 Provide overall direction on all matters relating to HSQE across the Group
- 2 Ensure that the Group Environmental Management System is implemented and reviewed at the Group Management Review.

Regional/ Divisional Heads (i.e. Director/ Managers)

- 1 Maintain implementation of the Group Environmental Management System to ensure continued compliance with ISO14001. *
- 2 Ensure Training Appraisals are carried out annually and required training provided.
- 3 Ensure Group Objectives & Targets are implemented.
- 4 Agree process for regular reporting with Environmental Adviser, particularly for any issues that are proving difficult to resolve. *
- 5 Ensure staff needed for audits are available when required.
- 6 Ensure actions resulting from Corrective Action Requests and Observations raised during audits are completed by the deadlines.
- 7 Hold Regional/ Divisional Management Reviews (to include environment) at least once a year and ensure actions are completed.

Group HSQE Manager

- 1 Co-ordinated HSQE standards throughout the Company*
- 2 Set aims and objectives for the improvement of HSQE standards and promoting initiatives*
- 3 Monitor and report on standards*

Group Environmental Manager

- 1 Maintain the Group Environmental Management System to ensure continued compliance with ISO14001 and ISO 14064-1 and other industry certifications/ schemes. Liaise with certification bodies.*
- 2 Report to the Main Board Director for Environment on environmental performance. Provide Group level Environmental KPI statistics monthly to the Main Board Directors.*
- 3 Set and review Group Environmental Objectives & Targets in conjunction with the Group HSQE Manager.
- 4 Keep up-to-date with changes in environmental legislation and construction industry guidance. Ensure Environmental Legislation Registers are maintained and available to relevant employees.*
- 5 Provide advice, and respond to queries and correspondence on environmental issues. Liaise with third parties at Group level as required.*
- 6 Communicate environmental requirements to Regional/ Divisional Directors/ Managers/ HSEQ and Environmental Advisers. Ensure HSEQ/ Environmental Managers/ Advisers understand requirements of the Group Procedures and Guidance Notes.*
- 7 Produce the Group Audit Programme in conjunction with Group Quality Manager, Group Health & Safety Manager and Group HSQE Auditors. Select and train Environmental Auditors.

- 8 Review Audit Reports/ Performance/ identify areas of weakness and implement improvement actions.
- 9 Ensure environmental incidents/ non-compliances are fully investigated and appropriate corrective/ preventative actions are identified and implemented and lessons learnt are disseminated across the Group.
- 10 Identify employees that require environmental training, provide training and maintain training records.
- 11 Prepare reports for Group Management Reviews, in conjunction with the Group Quality Manager and Group Health & Safety Manager. Attend Group/ Regional/ Divisional Management Reviews and follow-up actions.
- 12 Liaise with Group Quality Manager and Group Health & Safety Manager, particularly where the management systems are integrated. *

Group EMS Adviser

- 1 Keep the Group Environmental Manager fully briefed on all matters pertaining to the Group Environmental Management System.*
- 2 Keep up-to-date with changes in environmental legislation and construction industry guidance and produce Environmental Legislation up-dates*.
- 3 Review and up-date current Group Environmental Management System*.
- 4 Provide environmental support to contracts, regions and divisions where required. Liaise with other Departments and third parties.*
- 5 Provide employees with training on requirements and implementation of the Group Environmental Management System.*
- 6 Undertake compliance audits on Regions/ Divisions/ Contracts implementing the Group Environmental Management System.*
- 7 Coordinate the compilation of Group level Environmental KPI statistics.*
- 8 Assist the Group Environmental Manager with the responsibilities given above. *

Regional/ Divisional HSQE Managers

- 1 Ensure the Group Environmental Management System is implemented within the Department and on contracts. Assign Environmental Advisers to individual Contracts and Yards.*
- 2 Lead the Departments Health, Safety Quality and Environmental Management Reviews. Prepare reports and identify key issues for discussion.*
- 3 Ensure implementation of Group Environmental Objectives & Targets and that progress is reported to the Group Environmental Manager.*
- 4 Collate Environmental KPI data and forward to Group Environmental Manager.*
- 5 Set and review Regional/ Departmental Objectives & Targets*
- 6 Keep up-to-date with changes in environmental legislation and construction industry guidance.
- 7 Ensure Major Incidents and Non-conformances are reported to the Group Environmental Manager immediately and follow up information is forwarded in a timely manner.*
- 8 Review Regional/ Divisional Environmental Incidents and Non-conformances. Ensure they are fully investigated and appropriate corrective/ preventative actions are implemented. Identify trends and actions for improvement.*
- 9 Attend Group HSQE Meetings and disseminate information to relevant employees.*
- 10 Provide feedback and reports on environmental performance to Group HSQE Manager as requested and seek advice when needed.*
- 11 Ensure employees understand requirements of Group Procedures and Guidance Notes. Identify employees that require environmental training, provide training and maintain training records.*

- 12 Obtain prior agreement from the Group Environmental Manager in writing for any deviations from Group Environmental Management System Procedures (e.g. use of client procedures or forms). Retain a record of written agreement on file.
- 13 Undertake internal compliance audits.*
- 14 Liaise with third parties on environmental issues as required.

Regional/ Divisional Environmental Managers/ Lead Environmental Advisers.

(Note – In Regions/ Divisions where there is no HSQE Manager and there are 3 or more Environmental Advisers, an Environmental Manager/ Lead Environmental Adviser is nominated by the Regional/ Divisional Head (i.e. Director or Manager) and Group Environmental Manager.

- 1 All the responsibilities assigned to Environmental Advisers (see below), plus:
- 2 Act as principal point of contact for environmental matters across the Region/ Division, liaising with other Environmental Advisers.*
- 3 Produce matrix for Divisions/ Regions where there is more than one Environmental Adviser showing responsibilities for Contracts, Yards and general items (e.g. Division/ Region Objectives & Targets).
- 4 Attend Group HSQE Meeting on behalf of other Environmental Advisers and disseminate information to them after the meeting. *(Note – other Environmental Advisers may also attend but the Manager/ Lead must attend as a minimum).* *
- 5 Take the lead in producing the environmental input into the Management Review Report and following-up actions. *
- 6 Maintain an overview of the implementation of the Group Environmental Management System in the Region/ Division. *

Environmental Advisers – also see Regional/ Divisional Environmental Managers/ Lead Environmental Advisers above.

- 1 Assist with implementation of the Group Environmental Management System to ensure continued compliance with ISO14001. *
- 2 Report Major Incidents to the Group Environmental Manager immediately, and to statutory authorities if necessary.
- 3 Log, monitor and investigate any environmental Incidents and Non-conformances
- 4 Obtain prior agreement from the Group Environmental Manager in writing for any deviations from Group Environmental Procedures (e.g. use of client procedures or forms). Retain a record of written agreement on file.
- 5 Disseminate information issued by Group Environmental Manager, including changes to legislation, to relevant employees. *
- 6 Provide feedback and reports to Group Environmental Manager as requested and seek advice when needed. *
- 7 Attend Group HSQE Meetings, as necessary, and disseminate information to relevant employees. *
- 8 Ensure employees understand requirements of Group Procedures and Guidance Notes. *
- 9 Identify employees that require environmental training, provide relevant training and maintain records of training provided.
- 10 Provide advice and respond to queries or correspondence on environmental issues. *
- 11 Identify significant environmental impacts for contracts/ yards and help set-up contracts/ yards to include appropriate controls.
- 12 Identify any environmental consents that are required and ensure they are obtained.
- 13 Notify Regional Waste Manager / Head Office Waste Manager if site will produce hazardous waste.

- 14 Produce Contract Environmental Management Plans, Local Yard Environmental Procedures and/ or site-specific environmental instruction.
- 15 Ensure Site Waste Management Plans are produced, regularly reviewed and retained as required.
- 16 Obtain Waste Permits/ Exemptions for Sites/ Yards as required.
- 17 Undertake contract/ yard environmental inspections to ensure controls are in place and working.
- 18 Monitor progress in closing out Corrective Action Requests and Observations raised during audits. *
- 19 Prepare reports for Regional/ Divisional Management Reviews, in conjunction with the Quality Manager(s), attend the meeting and follow-up actions.
- 20 Provide environmental input to Pre-qualifications and Tenders.
- 21 Agree a process for regular reporting to senior management in Contract/ Yard/ Region/ Division. *
- 22 Ensure all environmental records are kept and readily available.
- 23 Liaise with Quality Managers and Safety Managers, particularly where the management systems are integrated. *

Project Managers

- 1 Approve Contract Environmental Management Plan and ensure environmental controls are implemented by employees and subcontractors.
- 2 Provide information on contract requirements, including scope of works and forecast of waste quantities, to the Environmental Adviser following contract award and prior to start of works on site and also when any changes occur.
- 3 Nominate Environmental Adviser, Waste Rep(s), person to produce and maintain Site Waste Management Plan, person to undertake weekly Site Compound/ Yard checks, person to check drip trays and bunds and person to supervise refuelling of tanks and bowzers.
- 4 Ensure a forecast of waste types, quantities and disposal routes is produced before works start on site.
- 5 Ensure required consents are obtained before associated works start.
- 6 Ensure waste minimisation and environmental mitigation measures are incorporated into design, construction method and/ or materials employed where possible.
- 7 Ensure environmental and waste requirements are included on Requisitions and in Subcontracts and Orders.
- 8 If purchasing recycled aggregates specify on the requisition that you require recycled aggregates produced in compliance with the 'Quality Protocol for the Production of Aggregate from Inert Waste' or obtain a U1 Exemption from the Environment Agency and forward to the Buying Department with the Requisition.*
- 9 Ensure oil, including diesel, is stored in properly bunded tanks/ bunded mobile bowzers/ drip trays.*
- 10 Ensure Waste Transfer Notes/ Hazardous Waste Consignment Notes are checked against invoices before payment.
- 11 Report Incidents and Non-conformances to the Environmental Adviser – if Major, report immediately.
- 12 Ensure Environmental Adviser is informed of environmental complaints.
- 13 Liaise with Statutory Authorities and Client as required and ensure records of communication (including verbal) are kept. Ensure Statutory Authorities are always accompanied on site (preferably by yourself/ Environmental Adviser).
- 14 Ensure environmental performance including review Incidents and Non-conformances, Waste Arisings and any Contract Objectives & Targets is included as part of Contract Review Meetings.
- 15 Ensure employees and subcontractors receive Induction Training (including environment), Environmental Tool Box Talks and other environmental as appropriate.
- 16 Ensure staff needed for audits are available when required.

- 17 Ensure actions resulting from Corrective Action Requests and Observations raised during audits are completed by the deadlines and signed off copies of Corrective Action Requests are forwarded to the relevant Environmental Adviser.

Method Statement / Work Package Plan Authors

- 1 Include environmental controls in Method Statements / Work Package Plans.

Waste Reps

- 1 Arrange for collection of waste through Regional Waste Manager.
- 2 Keep an up-to-date record of waste removed from site.
- 3 Confirm with Regional Waste Manager that Carrier Licences/ Disposal Site Licences/ Exemptions are valid and either keep a record of confirmation or obtain copies for site files.
- 4 Complete and sign Waste Transfer Notes/ Hazardous Waste Consignment Notes. Give copies to Drivers, send top copy to invoicing and keep photocopy on file.
- 5 Before hazardous waste is moved off site ensure the site has been registered with the Environment Agency as a 'Hazardous Waste Producing Premises'.
- 6 Ensure waste storage/ segregation/ recycling activities are correctly implemented.

Quantity Surveyors/ Commercial Managers

- 1 Check subcontractor invoices (if acting as Waste Carrier and/ or Waste Management Site) against Waste Transfer Notes/ Hazardous Waste Consignment Notes before authorising payment.
- 2 Monitor waste quantities and costs and provide information for production of Site Waste Management Plan Reports.*

Site Office Manager

- 1 Include Waste Transfer Notes/ Hazardous Waste Consignment Notes on Goods Return Sheet and return to Purchase Ledger Manager.*

Requisitioners

- 1 Include environmental and waste requirements on Requisitions and attach relevant clauses.

Drivers

- 1 Inform the Waste Rep. what waste they are removing and where it is being taken prior to removing any waste from Site.*
- 2 Collect Waste Transfer Note/ Hazardous Waste Consignment Note from Waste Rep when collecting waste or confirm 'Season Ticket' is already in place.
- 3 Only take waste to a licensed Waste Management Site as instructed by the Waste Rep/ Regional Waste Manager.
- 4 Get Waste Management Site to sign Waste Transfer Note/ Hazardous Waste Consignment Note and give to Regional Waste Manager (unless 'Season Ticket' is already in place).
- 5 If 'Season Tickets' are being used, complete Drivers Daily Tipping Log or Waste Collection Notes and give it to Regional Waste Manager along with all associated receipts.

Regional Waste Manager

- 1 Check with the Environment Agency that Waste Carriers are registered and Waste Management Sites are licensed before subcontracts or orders are placed.
- 2 Ensure environmental and waste requirements are included on Requisitions and in subcontracts and Orders.
- 3 Obtain Simple Exemptions from the Environment Agency for sites/ yards storing waste.
- 4 Register sites producing hazardous waste with the Environment Agency.
- 5 Check invoices from Waste Management Sites (and carriers in Regions) against Murphy Waste Transfer Notes/ Hazardous Waste Consignment Notes before authorising payment.

Regional Waste Administrator

- 1 Assist Regional Waste Manager with responsibilities given above.*

Purchase Ledger Managers

- 1 Head Office Divisions only - Check waste invoices (if Waste Carrier and/or Waste Management Site) against Waste Transfer Notes/ Hazardous Waste Consignment Notes *before* authorising payment. (Note – in Regions, forward invoices to Regional Waste Manager for checking).

Subcontract Buyers

- 1 If a subcontractor is to act as Waste Carrier and/ or Waste Management Site, provide details to Regional Waste Manager before placing subcontract.
- 2 Include environmental and waste requirements in subcontracts (as stated on the Requisition).
- 3 Only purchase recycled aggregate that has been produced in accordance with the WRAP Quality Protocol for the Production of Aggregate from Inert Waste'. Obtain a Protocol Compliance Checklist from the supplier declaring their product compliant before placing an order – Unless:*
- 4 The Project Manager has specified the purchase non-Protocol aggregate on the Requisition and attached a copy of the appropriate U1 Exemption obtained with the Environment Agency.*
- 5 When placing an overseas order request information on the quantity and type of packaging material that will be supplied with the product. Inform the Group Environmental Manager of the order and forward details of the packaging material, if received.*

Yard Managers

- 1 Provide information on yard activities to Environmental Adviser prior to setting up a new yard and when any changes occur
- 2 Nominate Waste Rep(s), person to undertake weekly checks, person to check drip trays and bunds, person to supervise refuelling of tanks and bowsers
- 3 Ensure required consents are in place before activities start.
- 4 Ensure oil, including diesel, is stored in properly bunded tanks/ bunded mobile bowsers/ drip trays
- 5 Test underground storage tanks annually for leaks.
- 6 Ensure Waste Transfer Notes/ Hazardous Waste Consignment Notes are checked against invoices before payment.
- 7 Report Environmental Incidents and Non-conformances to the Environmental Adviser – if Major, report immediately.
- 8 Ensure Environmental Adviser is informed of environmental complaints.

- 9 Liaise with Statutory Authorities and Client (if applicable) as required and ensure records of communication (including verbal) are kept. Ensure Statutory Authorities and Clients are always accompanied in the yard (preferably by yourself/ Environmental Adviser).
- 10 Provide information on Group Environmental Objectives & Targets as necessary.
- 11 Approve Local Yard Environmental Procedures and ensure controls implemented.
- 12 Ensure employees and subcontractors receive Induction Training (including environment), Environmental Tool Box Talks and other environmental as appropriate.
- 13 Ensure staff needed for audits are available when required.
- 14 Ensure Corrective Action Requests and Observations raised during audits are completed by the deadlines.

Group Training Coordinator

- 1 Maintain Group Training Database of skills, qualifications and training.
- 2 Organise training as required.

Group HSQE Auditor

- 1 Manage the Group audit process to ensure effective implementation of the Group Audit Programme.
- 2 Undertake internal and supplier compliance audits as scheduled on the audit programme.
- 3 Monitor progress in closing out environmental Corrective Actions and Observations and forward copies of closed out Corrective Actions to the Group Environmental Manager.
- 4 Identify trends in audit findings and report to Group Health & Safety Manager, Group Quality Manager and Group Environmental Manager.
- 5 Provide in-house training and instruction to nominated individuals to improve/ expand auditing skills within the Company.

Environmental Auditors

- 1 Undertake internal compliance audits as scheduled on the audit programme.
- 2 Monitor progress in closing out environmental Corrective Actions and Observations and forward copies of closed out Corrective Actions to the Audit Administrator.

Audit Team Leader

- 1 Arrange and supervise Group Audits.

Auditees

- 1 Ensure that actions identified during audits (Corrective Action Requests and Observations) are completed by the deadline.

Group Audit Administrator

- 1 Maintain up-to-date records of Group Audits.

All Staff

- 1 If there is an incident, stop work, contain it and report it to the Project/ Site/ Yard Manager.
- 2 Contact the Waste Rep. when waste needs to be removed.

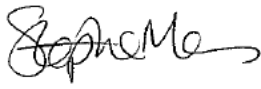
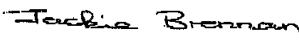
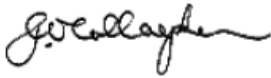
- 3 Pass on any queries or correspondence on environmental issues to Environmental Adviser or Group Environmental Manager.*
- 4 Work in accordance with Group Environmental Procedures, Contract Environmental Management Plan/ Site Waste Management Plan/ Local Yard Environmental Procedure and Method Statements.

Appendix 4H:

MOH0004-PRO-00019 – Contract Environmental Management

GROUP PROCEDURE

Contract Environmental Management

			
Stephen Marr Group Environmental Manager		Jackie Brennan Group HSQE Manager	James O'Callaghan Main Board Director
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

03	02 Nov 14	Up-dated to incorporate revised requirements for waste, a separate Consents Checklist for Wales, measurement of embodied carbon and to align with the up-dated Group Procedure - Quality Observations
02	31 Jan 11	Revised to incorporate the new Maxcel cost code contract number only
01	30 Oct 09	Up-dated to incorporate additional requirements and Group format
00	01 Apr 03	Issued for Implementation
REV	DATE	STATUS / DESCRIPTION OF CHANGES

DOCUMENT NO.	MOH0004-PRO-00019
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- 1.0 **Purpose**
- 2.0 **Scope**
- 3.0 **References**
- 4.0 **Definitions**
- 5.0 **Procedure**
 - 5.1 Planning
 - 5.2 During the Contract
 - 5.3 Communication and Records

APPENDICES

A	Aspects & Impacts Register	MOH0004-FOR-00029
B	Consents Checklist (England)	MOH0004-FOR-00010
C	Consents Checklist (Wales)	MOH0004-FOR-00088
D	Consents Checklist (Scotland)	MOH0004-FOR-00044
E	Consents & Authorisations Register	MOH0004-FOR-00011
F	Inspection & Test Plan	MOH0001-FOR-00069
G	Template Contract Environmental Management Plan	MOH0004-FOR-00030
H	Template Site Waste Management Plan	MOH0004-FOR-00048
I	Template Carbon Footprint	MOH0004-FOR-00089
J	Contract Site Set-up Environmental Checklist	MOH0004-FOR-00031
K	Site Compound/ Permanent Yard Environmental Check	MOH0004-FOR-00008
L	Contract Environmental Inspection	MOH0004-FOR-00006
M	Contract HSE Inspection	MOH0004-FOR-00057
N	Watercourse Monitoring	MOH0004-FOR-00042
O	Monitoring of Pumping	MOH0004-FOR-00043
P	Filing Index Template	MOH0001-FOR-00087
Q	Communication Log	MOH0004-FOR-00020

1.0 PURPOSE

The purpose of this Procedure is to describe the processes for environmental management on a contract, to ensure appropriate controls are put in place, checks and inspections are carried out and records kept.

2.0 SCOPE

This Procedure shall apply to all operating Departments, Business Units and Regions of the Murphy Group organisation.

3.0 REFERENCES

- i. BS EN ISO 14001:2004 Environmental Management Systems: Requirements:

Clause 4.3.1	Environmental Aspects
Clause 4.3.2	Legal and other requirements
Clause 4.4.6	Operational control
Clause 4.5.1	Monitoring and measurement

4.0 DEFINITIONS

Definitions are given in the Group Environmental Manual and referenced Procedures.

5.0 PROCEDURE

TASK	RESPONSIBILITY
5.1 PLANNING	
5.1.1 Document Review	
i Review contract, Environmental Statement, ecological/ archaeological/ contaminated land surveys, consents, any other documents. Refer to these documents in Contract Environmental Management Plan.	Environmental Adviser/ HSQE Adviser
5.1.2 Aspects & Impacts	
i Identify the Aspects and Impacts associated with the works in accordance with the <i>Group Procedure – Environmental Aspects and Impacts (MOH0004-PRO-00003)</i> .	Environmental Adviser/ HSQE Adviser (with input from the Project Manager)
ii. Complete the Aspects & Impacts Register.	
Form : MOH0004-FOR-00029 Aspects & Impacts Register	
5.1.3 Legal Requirements	
i Review the scope of works and identify any environmental consents/licences/permissions that are required using the Consents Checklist.	Project Manager/ Environmental Adviser/ HSQE Adviser
Form : MOH0004-FOR-00010 Consents Checklist (England)	
Form : MOH0004-FOR-00088 Consents Checklist (Wales)	
Form : MOH0004-FOR-00044 Consents Checklist (Scotland)	
ii Check with the Client whether any of the required consents/licences have already been obtained. If so, obtain copies and file on site.	
iii If consents/ licences have not been obtained already, agree who will obtain them and ensure they are obtained prior to the associated works activity beginning.	
iv Liaise/ consult with the Client/ Statutory Authorities/ Regulatory Bodies/ Service Providers as required e.g. regarding controls in sensitive areas such as near watercourses, SSSIs, residential areas or when arranging a discharge consent.	
v Maintain a Consents & Authorisations Register, detailing consents required, responsibilities, timescales and progress. Forward to Project Managers/ Engineers for inclusion in ITP.	Environmental Adviser/ HSQE Adviser
Form: MOH0004-FOR-00011 Consents & Authorisation Register	
vi Add consents to the Project Programme and Inspection & Test Plans as a hold point (see <i>Group Procedure – Inspection and Testing MOH0001-PRO-00020</i>).	Project Manager
Form: MOH0001-FOR-00069 Inspection & Test Plan	

TASK	RESPONSIBILITY
vi Manage waste in accordance with <i>Group Procedure – Waste MOH0004-PRO-00006</i>). Identify/ quantify all waste streams, including subcontractors waste. Produce an estimate of contract waste arising prior to works starting on site.	<i>Project Manager/ Environmental Adviser/ HSQE Adviser</i>
5.1.4 Environmental Management Plan(s)	
i Produce a Contract Environmental Management Plan to include: <ul style="list-style-type: none"> Controls for impacts identified in Aspects and Impacts Register (Refer to <i>Group Environmental Controls</i>). Details of Consents identified on Consent Checklist and any conditions attached to consents. Contract requirements. Requirements in Environmental Statements/ecological, archaeological or contaminated land surveys and any other documents. <p>From: MOH0004-FOR-00030 Template Contract Environmental Management Plan</p>	<i>Environmental Adviser/ HSQE Adviser</i>
ii Produce a Site Waste Management Plan for all contracts using SMARTWaste or the Template Site Waste Management Plan.	
From: MOH0004-FOR-00048 Template Site Waste Management Plan	
iii On large contracts or where required by the Client separate Environmental Plans may be produced covering various aspects of the environmental controls eg. Water Management Plans/ Noise Management Plans etc. These plans should, as a minimum, include all the relevant controls and monitoring requirements contained within the Murphy Environmental Management System.	
iv Review and approve Contract Environmental Management Plan(s).	<i>Project Manager</i>
v Issue Contract Environmental Management Plan(s) to relevant staff.	<i>Environmental Adviser/ HSQE Adviser & Document Controller</i>
5.1.5 Carbon Footprint	
i For projects with a contract value of over £1 Million, produce a forecast Carbon Footprint including emissions associated with the main construction materials (embodied carbon)	<i>Estimator/ Environmental Adviser/ HSQE Adviser</i>
Form: MOH0004-FOR-00089 Template Carbon Footprint	
5.1.6 Environmental Do's & Don't's	
i Produce Environmental Do's & Don't's comprising the key site controls and issue to site operatives.	<i>Environmental Adviser/ HSQE Adviser</i>

TASK	RESPONSIBILITY
<p>5.1.7 Deviations</p> <p>i Obtain consent from Group Environmental Manager for any deviations from the Group Environmental Management System. e.g. use of client forms in place of the Murphy form.</p>	<p><i>Environmental Adviser/ HSQE Adviser</i></p>
<p>5.2 DURING THE WORKS</p>	
<p>5.2.1 Training</p> <p>i Provide training in accordance with the requirements identified in the <i>Group Environmental Training Requirements List (MOH0004-IDX-00008)</i> and Contract Environmental Management Plan.</p>	<p><i>Environmental Adviser/ HSQE Adviser</i></p>
<p>5.2.2 Controls</p> <p>i Complete the Environmental Contract Set-Up Checklist (<i>optional</i>).</p> <p>Form: MOH0004-FOR-00031 Environmental Contract Set-Up Checklist</p> <p>ii Implement the controls identified in the Contract Environmental Management Plan(s) and Site Waste Management Plan.</p> <p>iii Work with stakeholders to review design, methodology and material choices to identify where, through innovation, carbon savings can be made. Up-date Project Carbon Footprint form to record/ capture where savings have been made.</p> <p>Form: MOH0004-FOR-00089 Template Carbon Footprint</p> <p>iv Manage waste in accordance with <i>Group Procedure – Waste (MOH0004-PRO-00006)</i>. Ensure compliance with Duty of Care. Keep records of waste movements and produce quarterly summary reports.</p> <p>v Liaise/ consult with the Client/ Statutory Authorities/ Regulatory Bodies/ Service Providers as required e.g. regarding implementation of controls/ consent conditions, monitoring, inspections etc.</p> <p>vi Input necessary information into Method Statements / Work Package Plans - see <i>Group Procedure: Preparation and Issue of Method Statements and Safety Risk Assessments (MOH0001-PRO-00007)</i>.</p> <p>vii Review environmental performance at Contract Review meetings, include in the review, Incidents & Non-conformances, Carbon Reduction Initiatives, Waste Management and progress on Group/ Regional/ Divisional/ Contract Environmental Objectives & Targets.</p> <p>viii Inform Environmental Adviser/ HSQE Adviser of any changes to the scope of works/ activities that may have a significant impact on the environment.</p>	<p><i>Environmental Adviser/ HSQE Adviser</i></p> <p><i>Project Manager</i></p> <p><i>Project Manager/ Environmental Adviser/ HSQE Adviser</i></p> <p><i>Project Manager</i></p> <p><i>Project Manager/ Environmental Adviser/ HSQE Adviser</i></p> <p><i>Method Statement Author (with input from Environmental Adviser/ HSQE Adviser)</i></p> <p><i>Project Manager (with input from the Environmental Adviser/ HSQE Adviser)</i></p> <p><i>Project Manager</i></p>

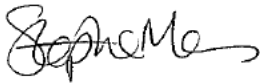
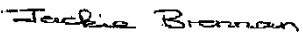
TASK	RESPONSIBILITY
ix Review changes to works/ activities to identify any new significant impacts. Update Aspects and Impacts Register if impacts are significant. Add controls for significant impacts to Contract Environmental Plan/ Method Statements.	<i>Environmental Adviser/ HSQE Adviser</i>
5.2.3 Inspections and Monitoring	
i Nominate a person to complete the weekly Site Compound/Permanent Yard Environmental Check and ensure checks are carried out.	<i>Project Manager/ Environmental Adviser/ HSQE Adviser</i>
From: MOH0004-FOR-00008 Site Compound/ Permanent Yard Environmental Check	
ii Complete a Contract Environmental Inspection at least every two months depending on risk. The inspection form should be edited to reflect the activities and environmental risks associated with the contract, including those in the site compound.	<i>Environmental Adviser/ HSQE Adviser</i>
Form: MOH0004-FOR-00006 Contract Environmental Inspection	
Form: MOH0004-FOR-00057 Contract HSE Inspection	
iii Inspect and approve dewatering arrangements before dewatering/ pumping activities begin. (optional: issue a 'Permit to Pump')	<i>Project Manager/ Environmental Adviser/ HSQE Adviser</i>
Form: MOH0004-FOR-00036 Permit to Pump	
iv Nominate a person to carry out and record checks on dewatering and pumping activities and/ or watercourses that may be affected by the works and ensure checks are carried out.	
Form: MOH0004-FOR-00042 Watercourse Monitoring	
Form: MOH0004-FOR-00043 Monitoring of Pumping	
v Undertake any other inspections/ monitoring required by consents/ licences/ permits etc and as set out in Contract Environmental Management Plan eg. noise/ dust.	<i>Environmental Adviser/ HSQE Adviser/ nominated person</i>
vi Undertake laboratory analyses of water/ soils, as necessary, in order to determine compliance with consents, licences/ permits and correctly classify materials for re-use/ disposal.	<i>Environmental Adviser/ HSQE Adviser/ nominated person</i>
vii Complete the Oil & Diesel Tank Check when oil and diesel tanks are delivered to site. (optional for tanks purchased after 2001).	<i>Environmental Adviser/ HSQE Adviser</i>
Form: MOH0004-FOR-00032 Oil & Diesel Tank Check	
5.2.4 Incidents & Observations	
i Manage environmental incidents or environmental observations in accordance with the <i>Group Procedure – Environmental Emergency Preparedness & Response (MOH0004-PRO-00020)</i> and the <i>Group Procedure – Quality Observations (MOH0001-PRO-00008)</i> .	<i>Project Manager/ Environmental Adviser/ HSQE Adviser</i>

TASK	RESPONSIBILITY
5.3 COMMUNICATION / RECORDS	
i Keep copies of all correspondence/ consents/ licences/ permits with Client/ Statutory Authorities/ Regulatory Bodies/ Service Providers in Contract/ Business Unit/ Regional Environmental Files and electronically in the Contract Environmental Folders. Keep records of all contractually related phone conversations and verbal agreements on a Communication Log. Form: MOH0001-FOR-00087 Filing Index Template Form: MOH0004-FOR-00020 Communication Log	Environmental Adviser/ HSQE Adviser
ii Keep records of all environmental monitoring/ inspections/ analyses in Contract/ Business Unit/ Regional Environmental Files and electronically in the Contract Environmental Folders.	Project Manager/ Environmental Adviser/ HSQE Adviser
iii Arrange removal of waste using a Waste Requisition in accordance with the <i>Group Procedure – Waste (MOH0004-PRO-00006)</i> .	Waste Rep / Project Manager
iv Keep records of waste movements, quantities and details of disposal arrangements in accordance with the <i>Group Procedure – Waste (MOH0004-PRO-00006)</i> .	Project Manager/ Environmental Adviser/ HSQE Adviser
v If not using SMARTWaste, within three months of completion of the contract, revise and re-issue the Site Waste Management Plan to provide a final summary of all the waste produced during the contract in accordance with the <i>Group Procedure – Waste (MOH0004-PRO-00006)</i> . Forward to the Environmental Adviser/ HSQE Adviser/ Regional Waste Manager. Retain for three years after contract completion at main place of business.	Project Manager/ Environmental Adviser/ HSQE Adviser/ Regional Waste Manager
vi Complete the 'Actual' Project Carbon Footprint on the Carbon Footprint form. Calculate the contract footprint in tonnes CO ₂ e/ £M Contract Value and record any innovations that have led to carbon reductions. Form: MOH0004-FOR-00089 Template Carbon Footprint	Project Manager/ Environmental Adviser/ HSQE Adviser

Appendix 4I:**MOH0004-INS-00001 – Invasive Plants**

GROUP ENVIRONMENTAL CONTROL

Invasive Plants

 Stephen Marr Group Environmental Manager			 Jackie Brennan Group HSQE Manager
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

01	31 Jan 11	Up-dated and revised to incorporate the new Maxcel cost code contract number
00	01 Apr 03	Issued for Implementation
REV	DATE	STATUS / DESCRIPTION OF CHANGES

DOCUMENT NO.	MOH0004-INS-00001
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Note – These controls must be followed and the arrangements for how they will be implemented on a contract/yard explained in the Contract Environmental Plan/ Local Yard Environmental Procedure and/ or Methods Statements.

1.0 BACKGROUND

Invasive Plants are plants not native to the UK and have been introduced from abroad. They overrun the UK's native plants, can damage structures and the environment and some are poisonous. It is an offence to plant or allow these plants to spread under the Wildlife and Countryside Act 1981 and the Weeds Act 1959. Invasive plants include plants such as Japanese Knotweed, Himalayan Balsam, Common Ragwort and Giant Hogweed.

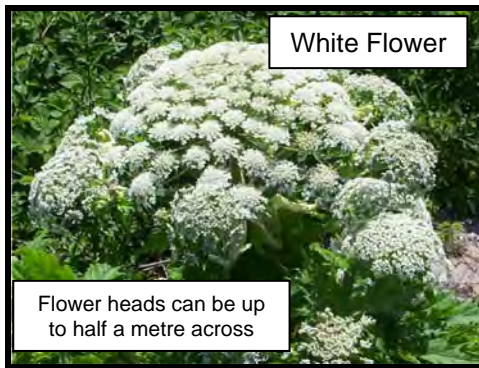
Murphy's responsibility is not the long term control of invasive plants (unless instructed by the client) but only to ensure that our works/actions do not make the problem worse or lead to the spread of the plant.

2.0 CONTROLS FOR ALL INVASIVE PLANTS

- Ensure that the area is fenced off at least 4 metres away from the plant. Inform site staff not to enter (including machinery) which can spread the material on its tracks.
- Assess the need for removal of the plant and if necessary discuss with the client regarding future use of the area and potential ongoing treatment or monitoring.
- On identification of the plant follow the guidance within the main body of this procedure to ensure removal, if required, and correct disposal.
- Keep records/plans of where the invasive plant was identified and how it was managed in the Contract Environmental files(s).
- Consult with the Environment Agency if:
 - Spraying herbicides within 10m of a watercourse
 - 1 week prior to the removal and movement of Japanese Knotweed
- Include method of dealing with invasive plants in the relevant Method Statements(s).
- If plants are to be disposed of off-site, contact the Regional Waste Manager well in advance to arrange a Waste Carrier.

3.0 GIANT HOGWEED

3.1 How to spot Giant Hogweed.



Each plant can produce 50,000 seeds.
Seeds can remain viable for 15 years



Spiky green leaves



Stem is ribbed and has spiky hairs. It has red/purple blotches during summer and can be up to 100mm across.



Note:

The sap of giant hogweed is poisonous and is released by handling, cutting or just brushing against the plant. It can have adverse effects on skin following contact.

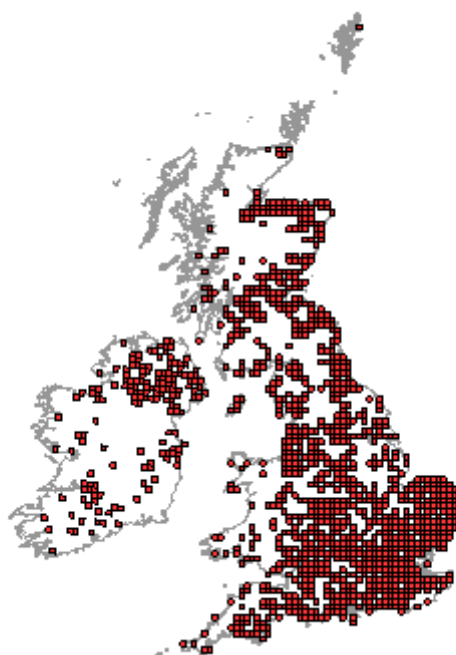
Symptoms are usually noticeable within 24 hours including blisters and swelling on the skin, which may be made worse by exposure to the sun.

Do not touch this plant without appropriate PPE



3.2 Where is it found?

Usually found near watercourses, near railway lines, on disused waste land and other damp places. The map below shows the distribution across the UK. For area specific data check the NBN website.



3.3 Methods for dealing with Giant Hogweed

3.3.1 Basic Controls

- Fence off area at least four metres from the plants. Notify workforce to keep out.
- Ensure that soil from within four metres of plants is not transferred to other areas from the site as the soil can contain seeds from previous year's growth i.e. in the tracks or wheels of plants.
- NEVER stockpile potentially contaminated material within ten metres of a watercourse.
- Use of tracked machinery should be limited until areas contaminated with giant Hogweed have been cleared and/or identified and cordoned off. On leaving the area tracked machinery should be thoroughly cleaned at designated area.
- NEVER use a strimmer or chipper on Giant Hogweed material as this can cause sap to become airborne, resulting in painful blisters.

3.2.2 Option A - Leave in situ and work around

- Agree with client
- Follow the basic Controls, in section 3.3.1 above.

3.2.3 Option B – Cut and Remove, including soil

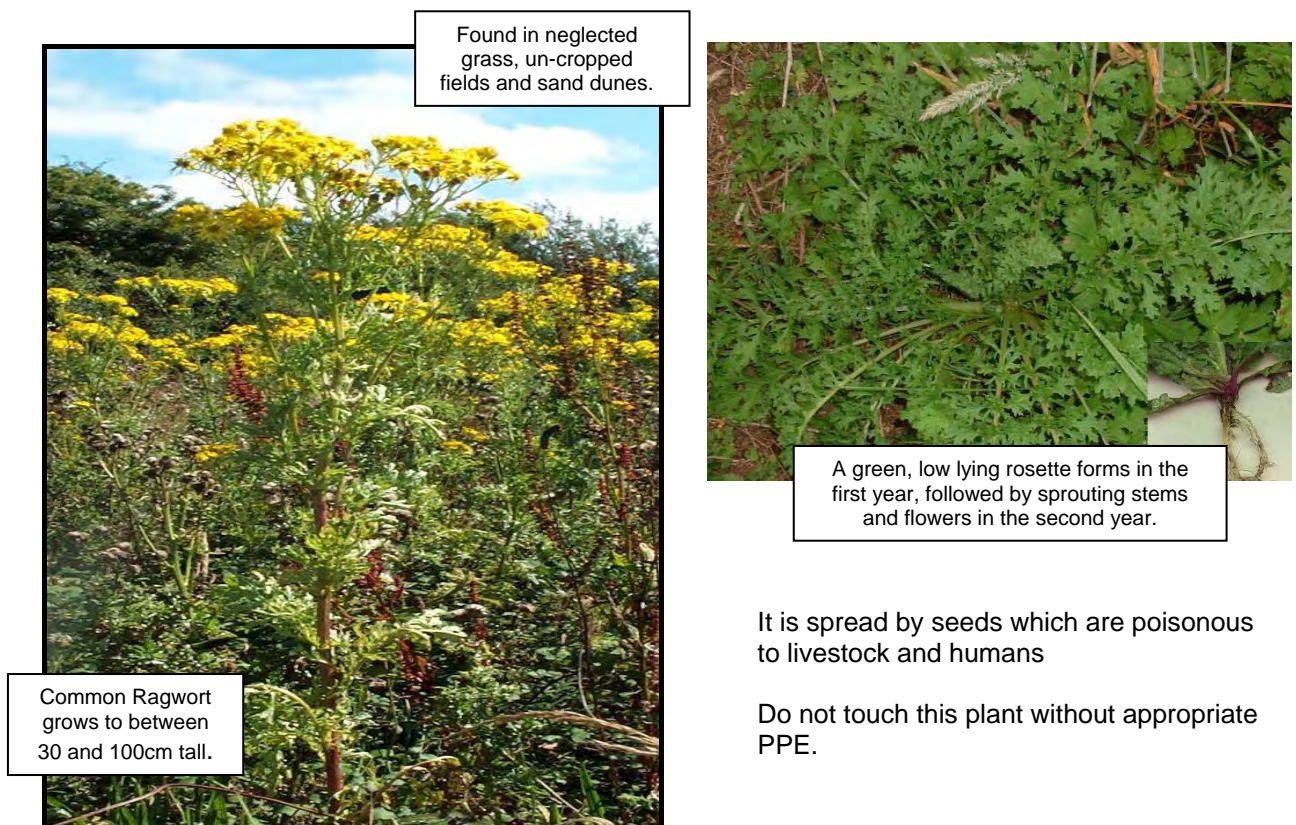
- Just cutting at or near ground level does not remove plant fully and therefore should not be carried out.
- Cutting is not advised for dense colonies, spray first to reduce size.
- Remove from at least 10-15 cm below ground including the removal of the surrounding soil. (approx 4 metres radius could be contaminated with seeds). Great care should be exercised if removing the plant while it is flowering. Each flowerhead can produce up to 5,000 seeds, which are easily dispersed by water and wind. Flowerheads should be bagged up.
- If all contaminated material and soil is not removed in the first place cutting/removal could be required once every two weeks in spring, until no new seedlings appear. This could go on for a number of years.
- Designated area should be used for cleaning all machinery that has been working within the fenced areas and may be contaminated with Giant Hogweed.
- If giant hogweed contaminated spoil needs to be stored for a short period of time it should only be stored on top of fabric/membrane in an area agreed with the Environmental Advisor, once cleared this storage area should be monitored for re-growth between March and September.
- All haulage lorries or dumpers (including waste carriers) carrying Giant Hogweed contaminated material should be covered.
- As Giant Hogweed is considered to be a contaminant, you can apply to custom and Excise for 'Landfill Tax Exemption' for disposing of contaminated soil.
- Ask Waste Rep to arrange disposal.

3.2.4 Option C – Spray with Herbicides

- Anyone planning to spray herbicide must be “competent in their duties and have received adequate instruction and guidance in the safe, efficient and humane use of pesticides.” This generally means that the person that will be undertaking the spraying must hold a certificate of competence for herbicide use or should work under the direct supervision of a certificate holder.
- ONLY USE GLYPHOSATE
- Notify the Environment Agency if spraying within 10 metres of a watercourse. Use ‘Form H1, notification of proposals for the use of herbicides in or near water’. Contact your local Herbicides Officer for Regional H1 Form.
- Treatment should be completed between March and August when there is green leafy material present.
- Additional applications at 4-5 weekly intervals may be required to control untreated plants.
- Treatment may be required for up to 5 years. Seeds can be viable for up to ten years.
- Monitor annually.
- Treat newly emerged plants as they appear.

4.0 COMMON RAGWORT

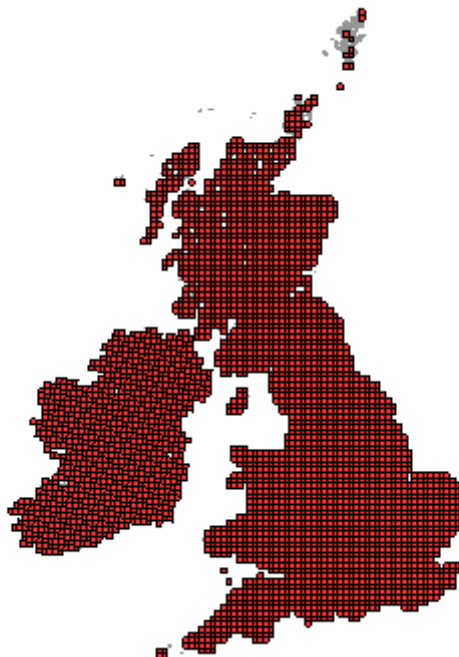
4.1 How to spot common Ragwort





4.2 Where is it found?

Usually found in neglected grass areas, un-cropped fields and sand dunes. The map below shows Common Ragwort has been found in almost every area of the UK. For area specific data check the NBN website.



4.3 Methods of dealing with Common Ragwort

4.3.1 Option A – Leave in situ and work Around without spreading

- Identify the site/field which contain the problem ensure that the site team are notified and made aware of the requirements.
- Ensure that no contaminated material is transferred between fields.
- Ensure that plant and machinery wheels are cleaned before moving to next site.

Note: Removal of as much ragwort as possible during the season that you are working in the field may be easier.

4.3.2 Option B – Removal

The plant can be manually controlled by pulling the plant and the roots out of the ground or cutting and removal before seed production in early spring. It is always best to remove the root.

Clearing/removing in this manner will clean the grass crop but does not result in reduction in the infestation unless carried out over a number of seasons. The use of herbicides has also proven to be unsuccessful but the spray of herbicide such as Roundup can manage the problem. Ask waste rep. to arrange disposal.

5.0 JAPANESE KNOTWEED

5.1 How to spot Japanese Knotweed

It has a hollow, bamboo like stem which is fleshy and red in the spring, green with red speckles in the summer, and dies off to leave woody stems in the winter. The leaves are red when the plant is very young, becoming green and heart shaped as it matures. This plant has an amazing growth rate, at up to 2cm per day, it has the ability to cover the area the size of a tennis court in a year. The plant can grow up to three meters in height.

The root system is often extensive, growing out for 5m and down for 2m from the base of the plant. The main problem with working near Japanese Knotweed is dispersing it further, the ground around the plant will be contaminated and should not be disturbed, only a tiny root fragment is needed to spread the plant.



Newly emerging
Japanese Knotweed



Hollow, Bamboo like stems:
Spring: fleshy & red
Summer: green with red speckles



Grows up to 3m high.
Can grow as much as
two centimetres per



Clusters of creamy
white flowers in late
summer/ early autumn

During the winter months knotweed dies back,
leaving hollow woody stems. Even in this winter
state, the root system remains active and it is
unadvisable to dig nearby.

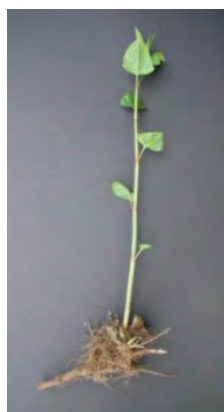


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If cut back or treated, a crown
of hollow stumps remain

In the winter woody dead stems
stay erect and new shoots grow
up amongst these in the spring



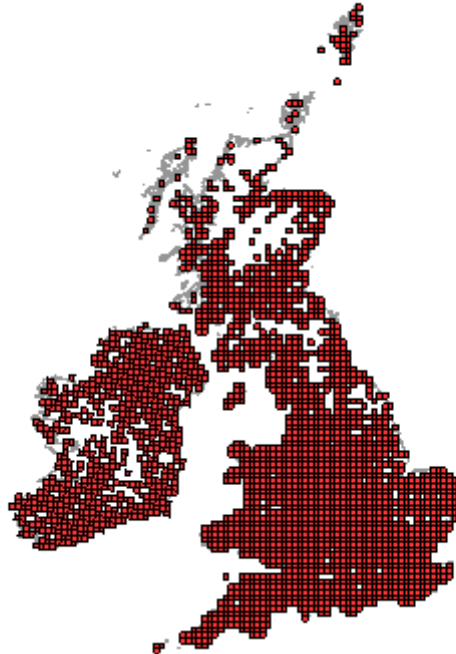
Tiny fragments (as little as
0.7g of its rhizome, or
root) can produce a viable
plant

Extremely destructive, will
grow in any type of soil, no
matter how poor, and can
grow through walls and
concrete.



5.2 Where is it found?

Japanese Knotweed is often found in dense clumps near railways and roadsides. The map below shows the distribution of Japanese Knotweed across the UK. For area specific data, search the NBN website.



5.3 Methods for dealing with Japanese Knotweed

5.3.1 Basic Controls

- Once Japanese Knotweed is identified, treat immediately. Do not allow to become established.
- Fence off area containing Japanese Knotweed and inform the workforce of the problem.
- Do not flail, mow or chip Japanese Knotweed as this will cause it to spread.
- Do not spread Japanese Knotweed stems or crowns or soil contaminated with Japanese knotweed plant which could contain roots. The smallest root fragment can spread the plant- even into houses!!
- Extreme care must be taken to ensure that all equipment used on site/ yard is free of Japanese knotweed material before leaving. A designated cleaning area should be used to clean all machinery which has been working with the fenced off areas and may be contaminated with Japanese Knotweed.

5.3.2 Option A – Leave in Situ and Work Around

- Agree with Client to leave material in-situ and work round
- Follow basic controls as stated above

5.3.3 Option B – Excavate and Remove

- Identify extent of Japanese Knotweed and its roots.
- Notify the Environment Agency one week prior to removal
- Excavate and dispose of the Japanese Knotweed and the surrounding material, to a depth of 3m and a radius of 7 m from the plant. Material left in-situ should be checked for roots, additional material will require removal if roots are present.
- Check the periphery of the excavation for roots to ensure that an adequate volume of material has been removed
- Care must be taken during the excavation and transfer of soil and subsoil containing Japanese Knotweed to avoid any spillages of material
- Monitor excavated area to ensure no re-growth
- For disposal options see below

5.3.4 Option C – Spray with Herbicide

- Anyone planning to spray a herbicide must be “competent in their duties and have received adequate instruction and guidance in the safe, efficient and humane use of pesticides”. This generally means that the person who will be undertaking the spraying must hold a Certificate of Competence for herbicide use or should work under the direct supervision of a certificate holder.
- Consult with the local Environment Agency office, if necessary regarding the best herbicide to use for the area, the active ingredient in most herbicides for this plant is Glyphosate.
- Notify the Environment Agency if you are spraying within 10 metres of a watercourse. Use ‘Form H1, Notification of Proposals for the Use of Herbicides in or Near Water’ (see Appendix A for example). Contact local Environment Agency Herbicides Officer for Regional H1 form.
- Treatment should be completed in early summer and then again in later summer
- More effective control can be achieved if Japanese Knotweed is cut or sprayed in early summer, then sprayed again in late summer, just before winter dieback.
- Treatment may be required for up to 5 years. Seeds can be viable for up to 10 years
- Monitor annually
- Treat newly emerged plants with herbicide when they appear

5.3.5 Option D – Excavate and Spray with Herbicide

- Use an excavator to scrape the surface crowns and rhizomes into a pile.
- The exposed ground can then be cultivated to a depth of 50cm and the vegetated material re-spread over the cultivated area. Note: This process stimulates the root to produce a higher density of stems, which renders it more vulnerable to herbicide treatment. Eradication may only take two applications, which may be performed within the same growing season.
- Area is then treated with herbicide following method as highlighted in 5.2.4. If working near a watercourse ensures that the Environment Agency is consulted and H1 form is completed (see Appendix A for example). Contact local Environment Agency Herbicides Officer for Regional H1 form.
- Digging can be carried out during the winter months and re-growth treated during the spring and summer.

- Japanese Knotweed and the surrounding material (to a depth of 3m and radius of 5m from the plant) can also be stockpiled on sheeting, in an area of the site/ yard for treatments as above. In this case the upper 50cm of topsoil, which contains all the crowns, and the majority of the rhizome should be stockpiled separately from the other, less infested material and treated.
- Material left in-sit should be checked for roots, additional material will require removal if roots are present.
- Material must not be re-used until all the knotweed material has been confirmed as unviable

5.4 Disposal

All parts of the Japanese Knotweed plant and any soil contaminated with it are classed as controlled waste.

Japanese Knotweed may be burnt on site/ in yard only if a Waste Management Licensing exemption is obtained from the Environmental Agency and with prior agreement of the Local Authority Environmental Health Officer.

Soil containing Knotweed material may be buried on site. Ideally at least on application of non-persistent herbicide will have been given to reduce the vigour of infective material.

- Consult with Environment Agency at least one week prior to burial regarding burial site and movement of material.
- On site burial must be performed to a depth of at least 5m and at least 10m horizontally from any surface e.g. foundations or river bed.
- The burial site should be excavated prior to removal.
- Depth of actual knotweed at burial site will not exceed 2 metres.
- Knotweed material should then be covered with a geo-textile layer or a heavy gauge polythene sheet prior to infilling.
- Record location of burial and ensure that the client is informed of its location.

If Japanese knotweed cannot be killed by burying or bunding infested excavated soil on site, it should be sent to a suitably licensed or permitted disposal facility. This method of disposal should be regarded as a last resort.

The site operator must be informed that there is living Japanese knotweed within the material.

6.0 HIMALAYAN BALSAM

6.1 How to spot Himalayan Balsam.

Himalayan Balsam is reputed to be the tallest annual plant in the UK, growing up to three meters in height. It spreads quickly and dominates local vegetation. The hollow stems can be thick, smooth and have a purple tinge. The leaves are pointy and have serrated edges, often arranged in two's or three's.

Flowers appear from June to October and are a pale pink / purple colour. The seeds are dispersed up to five meters away from the plant by exploding seed pods.

Tallest annual plant in UK
growing to 2-3m in height



Usually found near
watercourses



Very destructive to
both riverbanks and
local plant life.



Leaves are dark
green and pointy with
serrated edges



Stem is pinky-red,
hollow and jointed.

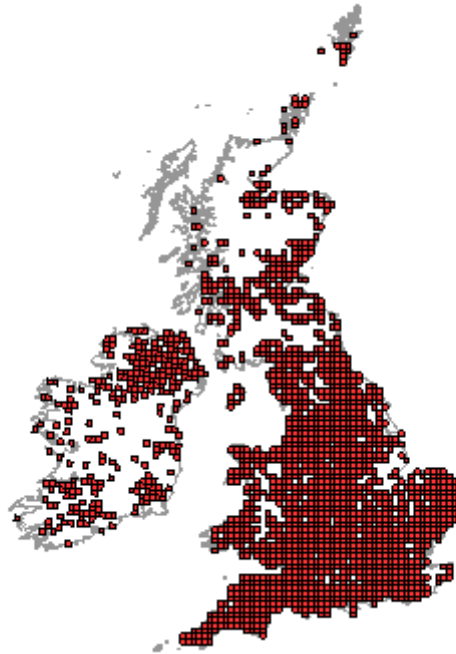
Pink or light pink flowers



Himalayan Balsam propagates
vigorously by the explosive
release of up to 500 seeds
over a 5m radius.

6.2 Where is it found?

Preferred sites are damp areas, usually along riverbanks but many other areas can be colonised. The map below shows the regions Himalayan balsam has been recorded. For area specific data, check the NBN website.



6.3 Methods of dealing with Himalayan Balsam

6.3.1 Basic Controls

- Fence off area and inform workforce
- If possible work around area under agreement from the client

6.3.2 Option A – Cut and Remove

- Cutting the plant is only really effective if it is made close to soil level below the lowest branch of the plant.
- Regular mowing will also control this plant even if the cutting level is above the lowest branch, provided the frequency is sufficient to prevent the formation of flowers and seeds.
- Small infestation can be controlled by hand pulling as the plant is shallow rooted.
- Keep cuttings separate from other waste.
- Cutting should be completed in late winter/spring to avoid seeding times.
- Ask Waste Rep to arrange for disposal

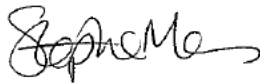
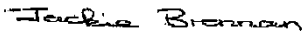
6.3.3 Option B – Spray with Herbicide

- Anyone planning to spray a herbicide must be “competent in their duties and have received adequate instruction and guidance in the safe, efficient and humane use of pesticides”. This generally means that the person who will be undertaking the spraying must hold a Certificate of Competence for herbicide use or should work under the direct supervision of a certificate holder.
- Consult with the local Environment Agency office regarding the best herbicide to use for the area. Glyphosate is usually sufficient.
- Notify the Environment Agency if working with 10m of a watercourse using a ‘Form H1, Notification of Proposals for the Use of Herbicides in or near Water’. Contact local Environment Agency Herbicides Officer for Regional H1 Form.
- Treatment should be completed in spring before the plant flowers but late enough to ensure that germinating seedlings have grown up sufficiently to be adequately covered by spray.

Appendix 4J:

MOH0004-INS-00004 – Contaminated Land

GROUP ENVIRONMENTAL CONTROL**Contaminated Land**

 Stephen Marr Group Environmental Manager			 Jackie Brennan Group HSQE Manager
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

01	31 Jan 11	Up-dated and revised to incorporate the new Maxcel cost code contract number
00	2 Apr 03	Issued for implementation.
REV	DATE	STATUS DESCRIPTION

DOCUMENT NO.	MOH0004-INS-00004
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Contents	Page
1.0 Background	3
2.0 Definitions	3
3.0 Unidentified Contaminated Land	3
4.0 Contaminated Land - Pollution Prevention Measures	4
5.0 Testing and dealing with Contaminated Land	4
6.0 Further Information	5

Note – These controls must be followed and the arrangements for how they will be implemented on a contract/yard explained in the Contract Environmental Plan/ Local Yard Environmental Procedure and/ or Methods Statements.

These controls apply to pre-existing contamination, not contamination caused by Murphy activities. This guidance does not consider the Health and Safety requirements when working with contamination. For information on Health and Safety consult the Safety Adviser.

1.0 BACKGROUND

It is important to identify and deal within contaminated land correctly due to the potential for pollution to groundwater, surface waters surrounding land, and liability for the cost of disposal and/or remediation. If contaminated land is not handled correctly and results in further pollution of surroundings it could result in fine and /or prosecution under the Environmental Prevention Act 1990.

Check with client regarding excising contaminated land /Ground condition surveys, which identify the locations of contaminated material and how it should be treated.

2.0 DEFINITION

Contaminated land is land, which, because of substances in, on or under it, is causing significant harm, OR there is a significant possibility of significant harm, being caused OR controlled waters being polluted OR likely to be.

3.0 UNIDENTIFIED CONTAMINATED LAND

Look out for signs of contamination such as:

- Discoloured soil
- Fibres in the soil
- Presence of old chemical containers
- Evidence of previous soil workings
- Evidence of underground structures, tanks, pipework, drains
- Waste pits
- Unusual smells:
 - BTEX – sweet/pungent
 - Cyanide – almonds
 - chlorine – bleach
 - ammonia – pungent (can be overpowering)
 - hydrogen sulphide – rotten egg
 - cresol – sweet tarry odour
 - tar's – gasworks odour

If contamination is encountered unexpectedly:

- Stop work, cover over the suspected contamination and seal off the area. Notify the Environmental Adviser.
- Identify measures required to prevent pollution.
- Implement These Measures

4.0 CONTAMINATED LAND – POLLUTION PREVENTION MEASURES

- Fence off and clearly mark contaminated areas.
- If removing contaminated land ensure that:
 - i. Staff are correctly briefed on method statement
 - ii. Contaminated area delineated on site
 - iii. Double handling of contaminated material is avoided, if possible
- Avoid stockpiling contaminated spoil, especially soils that contain contaminants that are likely to leach out eg. when it rains. If soils must be stockpiled:
 - Store on hard standing.
 - Cover to prevent dust/ rainwater spreading contaminants to the wider environment
 - Don't store on top of clean soils without using an impermeable layer to separate the two.
- Damp down contaminated soils to prevent contamination dust.
- When dewatering, monitor water levels to ensure that contaminated groundwater in adjacent sites does not spread.
- Do not discharge contaminated groundwater to controlled waters
- Contact Waste rep to arrange disposal if necessary.

5.0 TESTING AND DEALING WITH CONTAMINATED LAND

- Samples should be obtained for chemical testing from a grid pattern by a specialist, if hazardous, or by Murphy. Size of sampling grid is dependent on the size of the contaminated land area i.e. 20m grid patterns. A representative sample of the contamination must be obtained. Mark on a plan where samples were taken.
- The laboratory used for the analysis of samples should be UKAS / MCERTS accredited
- The laboratory should complete required testing of contaminated material to identify levels of contamination. If the type of contamination unknown complete standard test as suggested by laboratory.
- From the test results, identify what can be done with the contaminated material e.g. leave in situ, reuse, remove from site, treat etc. seek specialist advice. Note if treatment is required a waste management licence or exemption will be required.
- If the material is suitable for reuse on site approval/ consent from Environmental Agency may be required.
- Only materials, which are deemed unsuitable for reuse on site will be removed, and disposed of. Contact waste rep to arrange disposal.
- Include within method statements and Contract Environmental Management Plan sufficient information to develop working methods, which will prevent causing or spreading pollution from pre-excising contamination in the ground or in groundwater.

6.0 FURTHER READING

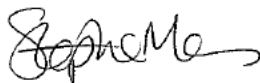
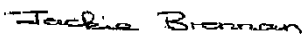
- 1) Environment Agency Website 'Contaminated Land Guidance'
- 2) CIRIA 'Environmental Good Practice on Site'
- 3) Group Environmental Department

Appendix 4K:

MOH0004-INS-00005 – Noise and Vibration

GROUP ENVIRONMENTAL CONTROL

Noise & Vibration

 Stephen Marr Group Environmental Manager			 Jackie Brennan Group HSQE Manager
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

02	31 Jan 11	Up-dated and revised to incorporate the new Maxcel cost code contract number
01	30 Oct 09	Revised and Issued for implementation
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DOCUMENT NO.	MOH0004-INS-00005
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Note – These controls must be followed and the arrangements for how they will be implemented on a contract/yard explained in the Contract Environmental Plan/Local Yard Environmental Procedure and/ or Methods Statements.

1.0 BACKGROUND

A **Statutory Nuisance** could arise from noise, smoke, fumes, gas, dust, steam, odours, deposits and accumulations of refuse and material, and other escapes from a site or yard. Such releases would only be classified as statutory nuisances if they affected or may affect the health of people in the locality or if they interfered with a person's legitimate use of land; this particularly applies to nuisance to neighbours in their homes and gardens.

Prohibition Notices: Local councils have the power to control noise from construction activities even if a 'nuisance', as defined above, has not been caused. If your local council believes that your works are creating an unreasonable level of noise, it can serve you with a prohibition notice.

In **England, Scotland** and **Wales**, this is known as a **Section 60 Prohibition Notice**.

In **Northern Ireland**, this is known as an **Article 40 Prohibition Notice**.

This notice sets out requirements that you must comply with, including:

- the type of plant or machinery to use
- limits on hours of working
- Maximum noise levels.

You can appeal the notice to the Magistrates Court in England, Wales and Northern Ireland or the Sheriff Court in Scotland. Failure to comply with a Control of Pollution Act 1974 (Section 60) notice can lead to prosecution and fines up to £5,000.

In some instances where there is a nuisance from noise, dust, or smoke emissions, the Local Authority may issue an **Abatement Notice (Section 80)** under the Environmental Protection Act 1990. Failure to comply with the conditions of the Abatement Notice can lead to fines of up to £20,000 and prosecution.

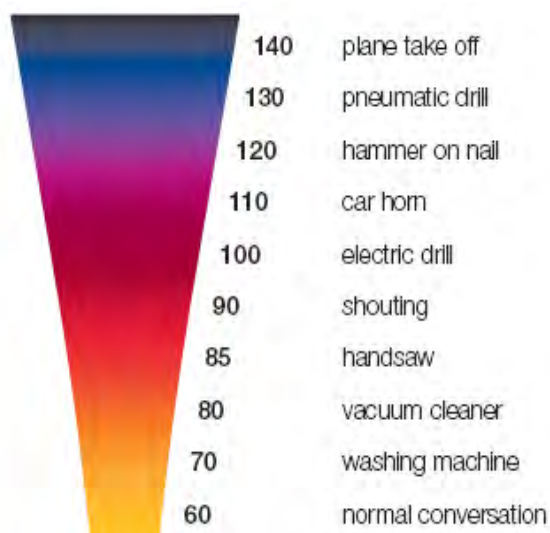
Section 61 Consent is prior consent for construction works obtained from the local Authority under the Control of the Pollution Act 1974. If applying for a Section 61 Consent, details of construction activities, plant & equipment and noise and vibration control measures must be included in the consent application. The Local Authority may also ask for noise predictions.

The applicant must demonstrate that **Best Practicable Means (BPM)** is being used to control noise and vibration. Best Practicable Means is using the best design, method, plant and equipment to minimise noise, taking account of, among other things, local conditions, the current state of technical knowledge and cost.

The requirement to obtain a Section 61 Consent is usually determined by the type of works, the sensitivity of the location of the works, the working hours and the preference of the Local Authority. Some Local Authorities are more likely to want a formal consent than others. For normal day time works it is often sufficient to simply inform the Local Authority that the works are taking place.

2.0 NOISE LEVELS

The schematic below gives some typical noise levels in decibels (dB) associated with particular activities.



However, when considering environmental noise, it is usually necessary to consider the combined effect of noise from several different sources and noise is usually measured and expressed as an average level (LAeq).

The LAeq_(period) is the noise level measured in dB(A) averaged over a specified time period (e.g. 5 minutes, 1 hour, 10 hours, 24 hours etc). This is the most common measure of environmental noise from a construction site where the noise level may vary continuously.

The other common measurement used to determine the likelihood of noise causing disturbance is the LAF10. This is the top 10 percent of readings over a specified time period. This is a useful guide as sharp changes/ peaks in noise levels are more annoying than a constant noise. If there is not much difference between the LAF10 and the LAeq it suggests a fairly constant noise level which is less likely to cause disturbance.

Noise criteria specified in a Section 61 may be different for each Local Authority. Typical allowable urban site noise levels are:

- 75dB(A) between 08:00-18:00 hours
- 65dB(A) between 18:00-23:00 hours
- 50dB(A) between 23:00-08:00 hours

5dB(A) may be subtracted from the above for works taking place in rural areas.

It should be noted that the allowable ranges will vary according to the existing background noise and the sensitivity of the immediate environment.

Generally all plant and equipment (which makes a noise) should carry a CE mark (**CE**) and guaranteed power level.

3.0 CONTRACT SET UP

When setting up a contract the following actions should be taken:

- Notify the Local Authority Environmental Health Officers of the works and give them details of a contact person on site.

- Keep them informed of the progress of the works and the dates and times of any particularly disruptive activities or out of hours working – this may avoid obtaining a formal Section 61 consent.
- If working near residential or other public areas, before starting work, make contact (in association with the client and main contractor) with local residents in writing and let them know what works are to be completed and how long it will take.
- When operating in residential areas, project contact details should be prominently displayed.
- Describe *general* noise requirements in the Contract Environmental Plan and if necessary Method Statements. This will generally include:
 - Working hours
 - Any noise limits
 - Control measures
 - Consent requirement (i.e. information on works included in the application and any conditions)
 - Monitoring requirements and
 - Any other agreements
- Noise and vibration should be controlled using Best Practicable Means and the following approach:
 - Control at source by using the quietest practicable work method, plant equipment
 - Prevent noise reaching sensitive areas (e.g. residential properties) by erecting screening

4.0 PREPARATION OF SECTION 61 CONSENT APPLICATION

A Contract may require that a Section 61 Consent is obtained either by the Client or the Local Authority. A minimum of 4 weeks should be allowed for the processing of the application. There is no standard application form for a Section 61 Consent and the level of detail required may vary between Local Authorities. See *Section 61 Application Form (MOH0004-FOR-00013)* for an example of a typical Section 61 Application template.

The application must contain details of:

- a) the work to be undertaken
- b) the location of works
- c) proposed working hours
- d) the method of work
- e) a list of the plant and equipment to be used
- f) noise calculation (see note below)
- g) the steps to be taken to minimise noise and vibration.

Note: the degree of detail required for the noise calculation varies depending on the Local Authority; the type of work being undertaken and the proximity of sensitive receptors. In most cases the requirements can be met using the *Noise Prediction spreadsheet (MOH0004-FOR-00016)* (see Section 7) but where more complex calculations are required (or where the Local Authority or Client require it) it may be necessary to employ a specialist noise consultant.

When a Section 61 Consent is in place, if changes need to be made to the working hours, methodology, plant and equipment or noise controls the Local Authority must be informed and approve of the changes in advance. Failure to do so would breach the conditions attached to the Consent and could result in the Local Authority issuing a Prohibition Notice.

5.0 NOISE CONTROLS

Measures to reduce the impact from noise should include:

5.1 Working Method

- Remind site personnel of their obligation to minimise noise and vibration through on site signage.
- Use working methods that produce the least amount of noise practicable
- Reduce the need for noisy assembly practices e.g. fabricate off site
- Restrict noisy activities to certain times of the day
- Locate accesses away from public areas
- Minimise the drop height into hoppers, lorries or other plant
- No shouting / No loud radios
- Notify the Local Environmental Health Officer of particularly noisy works within approximately 100m of housing whether a Section 61 Consent is in place or not.

5.2 Plant, Equipment and Vehicles

- Locate noisy plant as far away as possible from public areas
- Locate plant away from walls if noise is reflected from the wall as this increases noise levels
- Use noise control equipment e.g. mufflers, silences, jackets, shrouds
- Use electrically powered plant, rather than petrol or diesel-powered
- Keep doors & covers on plant & equipment closed
- Shut down plant & vehicles when not in use
- Make sure plant is CE marked and is marked with the sound power level
- Make sure plant is well maintained
- Minimize the use of vehicle reversing alarms. If possible, set up a one-way system on site. Consider fitting a broadband reversing alarm, as this can reduce the level of noise that is generated on site.

5.3 Deliveries

- Ensure all deliveries are within specified working hours
- Ensure deliveries are within times agreed with the local authority and/or police
- Ensure delivery drivers are aware use the agreed access routes when delivering to site

5.4 Screening

- Use fencing, bunds, and/ or temporary stockpiles to screen noise. *Note:* trees do not reduce noise levels.
- Construct, procure fence screens of the correct density (i.e. at least 12mm thickness of plywood), height (i.e. about 1m above the highest sight line) and length, if required.
- Make sure there are no holes or gaps in the screening or at the bottom.
- Locate screens at the correct distance between the noise source and the receptor i.e. near the noise source or receptor, not halfway between the two (see below).

The increase in distance between a noise source and receiver over (or around) a noise screen compared to the direct distance path is known as the path difference. This can be expressed as

$$\text{path difference} = (\text{distance A} + \text{distance B}) - \text{distance C}$$

Figures 5.4a and 5.4b illustrate **where to** place screening to achieve the greatest noise reduction:

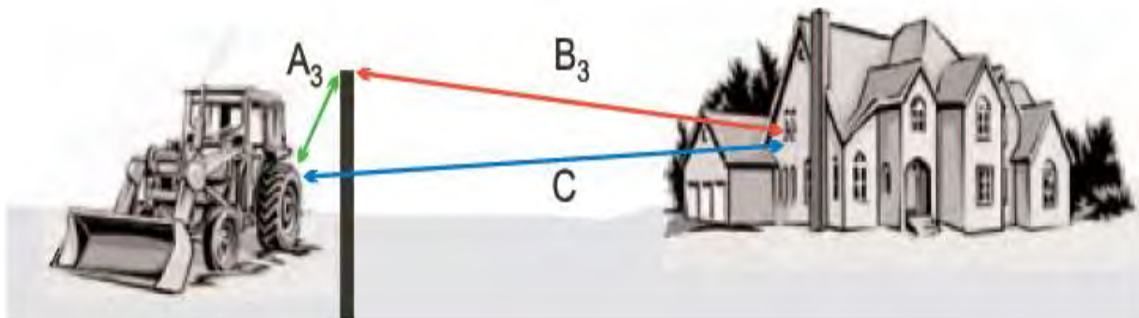


Figure 5.4a Noise Screen positioned closer to the noise source.

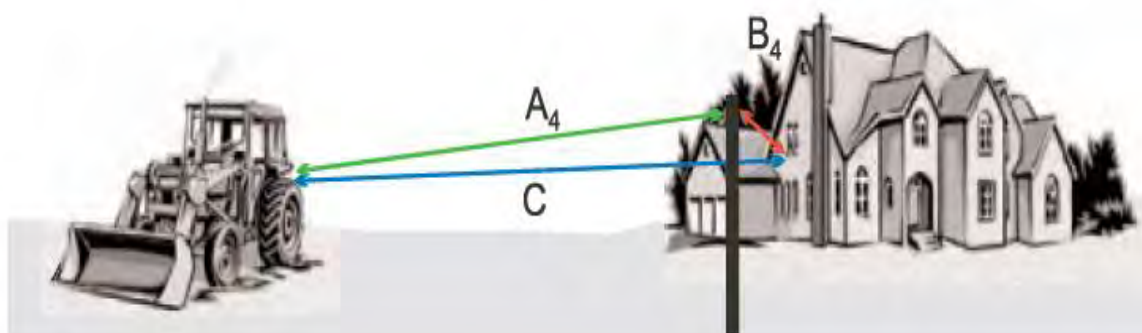


Figure 5.4b Noise Screen positioned closer to the noise receiver.

Figure 5.4c below illustrates **where not to** place a screen:

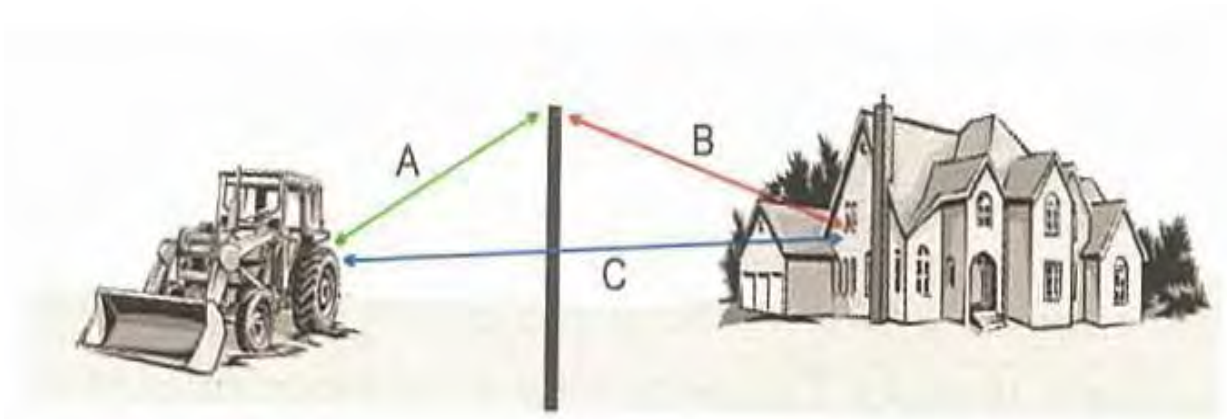


Figure 5.4c Noise Screen positioned midway between the noise source and receiver.

Generally the maximum reduction in noise level by a purpose-built screen or site security hoarding is 10dB(A). This can be achieved by the provision of a screen that breaks the line of sight between the source and receiver and should be constructed from a material of density 7 kg/m^2 or higher such as:

- 12 mm (minimum) plywood / chipboard
- 7 mm plexiglass

Noise Curtains can also be used to reduced noise emissions (as illustrated below).



6.0 NOISE MONITORING

Measurements of background noise levels may be required by the Contract or as part of the Section 61 Consent. Background noise should be sampled at sensitive locations (receptors) that may be affected by the works before works begin and periodically during the contract. Only monitoring equipment that has a current calibration certificate should be used. Sound level meters should be periodically calibrated in accordance with BS 7580-1 or BS 7580-2 as appropriate.

Only people who hold a noise competency certificate should carry out noise monitoring. Monitoring “environmental” noise is different to monitoring “safety” noise. Make sure that the person doing the monitoring is trained in “environmental” noise monitoring.

6.1 Instrumentation

Use a noise meter designed to determine equivalent continuous A-weighted sound pressure level. It should conform to the requirements for integrating averaging sound level meters, preferably of Type 1 as specified in BS 7580-1:1997 but at least of Type 2 as specified in BS 7580-2:1997.

Acoustic calibrators should be used before and after the monitoring period to confirm the correct operation of the meter and the accuracy of the readings. If the calibration is shown to vary by more than +/- 0.5dB it is advised that the measurements are retaken.

The noise meter microphone should be protected with a foam windshield. Where measurements are to be taken continuously in poor weather conditions, it may be necessary to use an all-weather microphone protection case.

In addition to recording the noise level, a record of the date, time, location, weather conditions, as well as a description of the activities being undertaken at the time should also be made. The results from the monitoring should be downloaded and summarised on the *Noise Survey Report (MOH0004-FOR-00065)*.

6.2 What to Measure

L_{Aeq} – The noise level measured in dB averaged over a specified time period (e.g. 5 minutes, 1 hour, 10 hours, 24 hours etc). This is the most common parameter used for environmental noise from a construction site where the noise level may vary continuously

L₁₀ – Top 10 percent of noise readings over a given time period. If there is little difference between the L₁₀ and the L_{eq} it suggests a fairly constant noise level which may be less disturbing than if there is a large difference between the L₁₀ and the L_{eq}, as this may be indicative of noise spikes which may be more disturbing.

L₉₀ – The bottom 10 percent of noise readings over a given time period. It is a noise parameter that is often used when determining the background noise in the absence of the noise specific source.

6.3 Where to Measure

Legislation or consent conditions may specify where measurements should be made, for example at 1m from the nearest sensitive receptor, at the site boundary, or 1m from the site boundary.

The microphone should be positioned approximately 1.2 to 1.5 m above the local ground height. Although it is possible to hold the meter in the hand for spot checks, it is preferable to mount the meter on a suitable tripod (below).



Façade Noise Measurement Apparatus



Free-field Noise Measurement Apparatus

6.4 When to Measure

Atmospheric conditions can impact upon the measured noise level. Noise Measurements should not be taken when wind speed is greater than 5 m/s or during heavy rain, hail etc

6.5 Monitoring Period

Limits on environmental noise are usually set as 1 hr ($L_{Aeq\ 1\ hour}$) or 10 hr ($L_{Aeq\ 10\ hour}$) averages. It is therefore best to monitor and report noise in one hour time periods and if possible noise should be monitored continuously over a 24 hour period. Where this is not possible (or for background reading purposes), the average noise level over a day can be approximated within certain tolerances by taking short-term measurements in accordance with the table below:

Sampling technique	Daily L_{Aeq} estimated within 95% confidence dB
5 minutes in every 1 hour	+/- 2.5
20 minutes in every 1 hour	+/- 1.5
Single 20 minute sample	+/- 5 *
Single 60 minute sample	+/- 3 *
* Figures assume measurements taken only when site working normally (eg. not during meal breaks)	

Table 6.5a Accuracy if approximating daily background measurements fro short-term readings

7.0 NOISE PREDICTIONS

7.1 Worked Example

The information outlined below is an example of how to use the *Noise Level Prediction (MOH0004-FOR-00016)* spreadsheet to predict the noise level 1m from the façade of a sensitive receptor near to a works site.

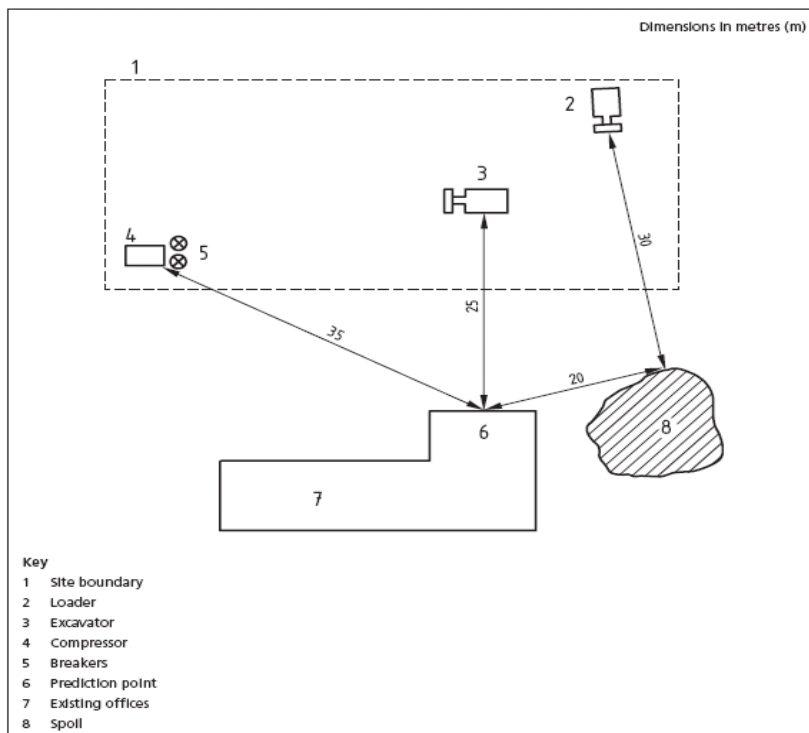


Figure 7.1a: Site showing plant locations in relation to the nearest affected façade

Plant type	L_{Aeq} at 10 m	Distance	Adjustments			Resultant L_{Aeq}	Duration of activity	Duration of activity as percentage of 10 h	Correction to $L_{Aeq(10h)}$	Activity $L_{Aeq(10h)}$
			Distance	Screening	Reflection					
	dB	m	dB	dB	dB	dB	h	%	dB	dB
Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 8	Step 10	Step 11
Excavator	71	25	-8	-5	+3	61	8	80	-1	60
Compressor	65	35	-11	0	+3	57	3	30	-5	52
Breaker	83	35	-11	0	+3	75	3	30	-5	70
Breaker	83	35	-11	0	+3	75	3	30	-5	70

Table 7.1a: Prediction of Noise from Stationary Plant (Form MOH0004-FOR-00016)

Step 1:

Find the L_{Aeq} (dB) at 10m for the item(s) of plant / machinery in question. This information can generally be found from the following sources / databases:

- BS 5228-1:2009 (Annexes C and D)
- DEFRA Update of Noise Database for Prediction of Noise on Construction and Open Sites 2004
- Manufacturers Information
- Actual readings taken of Murphy Plant/ Equipment

Step 2:

Enter the L_{Aeq} of the piece of plant/ machinery at 10m into column 2 of the spreadsheet as done in table 1 above. From the working example:

- the L_{Aeq} at 10m for an excavator is 71dB
- the L_{Aeq} at 10m for a compressor is 65
- the L_{Aeq} at 10m for a breaker is 83
- this information was obtained from the annex of BS 5228

Steps 3:

In column 3 enter the distance (in meters) that the piece of equipment will be to the nearest sensitive receptor from where it will be positioned on site. Sensitive receptors include flats/ houses/ offices/ schools. From the example above:

- the excavator will be operating 25m from the nearest sensitive receptor
- the breakers and the compressor will both be operating 35m from the nearest sensitive receptor

Step 4:

The value entered in step 3 will feed into a preset logarithmic equation in column 4.

Step 5:

Column 5 adjusts the sound levels according to the effects of screening. As a working approximation, if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier and of 10 dB when the noise screen completely hides the sources from the receiver. (This can be done through entering “y” for full screening and “p” for partial on the *Noise Level Prediction (MOH0004-FOR-00016)* spreadsheet).

In the example above:

- Only the excavator will be partially screened from the nearest sensitive receptor
- The breakers and the compressors will not be screened from the nearest sensitive receptor

Step 6:

Where the point of interest is 1 m from the façade of a building, make an allowance for reflection by adding 3 dB to the calculated levels (manually add +3 into column 6).

Step 7:

Column 7 is the resultant L_{Aeq} which considers the effects of distance, screening and reflection on the L_{Aeq} of the piece of machinery entered in column 2. The preset equation sums columns 2, 4, 5, 6.

Step 8:

In column 8, enter the length of time in hours that each item of plant/machinery is likely to be on for during a typical working shift. In the example above:

- it is estimated that the excavator will be operating for 8 hours of the working shift
- it is estimated that the compressor and breakers will be operating for 3 hours of the working shift

Step 9:

The value entered from step 8 should feed into column 9 as a percentage of a daily shift (typically 10 hours). This gives you the percentage on time for each item of plant/machinery. So in the example above:

- 80% on time for the excavator
- 30% on time for the breakers and compressor

Step 10:

In column 10 you are required to enter the correction to the L_{Aeq} (dB) that is determined from the percentage on time, determined in step 9. In order to do this you should use graph 1 below to find the correction value, this should then be entered into column 10. From the working example:

- 30% on time gives a correction value of -5 for the breakers and compressor
- 80% on time gives a correction value of -1 for the excavator
- these values are indicated on graph 1 with the red arrows

Step 11:

Column 11 has a preset equation that subtracts the correction value in column 10 from the resultant L_{Aeq} in column 7.

Decibel Addition:

Once the individual L_{Aeq} 's have been determined for each phase of the works, it may then be necessary to total the contribution of the individual L_{Aeq} 's generated in column 11. This can be done through decibel addition in either two ways:

Difference between the two levels dB(A)	Addition to the higher level dB(A)
0	3
1	3
2	2
3	2
4	1
5	1
6	1
7	1
8	1
9	1
10 and over	0

Table 7.1b This table can be used for decibel addition. It can be used to sum the contributions of each item of plant/machinery.

So from Table 7.1a, the Activity L_{Aeq} 's in column 11 can be added in the following way:

The L_{Aeq} 's are 70, 70, 60, and 52, dB.

70 and 70 (the difference is 0 so add 3 dB to the higher level). **73**

73 and 60 (the difference is greater than 10 so add 0 dB to the higher level). **73**

73 and 52 (the difference is greater than 10 so add 0 dB to the higher level). **73**

Or alternatively the following equation can be used on a calculator:

$$\text{dB Total} = 10\log (10(\text{dB1})/10 + 10(\text{dB2})/10)$$

Percentage Overtime Correction Factor:

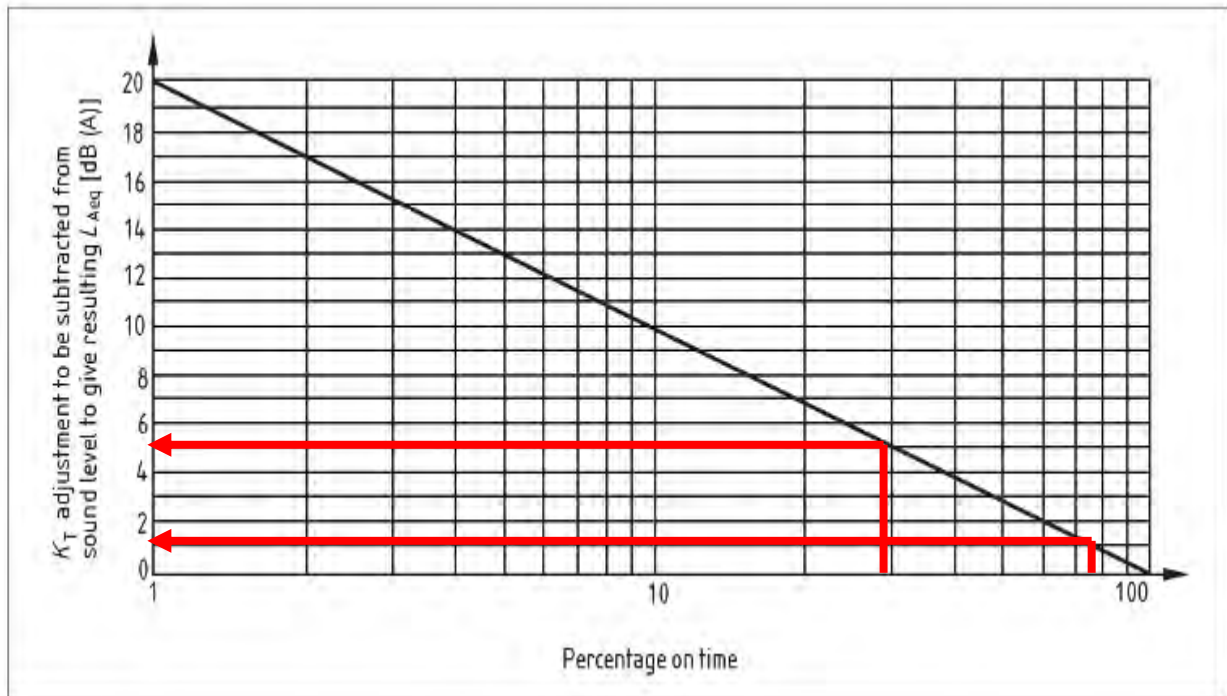


Figure 7.1c: This graph details the sound adjustments that are made to the resultant L_{Aeq} according to the percentage on time of the item of plant/machinery. The red arrows indicate adjustments made at 30% and 80%. Source: BS 5228

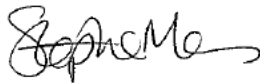
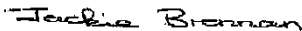
8.0 FURTHER INFORMATION

- 1) Environment Agency, NetRegs, Noise, Pre-planning Noise
- 2) CIRIA 'Environmental Good Practice on Site'
- 3) BS 5228 Noise and Vibration Control on Construction & Open Site (available from the Group Environmental Department)

Appendix 4L:

MOH0004-INS-00007 – Air Pollution Prevention

GROUP ENVIRONMENTAL CONTROL**Air Pollution Prevention**

 Stephen Marr Group Environmental Manager			 Jackie Brennan Group HSQE Manager
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

01	31 Jan 11	Up-dated and revised to incorporate the new Maxcel cost code contract number
00	2 Apr 03	Issued for implementation.
REV	DATE	STATUS DESCRIPTION

DOCUMENT NO.	MOH0004-INS-00007
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Contents	Page
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1.1 General Activities	3
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1.3 Haul Roads and Traffic	3
1.4 Plant, Equipment and Vehicles	3
1.5 Earthworks	4
1.6 Use of concrete and bentonite	4
1.7 Cutting and grinding	4
2.0 Monitoring & Checking	4
3.0 Further Information	4

Note – These controls must be followed and the arrangements for how they will be implemented on a contract/yard explained in the Contract Environmental Plan/ Local Yard Environmental Procedure and/ or Methods Statements.

1.0 AIR POLLUTION PREVENTION CONTROLS

1.1 General Activities

- Locate dusty activities away from sensitive areas e.g. houses
- Pave heavily used areas or lay geotextiles
- Minimise drop heights into hoppers, lorries or other plant.
- Damp down using water spray
- Water from the de-watering of temporary excavations or rainwater storage lagoons may be permitted for the purpose of dust suppression – check with local environment agency.
- Damp down using water with chemical additives to bind materials but check with the environmental agency before use.
- Enclose, shield or use dust extractors, filters or scrubbers to plant and equipment.
- Use barriers (e.g. hoarding) to shield residential areas and other sensitive areas from dust.
- Clean haul roads and areas of hard standing.
- Enforce speed limits on site.
- Erect dust screens
- Make sure exhausts do not discharge directly onto the ground.
- Erect windbreaks
- Very fine or dry materials should be stored within a building or with adequate protection from the wind.
- NO burning on site

1.2 Demolition

- Use enclosed chutes for dropping dusty materials to ground level and regularly dampen chutes.
- Locate crushing plant away from sensitive areas – locate within building if possible.
- Where necessary use water to dampen down buildings prior to demolition.
- Demolish building from inside out.

1.3 Haul Roads and Traffic

- Construct and maintain the road to the site exit.
- Ensure vehicles are sheeted when taking dusty or loose loads to or from site.
- Clean wheels of vehicles leaving site.
- Sweep site crossing points, access and egress points regularly – or use a road sweeper.
- If necessary water browsers should be available to dampen down haul roads.

1.4 Plant, Equipment and Vehicles

- Turn off engines when not in use.
- If black/ heavy smoke is being emitted, ensure that plant, equipment, vehicle is immediately taken out of use and serviced.

1.5 Earthworks

- Re-vegetate or seal completed earthworks as soon as possible.

1.6 Use of Concrete and Bentonite

- Bulk cement, PFA, lime and bentonite should be delivered by tanker
- Supervise filling of silos to avoid overfilling
- Mix concrete/ bentonite slurry enclosed/ shielded area
- Before concrete pours, vacuum dirt from formwork rather than blowing it out

1.7 Cutting and grinding

- Minimise cutting and grinding
- Use dust extractors or suppressors on equipment (e.g. cutters, saws)
- Spray water when cutting paving slabs

2.0 MONITORING AND CHECKING

Operatives should constantly monitor the site for excessive dust and black smoke being emitted from the plant and equipment and ensure that it is stopped immediately.

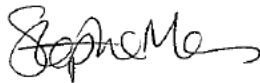
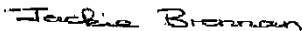
3.0 FURTHER INFORMATION

- 1) CIRIA 'Environmental good practice on site'
- 2) Environmental Agency Website, Air.
- 3) Group Environmental Department.

Appendix 4M:

MOH0004-INS-00008 – Archaeology and Heritage

GROUP ENVIRONMENTAL CONTROL**Archaeology & Heritage**

 Stephen Marr Group Environmental Manager			 Jackie Brennan Group HSQE Manager
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

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DOCUMENT NO.	MOH0004-INS-00008
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Contents	Page
1.0 Definitions	3
2.0 Working near/ on Archaeological/ Heritage Sites	3
3.0 Archaeological/ Heritage Protection Measures	3
4.0 Identification of Archaeological/ Human Remains/ Treasure	4

Note – These controls must be followed and the arrangements for how they will be implemented on a contract/yard explained in the contract Environmental Plan/ Local Yard Environmental Procedure and/ or Methods Statements.

1.0 DEFINITIONS

Scheduled Ancient Monument is a nationally important archaeological site that is protected by law. These are identified and protected by English Heritage.

Area of Archaeological Importance is a locally important archaeological site that is protected by law. These are identified and protected by the local authorities.

Listed building is a building or structure that is important due to its architecture or history and is protected by law. There are three different types of listed buildings:

- Grade 1 – These are the most important and are identified and protected by English Heritage.
- Grade 2* - These are identified and protected by the Local Authority
- Grade 2 – These are identified and protected by the Local Authority

Conservation Area is a group of buildings and streets that is important due to its architecture or history, and is protected by law. These are identified and protected by the Local Authority.

2.0 WORKING NEAR/ ON ARCHAEOLOGICAL OR HERITAGE SITES

- When working near archaeological areas, historical buildings or burial sites that could be affected by the works protection measures must be discussed with English Heritage/ Local Authority.
- Where possible amend the permanent or temporary design or execution of the works to preserve archaeological remains in situ.
- Records of all discussions and agreements with the English Heritage/ Local Authority must be kept on the communication log.
- All protection measures, consent/ licence requirements and any other agreements must be described within the Contract Environmental Plan and/ or method statements.
- Implement and maintain the protection measures detailed in the Contract Environmental Plan and/ or the methods statements including detailed drawings of the location of the sites.

3.0 ARCHAEOLOGY & HERITAGE PROTECTION MEASURES

- Fence off and clearly mark any sensitive areas e.g. listed buildings/ archaeological areas.
- If archaeological remains cannot be preserved in situ, make sure they are excavated, recorded by a specialist archaeological contractor.
- If a specialist archaeological contractor will be working on site, keep them informed of the work programme and any "last minute" changes. Cooperate with their requirements.
- If an archaeological 'watching brief' is required on site ensure an archaeologist is present during all top soil stripping.
- Use an excavator with toothless bucket for excavation in sensitive areas.
- When dewatering, monitor water levels in nearby waterlogged archaeological sites - dewatering may draw down water and dry out the remains causing damage.

4.0 IDENTIFICATION OF ARCHAEOLOGY/ HUMAN REMAINS/ TREASURE.

If you discover archaeological remains, human remains or treasure, stop work and notify the Contract Environmental Adviser.

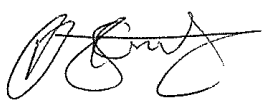

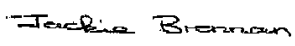
The Environmental Adviser will:

- Contact the Local Authority Archaeological Officer (and coroner within 14 days if coins, gold or silver found.)
- Identify measures required to ensure compliance with legislation which should be then be included in the relevant method statement (s).
- Brief employees and sub contractors on requirements.
- Monitor compliance with requirements.

Appendix 4N:

MOH0004-INS-00012 – Wildlife

GROUP ENVIRONMENTAL CONTROL**Wildlife**

 Phil Bailey Environmental Adviser	N/A	 Stephen Marr Group Environmental Manager	 Jackie Brennan Group HSQE Manager
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

02	31 Jan 11	Up-dated and revised to incorporate the new Maxcel cost code contract number
01	30 Oct 09	Revised and Issued for implementation
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REV	DATE	STATUS / DESCRIPTION OF CHANGES

DOCUMENT NO.	MOH0004-INS-00012
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Note – These controls must be followed and the arrangements for how they will be implemented on a contract/yard explained in the Contract Environmental Plan/ Local Yard Environmental Procedure and/ or Methods Statements.

1.0 WILDLIFE SITES

Site of Special Scientific Interest (SSSI) is a designated area with special plants, animals or geology. It may be nationally important or it may be an area that is listed in a European Directive (e.g. special protection area or special area of conservation) or even an international convention (e.g. Ramsar). SSSIs are identified and protected by Natural England.

Special Protection Area (SPA) is an internationally important area for rare and migratory birds (as listed in the European bird's directive). In the UK these areas are designated as SSSIs.

Ramsar Site is an internationally important wetland habitat (as listed under the conservation of wetlands of international importance). In the UK these areas are designated as SSSIs.

Special Area of Conservation (SAC) is an internationally important habitat (as listed in the European habitats directive). In the UK these areas are designated as SSSIs.

National Nature Reserve (NNR) is a designated area with special plants and animals, but is not so strictly protected as SSSIs. These are identified and protected by Natural England.

Local Nature Reserve (LNR) is a local area, with special plants and animals. These are identified and protected by the local authority.

During the planning stages of a project use <http://magic.gov.uk> to determine if any of these special wildlife sites will be affected by the proposed works. The Magic website contains interactive maps outlining habitat types and land classifications across the UK. Sites of Special Scientific Interest (SSSI) and other protected areas are also highlighted.

2.0 WILDLIFE PROTECTION MEASURES

- Fence off and/ or clearly mark sensitive areas prior to the start of construction activities.
- If works enter/ disturb a sensitive area make sure the method statement includes mitigation measures, workers are provided with toolbox talks, etc.
- If an ecologist is required ensure they are informed of works to complete watching brief.
- When dewatering near sensitive wetlands monitor water levels daily.
- Always reinstate habitat where possible.
- Programme works to avoid sensitive times e.g. avoid site clearance between April and August (bird nesting season). If trees/ hedges are not felled by end march it may be necessary to put nets up to prevent birds from nesting. For guidance on suitable months to survey/ mitigate for protected species see the ***Wildlife Calendar (MOH0004-GDN-00013)***.
- If protected species are present, relocate where possible. Only a specialist may do this under license from English nature or DEFRA. Development Consent may also be required from Natural England or DEFRA.

3.0 PROTECTED SPECIES

Protected species that may be found on site include:

- All nesting birds
- Badgers
- Bats
- Common Lizards
- Dormice
- Great Crested newts
- Insects – certain species only e.g. types of beetle, butterfly, cricket, dragonfly
- Natterjack toads
- Otters
- Slow worms
- Snails- certain species only
- Snakes -(note –adders have a poisonous bite)
- Water voles

Fines and/ or jail sentences can apply for injuring, killing, capturing or interfering with the habitat of these species. Pleading ignorance to their presence will not excuse the offence. The Company profiles can be badly damaged if any employees are found guilty of these offences and they are taken very seriously.

During the planning stages of development a desk study should be carried out to determine the possibility of encountering any of these species on site.

Records of distribution of protected species can be found on the NBN database (<http://data.nbn.org.uk>). This shows recent biodiversity records within 1 km of any proposed site in the UK.

If the NBN results show there are records of any of these species in the area of proposed works, contact your Environmental Adviser/ an ecologist.

Refer to the **Wildlife Calendar (MOH0004/GDN00013)** for the best time to survey these species and plan works accordingly to cause minimal impact.

If ANY of these protected species are found on an area of proposed development a Development License must be obtained before work can continue.

Contact Natural England for a licence:

Tel: 0845 6014523 (local rate) / Fax: 0845 6013438

Email: wildlife@naturalengland.org.uk

4.0 ALL NESTING BIRDS

4.1 Habitat

Nesting birds can be found almost anywhere especially woodland, scrub, hedgerow, on the ground, in the buildings, cliff faces and riverbanks.

4.2 The Law

Under the Wildlife and Countryside Act 1981 all nesting birds are protected and it is illegal to kill or disturb them. Some species also have extended protection covering young away from the nest. Heavy fines apply- up to £5000 per bird (even pigeons!).

4.3 Requirements/ Mitigation

- No works in/ on nesting habitat between mid February and end of July. If works are absolutely necessary an Environmental Adviser/ ecologist should check area for nests before clearance.
- Programme clearance works for outside breeding season (end of October to mid February).
- Duration of nesting season can be weather dependant.
- If nest is discovered work should stop immediately. Works can only continue after young have left the nest.
- Nest sites should be fenced to prevent disturbance.
- Consent from DEFRA to move a nest is only granted under extreme circumstances.
- Movement of a nest under consent would need to be completed by an ecologist and require additional monitoring.

5.0 BADGERS

5.1 Identification

Badgers grow up to a meter in length and weigh 10-12kg. Their black and white striped face is easily recognisable and the body is covered in dark silvery fur. They are nocturnal so evidence of their presence is often more common than actual sightings.

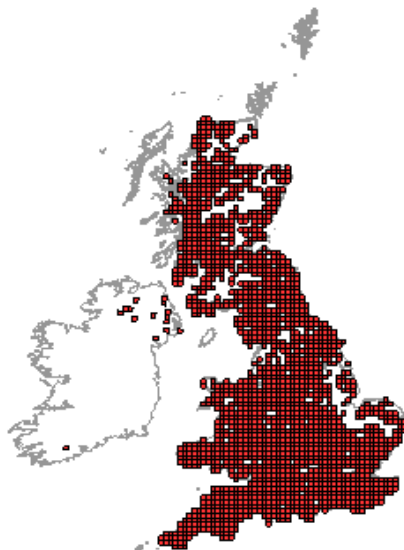


A sett can have a single or many entrances and is often confused with a rabbit warren or fox earth. The way to identify if the burrow belongs to a badger is by its size and shape of the entrance. The tunnels are wider (20-30cm's) than they are tall and have a flat bottom, giving them a distinctive D-shape.

Their five-claw paw prints are also indications of badgers in the area. Refer to the Toolbox talk on badgers for further guidance.

5.2 Habitat

Badgers can be found throughout the UK, check the NBN website for area specific data.



Badger setts can be found almost anywhere but sloping ground in woods, scrub, hedge banks and field boundaries are favoured.

5.3 The Law

A license is required for working within 30m of a sett. If the exclusion and destruction of a sett is necessary this can only be completed under license under the Badger Protection Act 1992. The application for the licence must generally be from experienced ecologists and can take up to 2 months to obtain. It is illegal to injure, kill, capture or destroy/obstruct/interfere with a sett without a license, £5000 fines and jail terms can apply.

5.4 Requirements / Mitigation

No works within 30m of a badger sett can be completed without a license and generally under supervision from ecologist.

- Disturbance to a badger sett (i.e. works within 30m) can not occur from December to June inclusive.
- No exclusion of a badger sett can begin after the end of October and must be completed by an ecologist and under license.
- If a sett is discovered consult with the client regarding action- this may include the relocation or works.

All mitigation works **MUST BE** completed under license and supervision by an ecologist.

- Setts, especially main setts should be retained where practicable.
- Artificial setts can be constructed, a short distance away, and badgers relocated but this should only be done if essential and **MUST BE** done under license by an ecologist.
- Temporary exclusion of badger setts can be completed to allow works in close proximity to be undertaken but again this must be completed under license.
- Fencing to reduce road mortality may be required as well as additional mammal tunnels.

6.0 BATS

6.1 Identification

There are 16 species of bat in the UK, 12 are endangered. The smallest of these is the Pipistrelle, it measures roughly 4cm in height and weighs only 5 grams. The largest species, the Noctule bat is twice the size and weighs up to 40 grams. Bats are usually seen flying at dusk, whilst during the day they roost (almost anywhere).

They do not cause structural damage or make nests, they prefer existing “nooks and crannies” to roost in, look out for:

- Staining/ scratches on walls or fences below the roost
- Squeaking noises coming from the roost
- Guano (crumbly droppings) and insect wings on the ground below the roost (rodent droppings do not crumble and are smooth)



Bat guano beneath roost



Wall stained around roost entrance



Roost behind boarded windows of derelict house.

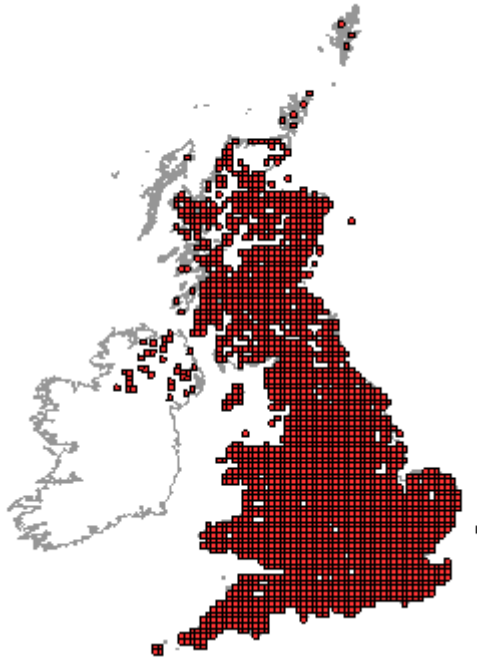


Between brickwork.

Refer to the Toolbox Talk on Bats for further guidance.

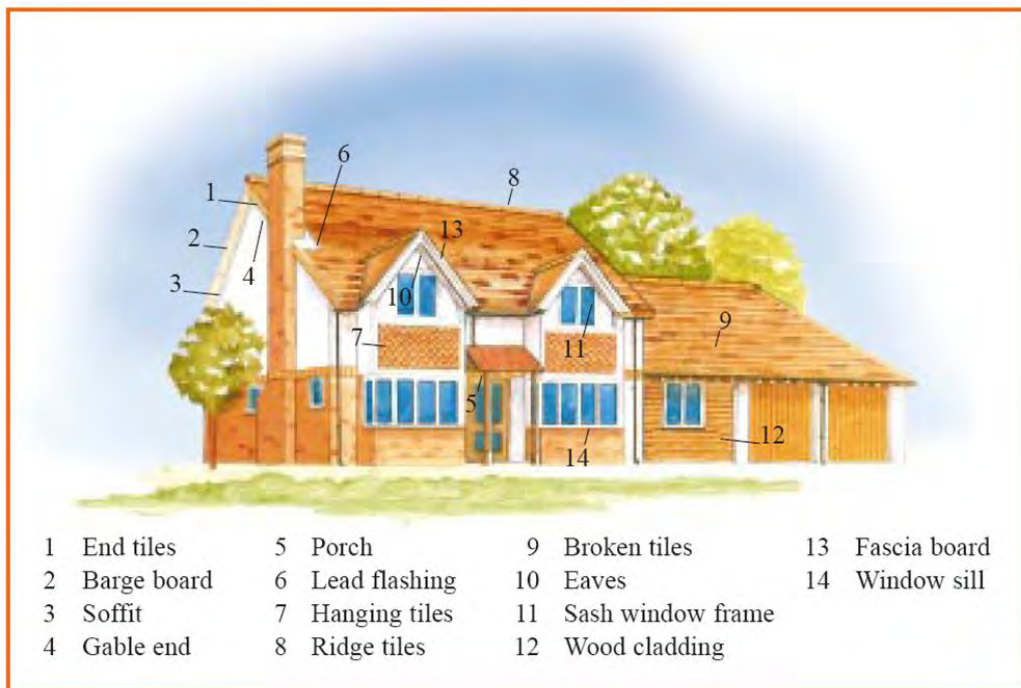
6.2 Habitat

Bat distribution is widespread across the UK, for site specific information check the NBN website.



Bat roost sites include:

- Buildings (see possible places below)



- Trees (woodpecker holes, ivy, flaking bark, splits in the trunk/branches)
- Underground structures
- Bridges
- Tunnels
- Caves

Feeding can be anywhere e.g. woodland, parkland, hedgerow/linear features, grassland and water bodies.

6.3 The Law

Under the Wildlife and Countryside Act 1981 and European directive it is illegal to kill, disturb, or capture bats and to disturb, destroy, or obstruct access to roosts, even when the bats are seasonally absent. A £5000 fine can apply for each bat.

6.4 Requirements/ Mitigation

- No works can be undertaken that affects breeding roosts in summer or hibernation roosts in winter.
- If a tree houses bats then it **MUST BE** felled under supervision of a licensed bat worker.
- Culverts, buildings and other structures should be checked for bats prior to the commencement of works.
- Works can be significantly affected for necessary bat mitigation.

Mitigation measures may include the construction/ installation of artificial bat roosts on trees, under bridge structures for example. Generally any required mitigation will be highlighted within the contract documents or given under instruction from the client.

7.0 COMMON LIZARDS

7.1 Identification

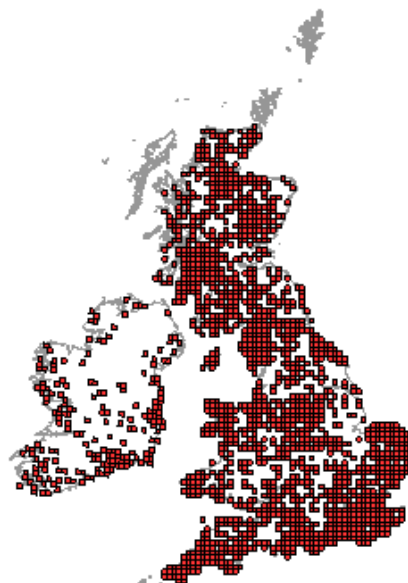
These fast moving lizards are typically 10-16cm in length and have a scaly skin. They are grey brown to dark brown, often with a darker strip running the length of the spine.

They are not to be confused with newts which are slow moving and are often found in or near water.



7.2 Habitat

Common Lizards are widely distributed across the UK, check NBN website for area specific records.



Adults emerge from hibernation in March. They bask in open sunshine during the summer months and are widely distributed through-out the UK. They can be found in gardens, heathland, disused railway lines, motorway/road verges, brownfield sites, open meadows, and along hedgerows and ditches.

Hibernation occurs between October and April, when they can be found in underground burrows, or beneath rocks and logs.

7.3 The Law

Lizards are a protected species under the Wildlife and Countryside Act 1981. It is illegal to intentionally injure, kill, or trade lizards.

7.4 Requirements / Mitigation

A license is not required to handle Common Lizards but it is strongly recommended that you seek advice from Natural England or an ecologist if you propose to relocate them. Although it is not essential the lizards are relocated prior to development every reasonable effort should be taken to safeguard these animals.

8.0 DORMICE

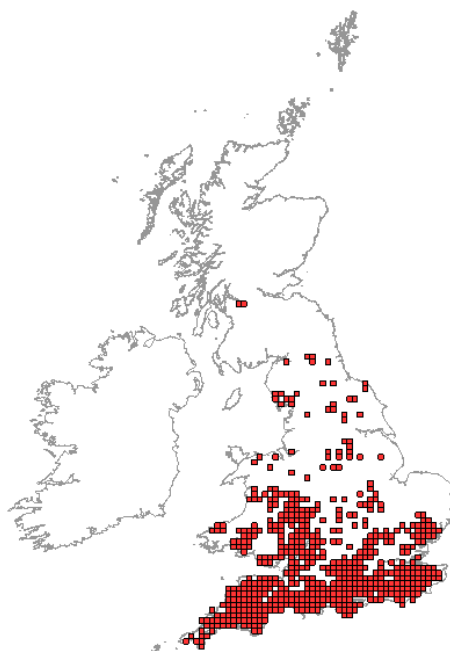
8.1 Identification

Dormice are small with a pointed muzzle, large ears, large back eyes, long whiskers, thick furry tail the same length as the body. Their fur is an orange- brown colour.



8.2 Habitat

Dormice are mainly found in the southern half of the UK and are absent from Scotland, N.Ireland and Ireland. Check NBN website for area specific data.



Dormice are nocturnal and therefore rarely seen. The presence of Dormice should be assumed in any area of deciduous woodland with scrub, coppiced woodlands and hedgerows (especially hazel and honeysuckle). Summer nests are about the size of a grapefruit. Dormice hibernate on or under the ground from about October until March or April (best time to survey them). They are thus affected by ground disturbance in winter and early spring.

8.3 The Law

Dormice are protected by European law and may not be intentionally killed, injured, disturbed in their nests, collected, trapped or sold except under licence.

8.4 Requirements / Mitigation

After carrying out a desk survey for any records of dormice in the area, the potential presence of dormice should be considered when development or land-use change is planned that affects any type of woodland, hedgerow or scrub. If their presence is suspected, a survey by an ecologist should be carried out at the earliest possible opportunity as mitigation measures may depend on the season and may not be easily accommodated into works timetables later.

If the disturbance of dormice is unavoidable, mitigation may include the provision of compensatory habitat. Translocation of populations should be considered a last resort. If dormice are found on site STOP work and contact the Environment Agency.

9.0 GREAT CRESTED NEWTS

9.1 Identification

Great Crested Newts (GCN's) can grow up to 18cm in length and are dark brown or black in colour. They have warty skin with a row of white dots along the side of body and head. Both male and female have a yellow underbelly with black markings. The males develop the jagged crest along their backs during breeding season (May-July).



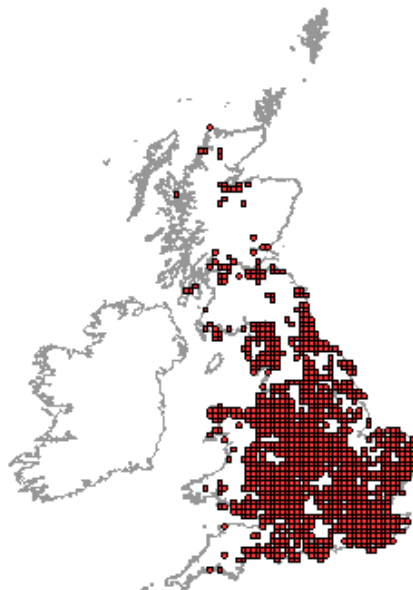
Male



Female

9.2 Habitat

Great Crested Newt distribution in the UK is shown below, they are absent from N.Ireland and Ireland. For area specific records check the NBN website.



GCN's can be found in medium sized ponds e.g. field ponds, flooded pits and large ditches. These ponds are generally well vegetated, moderately shaded, have no fish and few wildfowl. Refer to the **Great Crested Newt Habitat Suitability Index (MOH0004-GDN-00028)**, located in the information library on the intranet for guidance on habitat suitability.

Great Crested Newts can be found up to 500 meters outside these ponds in frost free areas such as; undergrowth, log piles and large rocks where they usually hibernate. Newts will generally move back towards the pond after hibernation in spring (April).

If the desk study shows a record of GCN's in the area contact an ecologist. If the desk study results are negative but the area contains suitable habitat an environmental adviser/ecologist should be contacted.

9.3 The Law

It is illegal to kill, capture or disturb newts or to obstruct access to ponds/important land habitat. A £5000 fine for each newt applies. A license is needed for survey and any works in 500-metre radius of a breeding pond (the "Newt Zone") under the Wildlife and Countryside Act 1981 and European law.

9.4 Requirements / Mitigation

- All works within the Newt Zone should be supervised by an ecologist or be carried out under their guidance.
- No works should be completed on the ponds during the breeding season/ active season (February to October).
- Terrestrial works should be completed in April / May.
- All works **MUST BE** licensed.

Temporary mitigation works may include:

- Newt fencing (500mm high plastic fencing which allows newts to climb over but not back) see Figures 1 and 2.
- Pitfall-traps –buckets which when crossing the fence the newts will fall into (once they have been captured they can be relocated). If pitfall traps are used an ecologist will be required on a daily basis to check the traps. If all newts in the area are to be translocated permanently pitfall traps will be required.
- Hand searching may be required when clearing the hibernation area; this will have to be done by an ecologist licensed to handle newts.

Figure 1- Temporary Newt Fencing (Plan view)

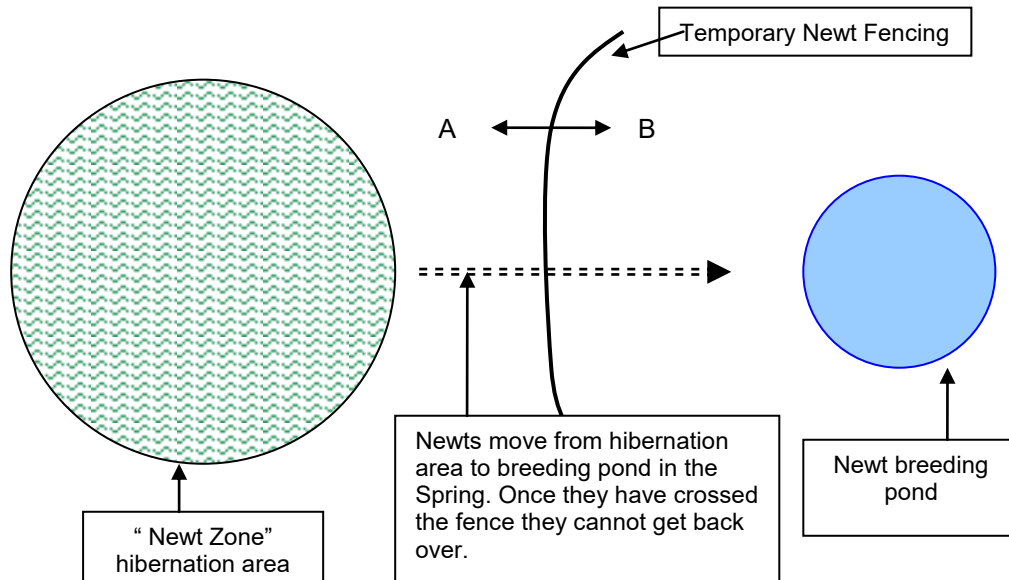
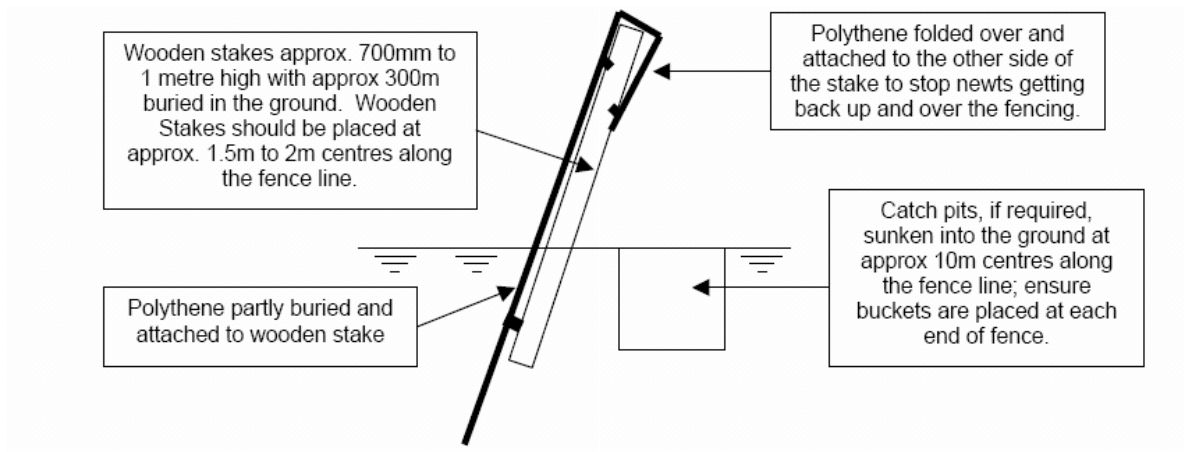


Figure 2 - Section AB (Newt Fence).



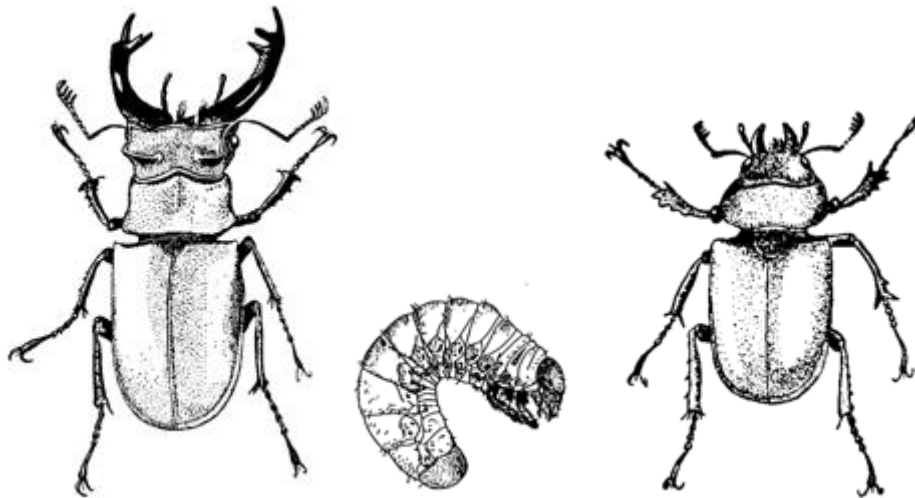
If a great crested newt pond is to be removed as part of the work then there may be a requirement to build a receptor pond for the newts or improve an existing pond nearby. A receptor pond should be identified by an experienced ecologist and information included in the application for license.

10.0 INSECTS

Stag Beetle

10.1 Identification

Stag Beetles are the largest terrestrial beetle, between 5 and 8 cm in length. Large antler shaped jaws give them their name.



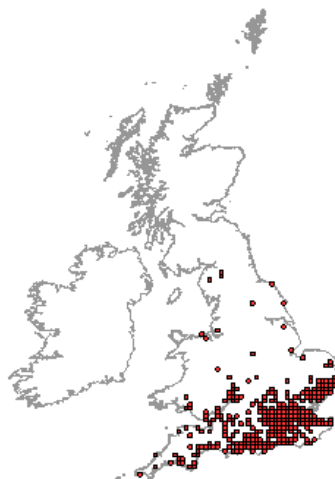
Male

Larvae

Female

10.2 Habitat

Stag beetles are mainly found in the South East of the UK including London. Check NBN website for area specific data.



The stag beetle requires dead wood to complete its lifecycle. The larvae live in dead wood or tree stumps of many types of tree; they usually avoid fir trees, conifers and pine. The adults emerge from the soil beneath logs and stumps from May to late July.

10.3 The Law

Stag beetles are a globally threatened species and are protected under the Wildlife and Countryside act of 1981. The presence of the beetles is not an obstruction to development but consideration and sympathetic measures should be taken where possible.

10.4 Requirements / Mitigation

- During planning stage a survey should be undertaken of the site between mid- May and early August. Check NBN Gateway (<http://data.nbn.org.uk>) for online records of the area.
- If the survey indicates the presence of stag beetles submit a scheme of mitigation and proposed timings of the works to the local planning authority.
- Mitigation can include providing habitat or “loggeries” for the beetles. These consist of a few hardwood logs sunk end-on into the ground in partially shaded areas.
- If larvae are found when digging up or removing dead wood/logs, try to carefully remove the larvae and place them in some dead wood nearby, making sure they are covered and in a cool, moist (but not wet) place.

11.0 NATTERJACK TOADS

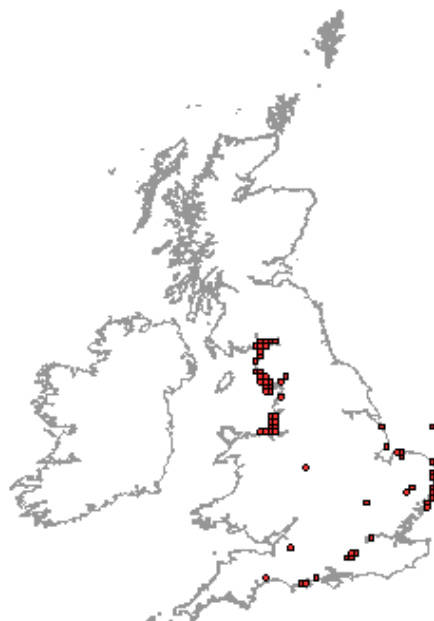
11.1 Identification

Natterjack toads are smaller than common toads and have a distinctive yellow stripe down the centre of the back. They tend to run rather than hop due to their short legs.



11.2 Habitat

The map below shows an overview of Natterjack distribution. For area specific records check NBN website.



Natterjacks are quite rare in Britain and usually confined to coastal sand dunes, coastal marshes, and sandy heaths. Preferring sandy areas due to the warm shallow ponds commonly found here.

11.3 The Law

These toads are protected by UK and European law. It is therefore illegal to intentionally injure, kill, disturb in any way, possess or trade them.

11.4 Requirements / Mitigation

If the desk study shows records of these toads within 1km of the area of proposed work a survey should be carried out by licensed ecologists. This survey cannot successfully take place during the winter months when the toads are hibernating.

If the survey confirms their presence and the development will significantly affect the toads or their habitat then mitigation or protection should be carried out.

12.0 OTTERS

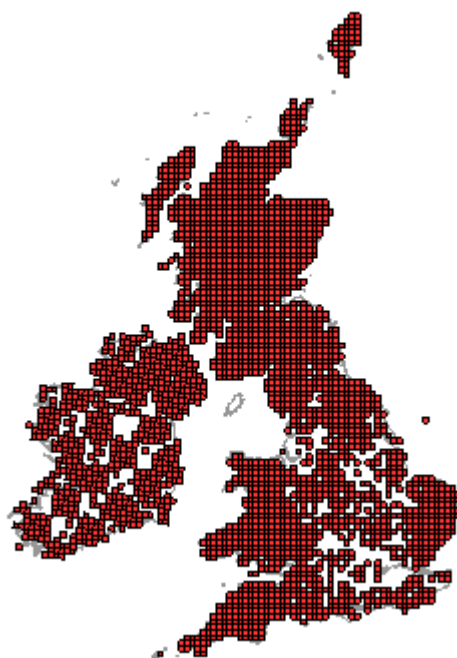
12.1 Identification

Otters have a long slender body often over a meter in length, with brown fur and a lighter shade of brown on the underside. Otters can weigh over 10kg and are often seen swimming low in the water with only their nose and eyes above the surface.



12.2 Habitat

Otters are widespread across the UK. For area specific data check the NBN website.



Otters can be found alongside rivers, streams and lakes generally with good water quality. Otter Holts (burrows) are usually located in undisturbed riverbanks especially under exposed tree roots.

12.3 The Law

It is illegal to kill, capture or disturb otters or to damage / destroy their places of shelter under the Wildlife and Countryside Act 1981 and the EC habitats directive.

12.4 Requirements / Mitigation

- Disturbance level is not associated with seasons.
- Works in areas where otters have been located should be completed under guidance from an ecologist or the Environment Agency.
- In areas where otters have been identified, the Environment Agency may put additional conditions in land drainage consents e.g. for building culverts.

Mitigation works **MUST BE** completed under the guidance of a specialist (this can either be an ecologist or from the local Environment Agency) and can include:

- Creation of features of value and artificial Holts.
- Maintenance of access corridors along the watercourse during works.
- The provision for mammal ledges (shelves within a new culvert) or mammal tunnels to allow safe passage of otters through the culvert in flood conditions.
- In areas, which are highly populated by otters, there may be a need to construct additional fencing to keep the otters off the road network and/or additional mammal tunnels.

The requirements for mitigation should generally be within the environmental method statement and works highlighted within the contract or under instruction from the client.

13.0 SLOW WORMS

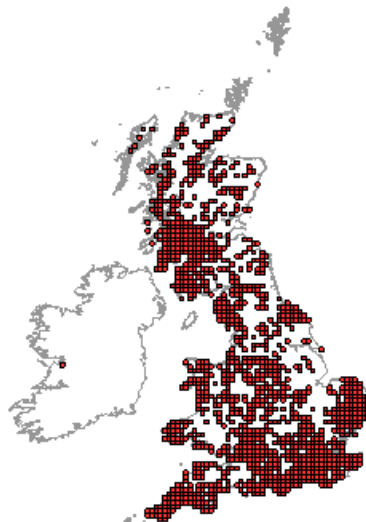
13.1 Identification

Often mistaken for a snake, these legless lizards usually grow to 45cm in length. They are harmless to humans. They have few markings and small highly polished scales giving them a glassy appearance. Colours vary between light and dark brown, grey, and bronze. Like all lizards (and unlike all snakes) they have eyelids and can sometimes be seen blinking.



13.2 Habitat

Slow worms are very widely distributed in Britain. For area specific data check the NBN website.



Often found in gardens (especially compost heaps), allotments, church yards, waste areas, wooded areas and along railway embankments. They prefer long rough grass and other cover such as piles of bricks or leaves.

They are often seen between March and October.

13.3 The Law

Like all lizards in the UK, slow worms are protected by law. It is a criminal offence to intentionally injure or kill these animals.

13.4 Requirements / Mitigation

Mitigation measures are likely to include creating habitat within the development or relocating to a more suitable area.

If slow worms are discovered on site, work should STOP immediately and a slow worm survey should be undertaken by qualified ecologists.

14.0 SNAILS

Desmoulin's Whorl snail

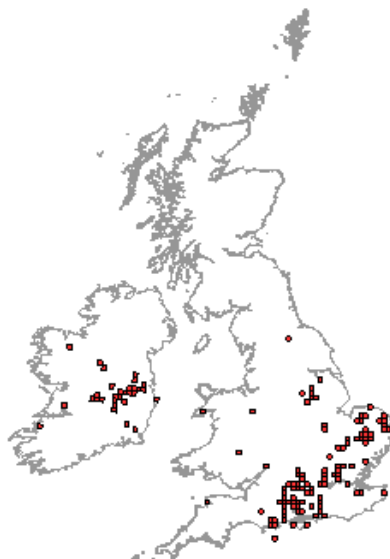
14.1 Identification

This tiny snail's shell is roughly 3mm in length, yellow/brown and translucent. The shell is made up of four whorls and has a glossy appearance.



14.2 Habitat

This species of snail is usually found along a corridor stretching from Norfolk to Dorset with some isolated populations in Shropshire, Cornwall, Kent and north Wales. For area specific data, check the NBN website.



The highest concentrations of the Desmoulin's Whorl can be found in the river catchments of the Thames Basin, the Hampshire Basin and the Norfolk Broads.

It can usually be found around the edges of streams, rivers, marshes and ponds.

14.3 The Law

This species of snail is rare and endangered in the UK yet we hold the largest number in the European Union. It is therefore protected by European Law. It is an offence to intentionally kill, injure or have a detrimental effect on their habitat.

14.4 Requirements / Mitigation

In a high profile and expensive court case in the 1990's the development of the Newbury bypass was delayed while a colony of these snails was relocated. If the desk study suggests these snails will be affected during the development - contact your environmental adviser/a licensed ecologist for a survey and mitigation if necessary.

Roman Snail

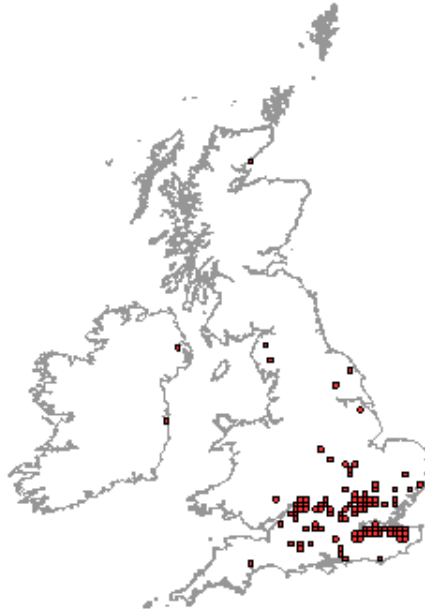
14.6 Identification

This is the UK's largest snail with a height of 30-50mm. The shell has five or six rounded whorls and distinctive lateral growth stripes.



14.7 Habitat

This species favours open hedgerows, bushes and edges of forest on ground rich in lime.



These snails are distributed chiefly in a broad band across England running from the Cotswolds to the Chilterns and is also scattered along the North Downs of Surrey and Kent with further isolated colonies in central and southern England. For area specific data check the NBN website.

14.8 The Law

Roman Snails are now protected against killing, injuring taking possession or control and sale, possession or transport for the purpose of sale, and advertising the buying or selling of such animals.

14.9 Requirements / Mitigation

If these snails are found on site either during planning or operation stages, contact an ecologist. It is likely that relocation will be the most effective form of mitigation.

15.0 SNAKES

Adders

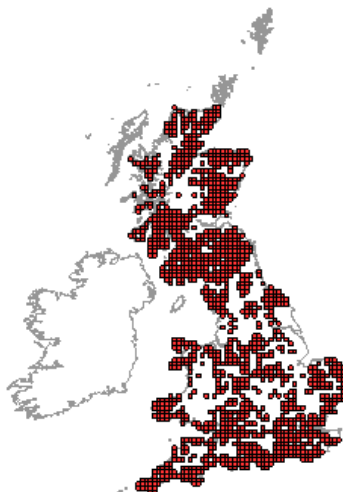
15.1 Identification

Adders grow to around 90cm in length but are usually smaller. The female are brown, the males black/grey both have a distinctive black zigzag/diamond pattern on their back and have a heavy bodied, squat appearance. They are venomous but a bite is very unlikely to be fatal. There have only been 10 fatalities in the past 100 years. Adders are very shy. Most reported adder bites have been as a result of humans trying to catch the snake and handle it.



15.2 Habitat

Adders are found across the UK in almost every county but like all snakes, they are absent from N.Ireland and Ireland.



Adders favour moors and open grasslands but are often found in or near woodland. They are likely to be out of hibernation between spring and October.

15.3 The Law

Adders are a protected species, it is a criminal offence to intentionally harm or kill an adder. It is also illegal to keep adders without a licence.

15.4 Requirements / Mitigation

Mitigation would usually mean trapping and relocating the snakes in question. If an adder is found on site STOP work immediately and contact a licensed ecologist.

Grass Snakes

15.5 Identification

Grass snakes are the UK's largest snake reaching lengths of nearly two metres. They vary in colour from olive green to grey/brown with black bars along their sides. They have a characteristic orange collar around their necks and their undersides are lighter in colour.

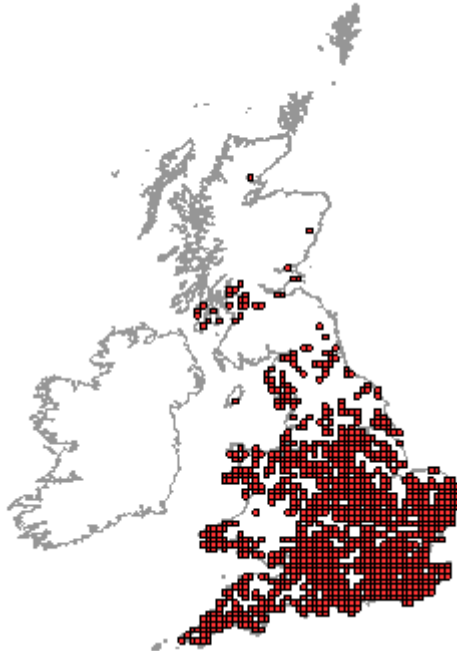


A defence mechanism of the grass snake is to “play dead”, shown in the picture below.



15.6 Habitat

Grass snakes are found mainly in lowland areas of southern England and are absent from N.Ireland and Ireland. For area specific data, check NBN website.



Commonly found in areas with water sources (streams, rivers, ditches, ponds) including grassland, woodland, gardens, hedges, or parks. Usually active from spring until October when they hibernate through the winter.

15.7 The Law

Grass snakes are protected by law in the UK under the Wildlife and Countryside Act of 1981. Intentional injury or killing of these snakes is illegal.

15.8 Requirements / Mitigation

As with the other reptiles in this section a desk study should show any records of snakes in the area for proposed development. If there are records, a qualified ecologist should be employed to carry out a site survey and any further action.

If a snake is found on site, work should STOP immediately until a licensed ecologist has relocated the snake(s).

16.0 REPTILES

16.1 Habitat

There are many locations where reptiles can be found including grassland, field/woodland edges. Heath land, sand dunes, scrub, hedgerow banks and man- made features e.g. rubble, wood piles, paving slabs and derelict buildings.

16.2 The Law

Under the wildlife and countryside Act 1981 reasonable precautions must be taken to avoid incidental mortality.

16.3 Requirements / Mitigation

- Avoid works to reptile areas from mid October to mid-April.
- If working at other times a capture operation maybe necessary first- these are best done in April and May or August and September.
- Generally an ecologist must supervise works within a reptile area, until the reptiles are cleared from the area.
- Plastic fencing/ artificial refuges may be required for capture.
- Site clearance of an area maybe slowed to accommodate a search by an ecologist during clearance

Large-scale mitigation for reptiles is uncommon but if stated in the contract, for example, there maybe a requirement to create permanent refuge areas and relocate any reptiles found to these.

See sections 7, 9, 11, 13, and 15 for specific reptile information.

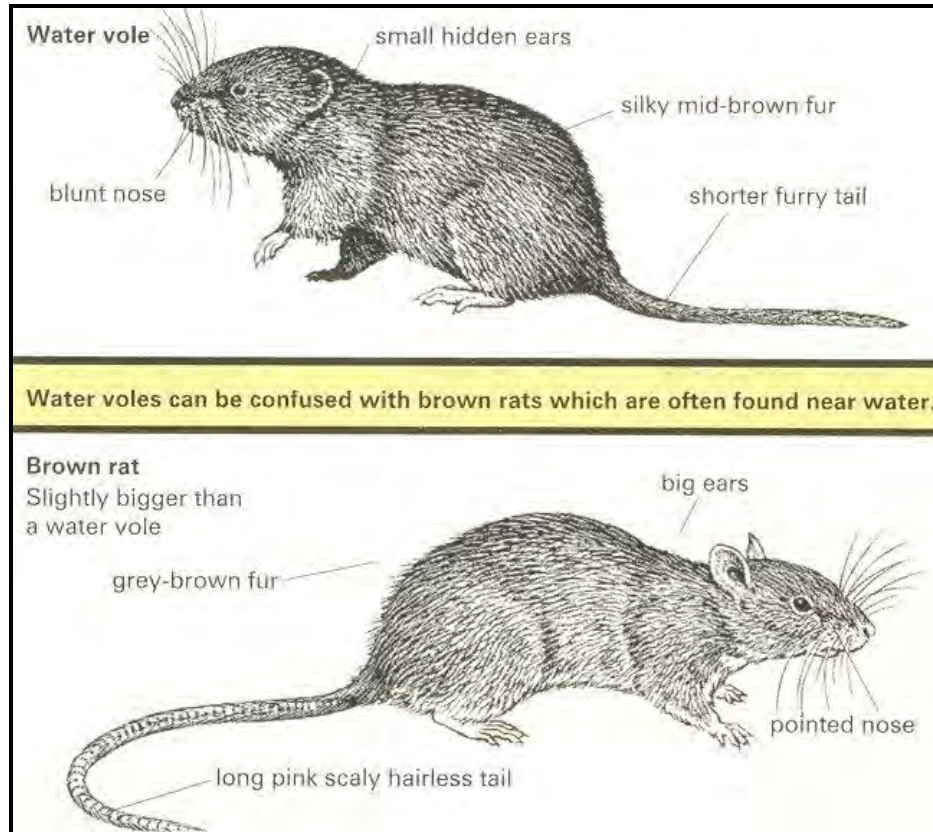
17.0 WATER VOLES

17.1 Identification

The body of a water vole is quite round and usually 14-22cm in length. Their fur is chestnut brown and the tail is 9-14cm long and covered in fur. They have a short, blunt face and ears that are short, rounded and almost hidden in their fur.

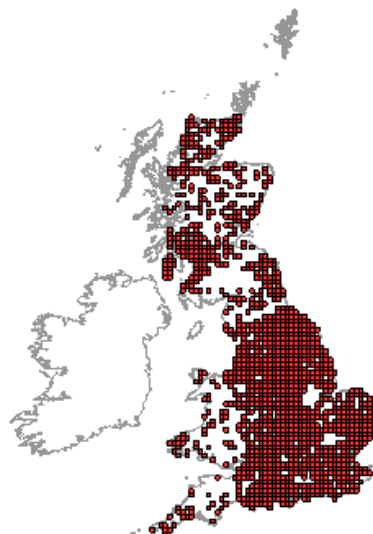


Water voles are sometimes confused with brown rats, below are some differences between the two.



17.2 Habitat

Water vole populations are widespread across the UK but is absent from N.Ireland and Ireland. For area specific data, check the NBN website.



Water voles can be found generally on steep (70°-90°) overgrown banks of streams, rivers, canals, ditches, ponds, and marshes.

17.3 The Law

Water voles are fully protected under the Wildlife and Countryside Act 1981. It is illegal to intentionally injure or kill a water vole or to destroy its habitat.

17.4 Requirements / Mitigation

- Avoid damaging habitat mid October to mid March. April to September is the best time to work in water voles areas.
- An ecologist should supervise works affecting water vole habitat

Mitigation works **MUST BE** done under the guidance of a licensed ecologist. Ideally these measures include:

- Capture and movement of individuals to a safe location up or down stream of the affected area. These works **MUST BE** completed by an ecologist.
- Strimming of the affected banks to discourage/displace water voles from the works area.

18.0 WHITE-CLAWED CRAYFISH

18.1 Identification

The body of a white-clawed crayfish can grow up to 12cm in length. They can be identified by their light coloured underside and a brown body with pitted surface.

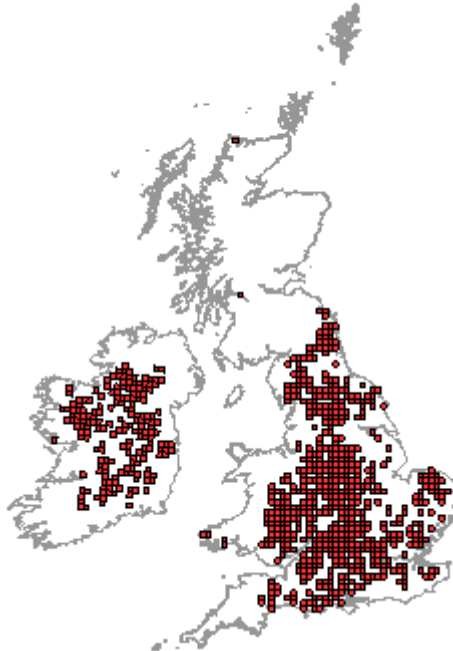


Signal crayfish (classified as a pest in the UK) can easily be mistaken for a white-clawed crayfish. Signal crayfish have a white mark on the hinge/thumb of their claws and are not native to the UK. They are slightly larger than white-clawed crayfish and endanger them through size and the carriage of a crayfish plague.

If any type of crayfish is discovered consult with an environmental adviser/ecologist or the local environment agency office to identify the species first. If signal crayfish are discovered the Environment Agency may ask to destroy them.

18.2 Habitat

They can be found across the UK but are very rare in Scotland. For area specific data check the NBN website.



White-clawed crayfish (protected crayfish) can be found in streams, rivers, canals, lakes, reservoirs and gravel pits and are native to the UK. They prefer clean water, which has high oxygen content and little sediment. They generally live in/under rocks and tree roots.

18.3 The Law

It is illegal to injure, kill, catch, or handle white-clawed crayfish without a license under the Wildlife and Countryside Act 1981 and European directive.

18.4 Requirements/Mitigation

- White-clawed crayfish should not be disturbed between November and June when activity is reduced and females are carrying eggs.
- Works in affected watercourses should be completed under guidance and supervision of a licensed ecologist.
- If the relocation of crayfish is required the works **MUST BE** completed by an ecologist under prior approval by the Environment Agency.

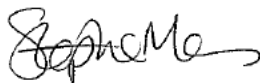
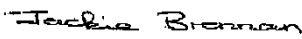
On identification of white-clawed crayfish, the Environment Agency will give guidance on required mitigation. This could include, for example, the relocation of the crayfish up/downstream and/or the use of larger stones/rocks in the bed of the watercourse.

Appendix 4O:

MOH0004-INS-00014 – Working near Watercourses

GROUP ENVIRONMENTAL CONTROL

Working near Watercourses

 Stephen Marr Group Environmental Manager			 Jackie Brennan Group HSQE Manager
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

02	31 Jan 11	Up-dated and revised to incorporate the new Maxcel cost code contract number
01	06 Mar 06	Minor changes
00	02 Apr 03	Issued for implementation.
REV	DATE	STATUS DESCRIPTION

DOCUMENT NO.	MOH0004-INS-00014
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Note – These controls must be followed and the arrangements for how they will be implemented on a contract/yard explained in the Contract Environmental Plan/ Local Yard Environmental Procedure and/ or Methods Statements.

1.0 BACKGROUND

Great care must be taken when working near or in watercourses. Under legislation such as the Salmon and Freshwater Fisheries Act 1975, the Highways Act 1980, the Environmental Protection Act 1990, the Water Resources Act 1991, the Land Drainage Act 1991 and various By-laws it is illegal to disturb spawning grounds or to pollute surface waters with 'polluting matters', which includes silt or compromise flood defences.

All temporary or permanent works on, over under and within between 2-15 metres of a watercourse (each area has different by-laws, e.g. Kent is 8m, South Wales is 15m) requires Consent.

Currently there are several different authorities responsible for granting consents. The Environment Agency is responsible for consents for works affecting sea & tidal defences and works on main watercourses; the Internal Drainage Boards (IDB) for ordinary watercourses (anything that is not a main river) and Local Authorities for ordinary watercourses not in an IDB District (local urban requirements).

Note: In certain areas the Environment Agency are in the process of taking over the management of ordinary watercourses. Therefore, it is recommended that the Environment Agency are contacted first to confirm who is responsible for the watercourse.

2.0 FLOOD DEFENCE CONSENTS

2.1 Works in/ near Main Rivers

All works (temporary or permanent) in, over or adjacent to (generally 8 metres but may vary with by-laws) a main river requires consent. A main river is defined as a watercourse shown on the DEFRA main river maps held by the Environment Agency. Consent takes up to 2 months to obtain.

If consent is required, consult with the Local Environmental Agency prior to making the application to ensure that all aspects of the works, checks etc, are included. For example there may be otters in the area, which require special measures in a permanent culvert. The Environment Agency has the right to refuse the consent, which means re-application and a further 2 months time delay. It is therefore best to consult with them before the application is sent.

2.1.1 Activities that will require Consent

- a) Permanent structures within 8 metres of the watercourse e.g sewer pipe, tunnel or headwall
- b) Permanent diversion of a watercourse
- c) Permanent culverting of a watercourse
- d) Permanent structure in a watercourse, such as a ford for access
- e) Permanent pipe, such as a gas pipe or tunnel under the watercourse
- f) Temporary diversion of a watercourse, to allow permanent construction of a culvert for example
- g) Temporary crossing of a watercourse
- h) Temporary over-pumping/obstruction of a watercourse

There may be a requirement to get a number of consents to construct one culvert for example, i.e consent for permanent structure, consent for permanent diversion for culvert and consent for temporary crossing to allow access for construction.

Permission should be obtained from British Waterways for any works in or near canals. British Waterways can also obtain the necessary Environment Agency consents for the works.

2.1.2 Making an application

When making an application the Environment Agency will require:

- a) Completed Application form (request from Local Environment Agency)
- b) Marked up plan of the area including grid reference
- c) Method statements highlighting process and controls
- d) Drawings relating to permanent and temporary works (3 copies of each of the drawings are required)
- e) In some cases they will require contact details in case of emergency e.g *Contract Emergency Contact List (MOH0001-FOR-00042)*
- f) Cheque for application fee

2.1.3 Consents Conditions

On obtaining a consent from the Environment Agency there will be a number of conditions attached. These may include:

- a) 7 or 14 days notice to the Environment Agency prior to the commencement of works.
- b) Completion of works notification to the Environment Agency
- c) Requirements to consult with the Environment Agency on certain aspects of the works
- d) If fish are present in the watercourse they may wish you to de-fish the area you are working in (the EA will sometimes do this free of charge)
- e) No materials should be stored within the flood plain

It is important to read and understand these conditions, include them in Environmental Management Plan and / or method statements and communicate them to the relevant site employees.

2.2 Work on Ordinary Watercourses

Any works which may cause an obstruction on an Ordinary Watercourse such as culvert, weir, dam or anything which may affect flow in the watercourse is defined as any watercourse which is not a main river. The consent is granted by the Environment Agency, or, in an internal drainage district, by the internal Drainage Board. Similar considerations apply in terms of making the application and complying with conditions as above.

2.3 Other Requirements

The Environment Agency also request 7 days advance notification of works near foul sewers or underground chemical or oil filled pipelines (which can include oil cooled cables).

Works on the seashore or involving sea defence walls need consent from the DTI. Consult your Environmental Adviser for further details.

3.0 WORKING NEAR WATERCOURSES

General controls include:

- a) Fence off and/or clearly marked watercourses ponds etc.
- b) Prevent surface run off from entering watercourses, particularly from exposed soil and stock piles e.g construct temporary bunds, straw filled ditches or silt fences adjacent to banks.
- c) Store all materials, plant and equipment over 10m away from watercourses and drains that lead to controlled waters.
- d) Prevent vehicles and plant from working in watercourses.
- e) Where these controls are not possible e.g when overpumping, an approved site-specific method of working must be in place. This requires a justification as to why there is no alternative location, an assessment of the environmental risks and a statement of the additional measures that will be implemented to control the risks, and an assessment of residual risk.
- f) Ensure plant is in good condition and does not pose a potential pollution risk.
- g) Use plant with integral bunds/drip trays.
- h) Refuel at least 10 metres away from watercourses. If this is not possible a concession can be obtained from the Environmental Adviser.
- i) If embankments are stripped of vegetation, stabilise them to prevent erosion e.g geotextile and/ or seed with grasses or fix seeded matting to the bank.
- j) Place oil absorbent booms downstream of the works where this has been identified as a necessary risk control measure.
- k) Provide temporary haul road bridges with kerbs and dust fences (a temporary crossing of a watercourse requires consent).
- l) Never pump water directly into a watercourse unless the Environment Agency have given permission/consent and all consent conditions are complied with (e.g that the water is clear, flow rate limits etc).
- m) Strictly control use of chemicals, spraying, shot blasting to prevent runoff, dust or spray entering the watercourse – for full details on maintenance of structures over water refer to the Environment Agency Pollution Prevention Guideline PPG 23 'Maintenance of Structures over Water'.
- n) Use a cofferdam for works in river channels (this works will require consent).
- o) The Project Manager should nominate a person(s) to check any watercourses or ditches near the works daily or at the frequency identified in the Environmental Management Plan for :
 - i. Change in water colour
 - ii. Change in water transparency
 - iii. Oily sheen on water surface
 - iv. Floating detritus
 - v. Scum and/or foam
 - vi. Dead/ decaying plants, animals, fish
 - vii. Records of the water checks (made on site at the time) are very important project records and should be maintained carefully.
 - viii. The Murphy Water Monitoring Booklet should be used to record checks

4.0 WILDLIFE

Wildlife can be an issue when working by watercourses as these provide a special habitat for a wide variety of plant and animal species. Care should be taken as far as possible during the works to protect the habitat.

In particular a number of protected species such as water voles and otters live on watersides, and great-crested Newts live near ponds. In addition, old masonry structures with cracks and cavities such as bridges are very favourable habitats for bats which are also protected species.

Details of dealing with wildlife are given in the *Group Environmental Control - Wildlife (MOH0004-INS-00012)*.

5.0 INVASIVE PLANTS

Invasive Plants such as Japanese Knotweed and Himalayan Balsam spread very readily along watercourses, as the root pieces or seeds are carried along with the watercourse and colonise downstream.

Extreme care should be taken when dealing with invasive plants in a waterside setting. Further details are given in the *Group Environmental Control - Invasive Plants (MOH0004-INS-00001)*.

6.0 FURTHER INFORMATION

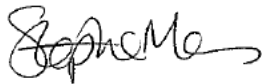
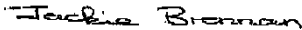
1. CIRCA 'Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors'.
2. EA Website, NetRegs, Pre-planning Water
3. Environment Agency. Application for Consent for Works Affecting Watercourses and/or Flood Defences, Explanatory Notes. Available from the Group Environmental Department.
4. Environment Agency Pollution Prevention Guidelines PPG5 'Works in, near or liable to affect Watercourses'
5. Environment Agency Pollution Prevention Guideline PPG 23 Maintenance of Structures over Water
6. Environment Agency Policy Regarding Culverts Policy Statement and Explanatory Notes. Available from the Group Environmental Department.

Appendix 4P:

MOH0004-INS-00020 – Site Compounds and Permanent Yards

GROUP ENVIRONMENTAL CONTROLS

Site Compounds & Permanent Yards

 Stephen Marr Group Environmental Manager			 Jackie Brennan Group HSQE Manager
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

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Note – These controls must be followed and the arrangements for how they will be implemented on a contract/ yard explained in the Contract Environmental Management Plan/ Local Yard Environmental Procedure and/ or Methods Statements.

1.0 BACKGROUND

Site Compounds and Permanent Yards must be planned, set up and managed correctly to prevent pollution and nuisance, thus avoiding intervention from statutory bodies and legal action.

A **Permanent Yard** is a yard that Murphy operates on a long-term basis, not only for a single, short-term contract. Permanent Yards are Head Office and Regional yards, and yards set up to serve long-term, framework-type contracts.

A **Site Compound** is an area, usually next to the site offices, that is set up for a single, short-term contract.

2.0 GENERAL MANAGEMENT

2.1 Management Procedures

A Permanent Yard is managed as a separate entity with its own documentation, in accordance with the *Group Procedure – Permanent Yard Environment Management (MOH0004-PRO-00013)*.

A Site Compound is managed as part of the contract and included in contract documentation, in accordance with the *Group Procedure – Contract Environmental Management (MOH0004-PRO-00019)*. The Site Compound does not have separate documentation and needs to be fully covered in the contract documents.

2.2 Aspects and Impacts

General guidance on assessing Aspects and Impacts is given in *Group Guidance Note – How to Assess Aspects and Impacts (MOH0004-GDN-00009)*.

It is important to ensure that all activities in the yard have been included, particularly in permanent yards where there can be activities not frequently carried out elsewhere or listed in the template. See later sections of this document for a range of yard activities.

2.3 Legal and other Requirements

In addition to the consent requirements for the site as given in the *Consents Checklist (MOH0004-FOR-00010)*, consideration should be given to other legal requirements.

Where relevant the Planning Permission and any site lease should be reviewed to check for any applicable conditions such as working hours. The project works contract should similarly be checked for applicable environmental requirements.

Any other activities which may need consents should also be considered. This includes (but is not limited to) the following:

- Vehicle refinishing work ('paint shop')
- Crushing (mobile or permanent)
- Cement batching (permanent)

2.4 Responsibilities

Each Permanent Yard must have a Yard Manager, nominated by the Divisional/ Regional Director/ Manager. The Yard Manager for Permanent Yards, or the Project Manager for Site Compounds, is responsible for ensuring that the Group Environmental Management System is properly implemented in the Permanent Yard/Site Compound. If the Yard Manager/ Contract Manager is not personally involved with the day-to-day activities in the yard, they must appoint a Yard Man. They must designate the following responsibilities and ensure that they have been trained by an Environmental Adviser:

- Waste Rep(s)
- Person to do weekly *Site Compound/Permanent Yard Environmental Check (MOH0004-FOR-00008)*
- Person to check drip trays & bunds
- Person to supervise refuelling, especially by tanker

Person to undertake monthly stock reconciliation of underground storage tanks

3.0 SITE COMPOUND / PERMANENT YARD LOCATION CONSIDERATIONS

3.1 Site Sensitivity

The ideal site is located in an area of low environmental sensitivity:

- Away from surface watercourses
- Away from groundwater source protection zones
- Away from residential areas or other sensitive neighbours
- Away from wildlife or ecological areas

If the Site Compound/ Permanent Yard is within Source Protection Zone (SPZ) 1 consult with the local Environment Agency officer to find out what activities are permitted. You may not be able to store fuel or oils. If you are allowed, then storage and checks will have to be rigorous. If the Site Compound/Permanent Yard is within a SPZ 2 storage and checks will also have to be rigorous.

See *Group Environmental Controls – Groundwater Protection (MOH0004-INS-00016)* for further information.

3.2 Site Infrastructure

The ideal site has good infrastructure provision:

- Covered in concrete hardstanding, or at least covered in areas where there is vehicle storage/ movement
- Proper site surface water drainage system (ideally a sustainable drainage system 'SUDS')
- Drainage to foul sewer for vehicle wash
- Interceptor
- Fuel storage and delivery infrastructure
- Buildings or sheds or covered areas for vehicle maintenance.
- Secure perimeter

See *Group Environmental Control – Drainage and Oil Interceptors (MOH0004-INS-00015)* to work out how the drainage for a Site Compound/ Permanent Yard needs to be set up and managed. This gives instruction on:

- General drainage set-up

- Wastewater from toilets, canteens and shower blocks
- Wastewater from vehicle and wheel washes
- Rainwater run-off
- Oil interceptors
- Consents and permissions needed.

4.0 SETTING UP A SITE / YARD

To help make sure that key items have been addressed at the set-up stage you may use (note – these forms are optional):

- For Permanent Yards - the *Environmental Yard Set-Up Checklist (MOH0004-FOR-00022)*
- For Site Compounds - the *Environmental Contract Set-Up Checklist (MOH0004-FOR-00031)*.

Before setting up a Site Compound/ Permanent Yard, a pre-condition survey may be completed. This will help to avoid claims, as well as ensuring that activities have not caused any pollution. A pre-condition survey may include:

- Photos of area and surroundings
- Testing of soil and/or water
- Testing of made ground for contamination
- Plan of area with location of key features.

5.0 OPERATIONAL CONTROLS - GENERAL

The following general principles apply:

- Avoid risks by not undertaking the activity, for example, do not store diesel in a groundwater Source Protection Zone.
- Reduce the risks by undertaking the activity in a different location, for example, do not locate a generator next to a residential area or diesel tanks next to a watercourse.
- Reduce the risks by checking the activity regularly, for example, check plant and equipment parked on the ground for leaks and spills.

In general terms, the longer the Site Compound/ Permanent Yard is going to be there, the stricter the environmental controls need to be. For example, it would be acceptable to put a diesel tank on hardcore for a two month contract but if the tank is to be there for two years it needs to be placed on concrete hardstanding.

6.0 STORAGE OF DIESEL AND OIL

6.1 Tanks

Refer to the *Group Environmental Control – Oil Storage and Control (MOH0004-INS-00030)* on how tanks need to be set up and managed.

Tanks must not be moved when full, unless they are integrally bunded.

Tanks must be located away from sensitive areas and bunded. This is not as basic as it may appear – refer to the *Group Environmental Controls – Oil Storage and Control (MOH0004-INS-00030)* for the full specification.

Tanks should preferably be located on concrete hardstanding such that small spills will not cause any pollution and can be easily cleaned up.

The *Oil & Diesel Tank Checklist (MOH0004-FOR-00032)* may be completed by the Environmental Adviser to ensure that storage complies with the Oil Storage Regulations.

It is advisable to keep bunds covered (e.g. with tarpaulin) to keep rainwater out to minimise the effort and cost of disposing of oily water.

6.2 Underground Storage Tanks

Refer to the *Group Environmental Controls – Underground Storage Tanks (MOH0004-INS-00011)* to work out how Underground Storage Tanks need to be installed, managed and decommissioned.

6.3 Drums

Refer to the *Group Environmental Control – Oil Storage and Control (MOH0004-INS-00031)* to work out how drums need to be stored and managed.

Drums must be in a bund or drip tray of sufficient capacity – you must refer to the *Group Environmental Controls – Oil Storage and Control (MOH0004-INS-00030)* for details. You must comply with the requirements to ensure that oil storage complies with the Oil Storage Regulations.

Drums must be located inside a building or cabin or on drip trays so that small spills will not cause any pollution and can be easily cleaned up.

It is advisable to keep drums covered if they are outside (e.g. with a tarpaulin) to keep rainwater out to minimise the effort and cost of disposing of oily water from the drip tray.

6.4 Small Containers

Only containers purposely designed for diesel, petrol, oil or chemicals must be used e.g. jerry cans. Do not use old plastic water containers to store diesel, oil or chemicals.

Containers must be kept in a drip tray inside a building or cabin or on concrete hardstanding.

6.5 Pipework

Pipework carrying oil or fuel eg from oil tanks into vehicle workshops must be set-up as follows:

- Located in an accessible area above ground rather than underground
- Drip trays under taps
- Securely fixed
- Tested for leaks at least once every 5 years if there are mechanical joints, or at least once every 10 years for other types of pipework
- If installing new underground pipes they must be corrosion resistant, enclosed in a protective sleeve/ duct with open grating covers for inspection. Connections should be minimised and there needs to be an access point for inspection.

6.6 Oily Water Disposal

Oily water from bunds and drip trays must either:

- be tankered off site as waste – the Waste Rep must arrange this through the Regional Waste Manager *or*
- be discharged through the oil interceptor ie. discharged UPSTREAM of the oil interceptor.

A small hand – pump needs to be purchased solely for the use of pumping oily water out of bunds and drip trays. Oily water from drip trays can then easily be pumped into a bund or into a drum or other container before being disposed of as above. See *Group Environmental Controls – Oil Storage and Control (MOH0004-INS-00030)* for further information.

7.0 STORAGE OF OTHER MATERIALS

7.1 Storage of COSHH materials

All storage cabins should be kept clean and tidy, with materials stored securely to prevent leaks and emissions. The cabins should be labelled, and within the cabins items should be segregated and labels used to indicate different areas and different items stored. All COSHH substances must be stored in a proper COSHH store, with a COSHH assessment and COSHH register. Contact the Safety Adviser for further details on COSHH storage.

See *Group Environmental Controls – Materials Storage & Management (MOH0004-INS-00031)* for details.

7.2 Storage of Bulk and Manufactured Materials

Bulk materials should be stored tidily to prevent mixing. Bays should be provided and sited to minimize dust.

Sacks and other materials should be handled carefully and stored tidily to prevent damage and waste

See *Group Environmental Controls – Materials Storage & Management (MOH0004-INS-00031)* for details.

8.0 WASTE

All waste should be segregated where possible into separate skips including wood, metal, plastic, tyres, paper, oily waste, paint waste and general construction waste.

As a minimum the Site Compound/ Permanent Yard should have a mixed waste skip and a Hazardous Waste skip or bin.

All skips and bins should be labelled, and located away from sensitive areas, preferably on hardstanding.

Road sweeper waste must be disposed of as follows:

- Settle out solids and discharge liquid to foul sewer ONLY with permission of the sewerage undertaker. Dispose of solids to a facility with the appropriate licence.
- Dispose of as waste, organised by the Waste Rep via the Regional Waste Manager.

9.0 SENSITIVE AREAS

Any sensitive areas within the Site Compound/ Permanent Yard need to be fenced off to ensure that they do not get damaged during activities within the compound/yard.

Sensitive areas include:

- Trees and shrubs, particularly trees subject to a Tree Preservation Order. All trees need to be fenced using secure fencing if they are in a working area – refer to the *Group Environmental Control – Trees & Hedgerows (MOH0004-INS-00006)* for full details of how to do this.
- Watercourses or ditches (including dry ditches) that run through the compound/ yard or are adjacent to it.
- Wildlife areas in or adjacent to the compound/ yard
- Listed Buildings.

The compound/ yard boundaries need to be clearly defined on the ground to ensure that the works within the compound do not stray outside these boundaries.

10.0 VEHICLE MAINTENANCE

10.1 Site Compounds

Routine vehicle maintenance must be completed at Permanent Yards only unless it is impractical to return to the Permanent Yard.

Ensure spill kit equipment is available at the location where maintenance is taking place.

If maintenance is to be undertaken routinely an area of concrete hardstanding needs to be in place. If there are controlled waters or unmade ground nearby, it needs to be surrounded by a raised kerb or roll-over bund to contain small spills, and preferably covered.

If maintenance is infrequent (e.g. only for breakdowns where it is not practical to return the plant to a main yard) and there is no hardstanding area, sufficient drip trays must be in place to contain any leaks or spills.

10.2 Permanent Yards

All vehicle maintenance must be completed on concrete hardstanding only, within a shed or building. This area should be surrounded by raised kerb or roll-over bund if there is unmade ground or controlled waters nearby.

Spill kit equipment should be available at the location where maintenance is taking place. Consideration should be given to the largest spill that could occur and where it would go. Spill controls then need to be in place to contain such a spill should it occur.

There should be a system for pumping Waste Oil automatically into the waste oil tank to avoid manual handling.

Degreasing solvents should be contained within a purpose-built sink with a bin underneath for the waste solvent. The system should be cleaned and the solvent replaced regularly. Use of open containers of degreasing solvent should be minimised.

Vehicle batteries should be kept inside a building/ cabin in a designated bin.

11.0 PLANT, EQUIPMENT & VEHICLE PARKING

Plant, equipment and vehicles should be stored/ parked away from sensitive areas, such as watercourses. They should also be stored/ parked on concrete hardstanding areas where possible. Regular checks should be made of parked items to make sure that they are not leaking or spilling and these checks must be more frequent if not parked on hardstanding and/ or in high risk areas (e.g. near watercourses).

12.0 VEHICLE WASH

Vehicle wash water must not be discharged to surface water drains.

On permanent sites, water may be discharged to foul sewer, by agreement/ consent of the sewerage undertaker.

On site compounds a discharge may be set up, or a closed system used, and water tankered away for disposal.

Note that use of detergent for vehicle washing will reduce the efficiency of any downstream interceptor.

13.0 VEHICLE REFINISHING - PAINT SHOP

Vehicle refinishing work is regulated by local authorities under the Environmental Permitting Regulations. Depending on the amount of solvent (ie paint) used, an Environmental Permit may be required which will stipulate control requirements in detail.

For any paint work, good environmental practices (which also improve health and safety) include:

- Minimising the amount of paint used including overspray
- Mixing of paints and cleaning of equipment in an enclosed area with solvent adsorption filters
- Ensuring that solvents for cleaning and solvent-contaminated materials eg rags are always stored in closed containers (no open bins or containers)

14.0 MECHANICAL CLEANING – GRIT BLASTING AND SANDING

Grit-blasting and sanding may be carried out as preparation for painting, for smoothing welded areas, or for other surface preparation.

The processes are not specifically environmental regulated, however the legislation concerning Statutory Nuisance applies to dust and noise emissions from these processes.

Good environmental practices include:

- Carrying out dusty work in an enclosed area, inside a building
- Using vacuum systems and local exhaust ventilation to minimise dust
- Damping dust down for handling
- Ensuring dust wastes are kept covered

15.0 JOINERY SHOP

Any sawdust wastes should be handled so as to prevent dust emissions.

Any paints and paint thinners in use should be handled in accordance with the good practice guidance given for the Paint Shop.

16.0 DUST

Good working practices include:

- Keeping hardstanding areas of the yard/ compound clean, with a roadsweeper as necessary.
- Damp down site roads if necessary to control dust in dry weather.
- No burning
- If excessive smoke is being emitted from vehicles, plant or equipment, it must be serviced straight away

See *Group Environmental Control – Air Pollution Prevention (MOH0004-INS-00007)* for further dust controls.

17.0 NOISE

Noise is an area where complaints are sometimes received from neighbours. Good working practices include:

- Keep noise to a minimum, especially in the evenings, night-time and at weekends
- Keep to set working hours
- If work has to be carried out outside the allowed working hours, the Environmental Health Department should be informed.

See *Group Environmental Control – Noise & Vibration (MOH0004-INS-00005)* for further noise controls.

18.0 PLANTS

Invasive plants can damage the yard surface and may spread offsite, with potential legal implications.

- If invasive plants are present follow the *Group Environmental Control – Invasive Plants (MOH0004-INS-00001)*
- If using pesticides or herbicides follow the *Group Environmental Control – Pesticides and Herbicides (MOH0004-INS-00018)*.

19.0 SITE SECURITY

Site security is essential for good environmental management, as a significant number of pollution incidents on construction sites arise from vandalism.

Good environmental practice includes the following:

- Site security lights should be arranged so as not to disturb neighbours as far as possible.
- Site hoarding should be well maintained and free from graffiti

20.0 ON-GOING SITE MANAGEMENT

20.1 Routine Site Compound/ Permanent Yard Checks

Weekly checks of key environmental risks should be undertaken using the *Site Compound/Permanent Yard Environmental Check (MOH0004-FOR-00008)*.

More detailed inspections and checks should be undertaken at least every 4 months, dependent on risks using the *Yard Environmental Inspection Form (MOH0004-FOR-00007)*. For a site compound these will be part of the regular inspection of the whole contract which should be carried out at least every two months using the *Contract Environmental Inspection Form (MOH0004-FOR-00006)*.

20.2 Periodic Review of Controls

At least annually, and following any changes in the yard, the controls should be reviewed by the Environmental Adviser. This covers aspects and impacts assessment, consents checklist and other legal requirements, and operational controls.

Changes which may need to be incorporated could arise from the following:

- New activities and processes in the yard
- New materials stored in the yard
- New buildings or structures in the yard
- New regulations affecting operations in the yard
- Change in sensitivity of site, eg new houses close by.
- New personnel responsible for yard operations
- Results of incidents, complaints, CARs and NCRs

Any unusual or "one-off" activities in the Site Compound/Permanent Yard such as removal of a fixed fuel tank should also be reviewed by the Environmental Adviser responsible for the yard, and any necessary controls incorporated into the Method Statement for the works.

20.3 Emergency Preparedness

Site environmental risks should be assessed and managed in accordance with the *Group Environmental Procedure – Aspects and Impacts (MOH0004-PRO-00003)* and the *Group Environmental Procedure – Emergency Preparedness and Response (MOH0004-PRO-00020)*. Controls identified should be incorporated into the Yard Procedure, Contract Environmental Management Plan or other risk management planning as appropriate.

Site environmental risks may include the following:

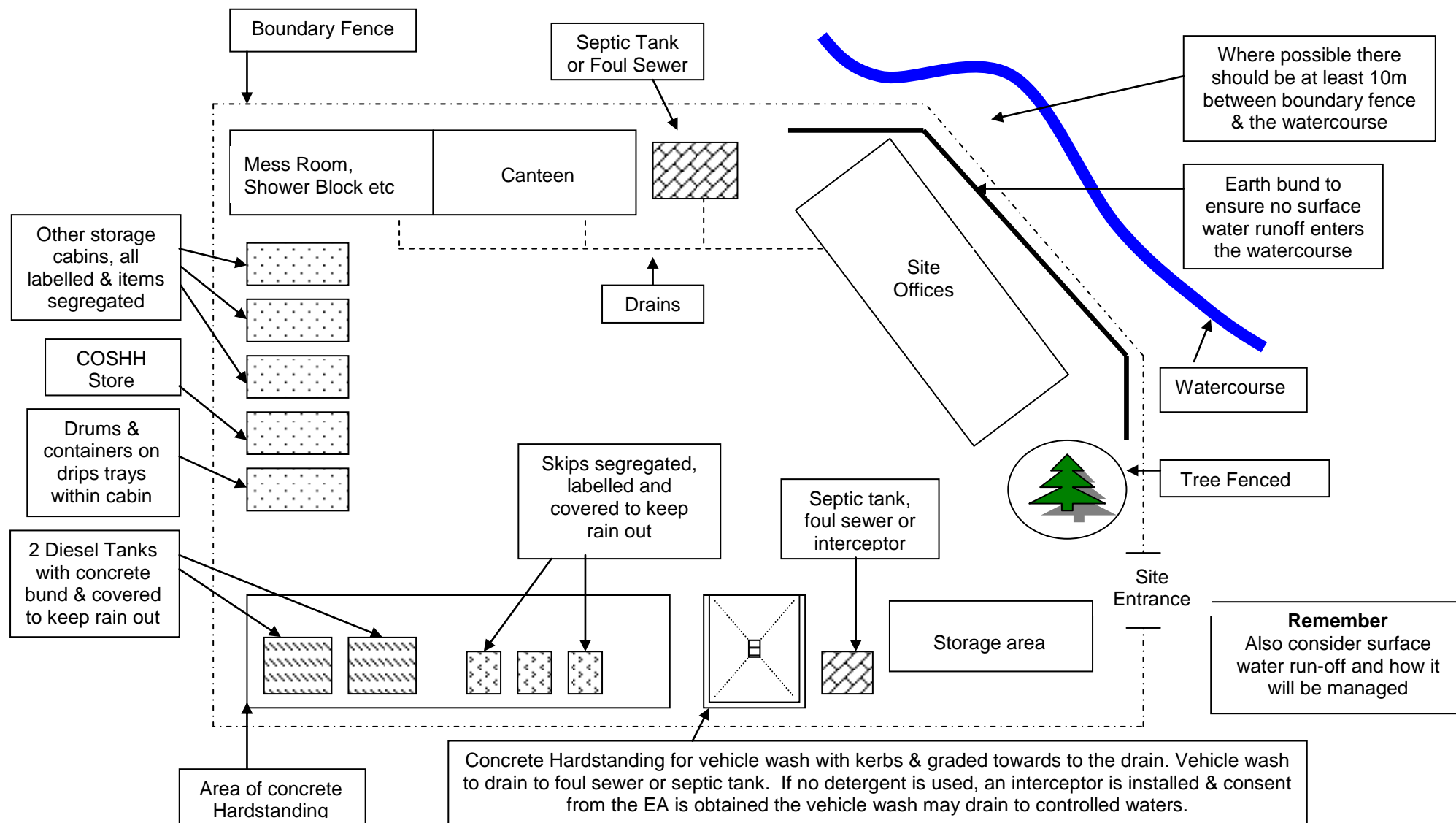
- Spill of fuel from road tanker delivery
- Fire
- Flood

The correct type of spill kit should be kept next to anything that may spill e.g. tanks, drums, containers.

Additional spill kit material should be stored within a cabin and the location of the spill kits marked on the Site/ Drainage Plan or highlighted on the *Emergency Contact List (MOH0001-FOR-00042)*.

20.4 Environmental Incident Management

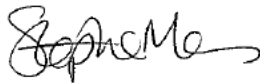
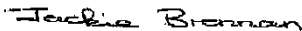
Refer to the *Group Environmental Control – Environmental Incidents & Emergencies (MOH0004-INS-00027)* and *Group Environmental Control – Environmental Non-conformances (MOH0004-INS-00028)* for full details of incident management.



Appendix 4Q:

MOH0004-INS-00021 – Water Supply and Abstraction

GROUP ENVIRONMENTAL CONTROL**Water Supply & Abstraction**

 Stephen Marr Group Environmental Manager			 Jackie Brennan Group HSQE Manager
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

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Note – These controls must be followed and the arrangements for how they will be implemented on a contract/yard explained in the Contract Environmental Management Plan/ Local Yard Environmental Procedure and/ or Methods Statements.

1.0 BACKGROUND

The Environment Agency (SEPA in Scotland) licenses the impoundment and abstraction of water under the Water Resource Act 1991. It is an offence to abstract more than 20m³/day (10m³/ day in Scotland) of water from ground or controlled waters without consent. There are over 2000 groundwater sources used for public drinking water in the UK.

2.0 CONTROLLED WATERS

Abstraction from controlled waters over 20m³/day (10m³/ day in Scotland) is not permitted without prior consent from the Environment Agency/ SEPA. Consult with the Local Environment Agency Office prior to making application. It can take up to 3 months to get an Abstraction Licence.

If consent to abstract is granted and the water is to be returned to the controlled water after use, strict requirements regarding quality of water returned will be included in the consent by the Environment Agency/ SEPA.

3.0 GROUNDWATER

Abstraction of groundwater over 20m³/day (10m³/ day in Scotland) is not permitted without prior consent from the Environment Agency / SEPA. Consent is unlikely to be given to abstract water from within a Source Protection Zone 1 and 2. Consult with the Local Environment Agency Office prior to making application.

De-watering rainwater from temporary excavations is permitted without consent. De-watering of rainwater storage lagoons may be permitted for the purpose of dust suppression – consult with the Environment Agency / SEPA.

4.0 STANDPIPES

A licence is required from the relevant water company to source water from a standpipe.

5.0 PRIVATE WATERS

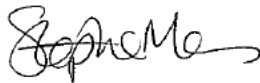
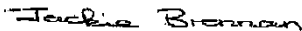
A licence is required to privately own ponds and lakes. Written permission is required from the landowner to abstract water.

If water is being returned to the pond/ lake after use, the quality of the water should be tested prior to abstraction to ensure that same or better quality is returned. This will also reduce the risk of claims at a later date.

Appendix 4R:

MOH0004-INS-00029 – Water Discharge

GROUP ENVIRONMENTAL CONTROL**Water Discharge**

 Stephen Marr Group Environmental Manager			 Jackie Brennan Group HSQE Manager
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

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Note – These controls must be followed and the arrangements for how they will be implemented on a contract/ yard explained in the Contract Environmental Management Plan/ Local Yard Environmental Procedure and/ or Methods Statements.

1.0 BACKGROUND

Great care must be taken when making discharges to watercourses. Under the Water Resources Act 1991 it is an offence to pollute surface waters with any 'polluting matter or solid waste matter' (which includes silt). It is also an offence to make a discharge to controlled waters without discharge consent or in contravention of the conditions of the consent.

This is a sensitive area for contractors and one in which prosecutions regularly appear in the courts. Dewatering operations are a typical source of water requiring discharge on Murphy sites and are covered in detail in the *Group Environmental Control - Dewatering and Pumping (MOH0004-INS-00013)*. Other operations that require discharge consent if they go to a watercourse are site run-off and water transfer between one source of supply and another.

In addition, consent must also be obtained for discharge to foul sewer, under the Water Industry Act 1991. Operations requiring a sewer connection would be site foul water (e.g. from toilets and canteen) and vehicle wash discharge, also any water where a discharge consent to a watercourse has not been granted e.g. because it cannot be cleaned up enough.

2.0 DISCHARGE CONSENT - CONTROLLED WATERS

Discharge consents are required for the discharge of all water (including clean water) to any controlled waters. The Environment Agency grants these consents, except in the case of canals where British Waterways is the authorising body.

Controlled waters include streams, rivers, lakes, canals, ponds, coastal waters and groundwater.

Formal consents can take up to 4 months. Sometimes the Environment Agency will not require a formal consent, but their agreement must be obtained to our method of working. The Environment Agency may require a detailed Method Statement with a marked-up plan highlighting controls and checks to be completed. The issue should be discussed with the local Environment Agency and if informal consent is received ensure that a written record of the agreements is kept in the Third Party Communications Log.

The consent (or agreement) is issued based on a given description of the works and/or Method Statement. The consent is invalid if the method of working is changed and an offence would be committed. If the method of working has to change due to site conditions, the Agency should be consulted to obtain their agreement to the proposed changes.

Also, the consent (or agreement) is usually issued with conditions. These must be fully complied with, as it is also an offence to make a discharge that contravenes the conditions of consent. Details of consent conditions should be included in the Environmental Management Plan and/or any appropriate Method Statements, once the consent has been received from the regulators. Adequate monitoring should be specified to ensure that consent conditions are being met.

Treatment may be required to enable the discharge to meet the consent conditions. If this is the case, consideration should be given as to how to manage the site works if the treatment system should fail. For example, are back-up units readily available, or is there the option to hold the water to delay the discharge until the treatment e.g. settlement has been effective? If the discharge is essential to the site works e.g. dewatering, the reliability of the system is important. Failure of a treatment system is not considered to be a defence in the case of a prosecution of this type.

Note that vehicle wash water where detergent has been used is *not* suitable for discharge to controlled waters, even where an interceptor is in place.

3.0 TRADE EFFLUENT CONSENT - SEWER

Trade Effluent consents are required for discharges to foul sewer. The local sewerage undertaker ('Water Company') grants these consents.

The receiving sewer must usually be identified including address and postcode and a sample of the effluent may be required.

Sometimes the sewerage undertaker will not require a formal consent, but will allow an agreement such as a 'Small Volume Letter'. Full written records should be kept of the agreement.

The consent (or agreement) is usually issued with conditions, although these are often just standard. Nevertheless, the conditions must be complied with, as it is an offence to make a discharge that contravenes them. For example, it would be an offence to dispose of chemicals especially pesticides down the sewer connection.

Note that where there is a vehicle wash discharge using detergent this *must* be discharge to foul sewer, with the appropriate Trade Effluent Consent, or tinkered off site.

4.0 PRIVATE WATERS

With regard to privately-owned ponds and lakes, written permission is required from the landowner to discharge water, in addition to discharge consent from the Environment Agency.

5.0 FURTHER INFORMATION

Further details on the consents needed for working by a watercourse are in *Group Environmental Control - Working Near Watercourses (MOH0004-INS-00014)*.

Further details on the consents needed for taking water out of a watercourse or the ground are in *Group Environmental Control - Water Supply and Abstraction (MOH0004-INS-00021)*,

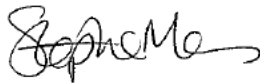
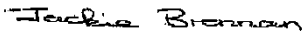
For details specific to pumping and dewatering, see *Group Environmental Control - Pumping and Dewatering (MOH0004-INS-00013)*.

Appendix 4S:

MOH0004-INS-00030 – Oil Storage and Control

GROUP ENVIRONMENTAL CONTROL

Oil Storage & Control

 Stephen Marr Group Environmental Manager			 Jackie Brennan Group HSQE Manager
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

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00	06 Mar 06	Issued for implementation.
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Note – These controls must be followed and the arrangements for how they will be implemented on a contract/yard explained in the Contract Environmental Plan/ Local Yard Environmental Procedure and/ or Methods Statements.

1.0 BACKGROUND

Pollution of a watercourse, groundwater or the sea (controlled waters) by oil is the most common type of water pollution incident dealt with by the environment agencies. Many such incidents are caused by leaks and spills from storage facilities, eg unbunded storage tanks.

The Control of Pollution (Oil Storage) (England) Regulations 2001 and the Water Environment (Oil Storage) (Scotland) Regulations 2006 and the Control of Pollution (Oil Storage) Regulations (Northern Ireland) 2010 set design standards for above ground, external oil stores and require that secondary containment, eg a bund (a surrounding wall) or drip tray, is in place to prevent oil escaping into controlled waters.

In England, the oils covered by these regulations include petrol, diesel, solvents, eg paraffin and kerosene, mineral oil, heating oil, lubricating oil, vegetable and heavy oil eg. bitumen. They do not apply to waste mineral oil which is subject to the Hazardous Waste Regulations 2004. They apply to most industrial, commercial and institutional sites storing oil in containers over 200 litres and to private dwellings with containers storing more than 3,500 litres.

In Scotland, the regulations apply to any kind of oil including petrol, diesel, mineral oil, heating oil, lubricating oil, waste oil, vegetable and plant oil but don't include uncut bitumen. They apply to the storage of any volume of oil, except private dwellings storing oil in a container with a capacity of 2,500 litres of oil or less.

In Northern Ireland, the regulations apply to petrol, diesel, vegetable, synthetic and mineral oils. The regulations apply to most industrial, commercial and institutional sites storing oil in containers over 200 litres, including drums and IBCs.

As yet there are no regulations in place for Wales however similar regulations are expected to be introduced soon. In the meantime Murphy sites in Wales should comply with the Control of Pollution (Oil Storage) (England) Regulations 2001.

Under s.85 of the Water Resources Act 1991 or the Water Environment (Controlled Activities) (Scotland) Regulations 2005, it is an offence to cause or knowingly permit poisonous, noxious or polluting matter to enter controlled water. Pollution of inland surface waters and groundwaters by oil is therefore an offence whether or not Oil Storage Regulations apply.

The Environment Agency is responsible for enforcing the regulations throughout England (and Wales in future). Should oil storage facilities be inadequate, the agency will provide advice and guidance to assist with compliance. However, if this is not followed the agency may serve an Anti Pollution Works Notice requiring inadequate facilities to be brought up to standard. Failure to comply with a notice is a criminal offence and may result in prosecution.

In Scotland and Northern Ireland enforcement will be by Scottish Environment Protection Agency (SEPA) and the Environment Heritage Service respectively.

2.0 DEFINITIONS

Oils used by Murphy include red diesel (gas oil), white diesel, hydraulic oil, engine oil, lubricating oil etc.

Secondary containment is a drip tray, area surrounded by a bund, or any other system for preventing oil which is no longer in its container from escaping.

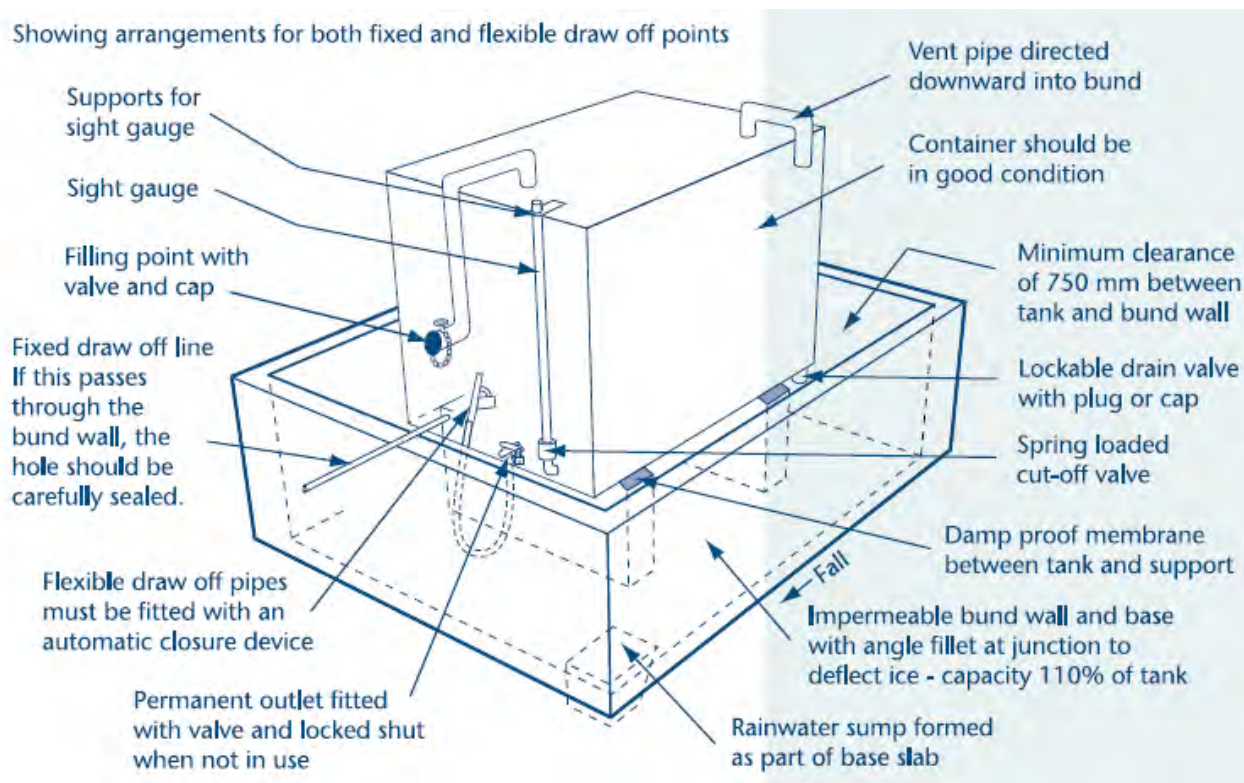
Groundwater Source Protection Zones are designated areas around public drinking water supplies to protect drinking water from pollution.

3.0 OIL STORAGE REQUIREMENTS

3.1 Above Ground Storage Outside - general

- Tanks **must** be positioned so as to minimise the risk of damage by impact.
- Oil storage should be at least 10 metres of a watercourse and at least 50 metres of a well or borehole.
- Oil **must** be stored in a tank of sufficient strength and structural integrity to ensure that it is unlikely to burst or leak in ordinary use.
- All oils (stored outside in containers larger than 200 litres) must have a secondary containment system (eg. bund, drip tray) that would hold:
 - 110% of the containers storage capacity; OR
 - If there is more than one container (eg drums), at least 110% of the largest containers storage capacity or 25% of the total storage capacity, whichever is the greater.
- Double skinned tanks must be banded, unless the outer skin would provide full secondary containment.
- The base and walls of the secondary containment **must** be impermeable to oil and water.
- The base and walls of the secondary containment **must not** be penetrated by any valve, pipe or other opening which is used for draining the system.
- If any pipe or draw off pipe penetrates the base or walls of the secondary containment, the junction of the pipe with the base or walls **must** be adequately sealed to prevent oil escaping.
- Any valve, filter, sight gauge, vent pipe or other equipment ancillary to the container (other than a fill pipe or draw off pipe) **must** be situated within the secondary containment.
- Where a fill pipe is not within the secondary containment system, a drip tray must be used to catch any oil spilled when the container is being filled.
- Containers should be marked with their contents and capacity.
- A sump should be installed in the base of the bund to collect rainwater.
- Reinforced materials should be used for bund wall construction.
- A minimum distance of 750mm should be allowed between the tank and the bund wall and 600mm between the tank and the base to enable inspection.
- The bund should be roofed or covered where possible to prevent / minimise the amount of rainwater that collects in it.
- Pipe work and steel valves should be protected against frost damage.
- When purchasing new tanks make sure they that comply with:
 - BS 5799 Part 5 for steel tanks
 - OFS T100 for polyethylene tanks
- Ensure tanks and bunds are routinely maintained.

Figure 1 Bunded oil tank



3.2 Fixed Tank Storage Outside

Note: A fixed tank is a container connected to fixed pipe work.

- Any sight gauge **must** be properly supported and fitted with a valve which **must** be closed.
- Any fill pipe, draw off pipe or overflow pipe:
 - **must** be positioned, or other steps **must** be taken, to minimise any risk of damage by impact so far as is reasonably practicable,
 - if made of materials which are liable to corrosion, **must** be adequately protected against corrosion,
 - if above ground, **must** be properly supported,
 - if underground:
 - **must** have no mechanical joints, except at a place which is accessible for inspection by removing a hatch or cover,
 - **must** be adequately protected from physical damage,
 - **must** have adequate facilities for detecting any leaks,
 - if fitted with a leakage detection device which is continuously used to monitor for leaks, the detection device **must** be maintained in working order and tested at appropriate intervals to ensure that it works properly,
 - if not fitted with a leakage detection device, **must** be tested for leaks before it is first used and further tests for leaks **must** be performed, for pipes which have mechanical joints, at least every 5 years and in other cases, at least once every 10 years.

- The tank **must** be fitted with an automatic overfill prevention device if the filling operation is controlled from a place where it is not reasonably practical to observe the tank and any vent pipe.
- Any screw fitting or other fixed coupling which is fitted and is in good condition **must** be used when the tank is being filled with oil.
- Where oil from the tank is delivered through a flexible pipe which is permanently attached to the container:
 - the pipe **must** be fitted with a tap or valve at the delivery end which closes automatically when not in use,
 - the tap or valve **must not** be capable of being fixed in the open position unless the pipe is fitted with an automatic shut off device,
 - the pipe **must** be enclosed in a secure cabinet which is locked shut when not in use and is equipped with a drip tray or the pipe **must**:
 - have a lockable valve where it leaves the container which is locked shut when not in use, and
 - be kept within the secondary containment system when not in use.
- Any pump **must** be:
 - fitted with a non-return valve in its feed line,
 - positioned , or other steps **must** be taken, to minimise any risk of damage by impact so far as is reasonably practicable, and
 - protected from unauthorised use.
- Any permanent vent pipe, tap or valve through which oil can be discharged from the tank to the open **must** satisfy the following requirements:
 - it **must** be situated within the secondary containment system,
 - it **must** be arranged to discharge the oil vertically downwards and be contained within the system,
 - in the case of a tap or valve, it **must** be fitted with a lock and locked shut when not in use.

3.3 Mobile Bowsers Outside

- Any tap or valve permanently fixed to the unit through which oil can be discharged to the open **must** be fitted with a lock and locked shut when not in use.
- Where oil is delivered through a flexible pipe which is permanently attached to the unit:
 - the pipe **must** be fitted with a manually operated pump or with a valve at the delivery end which closes automatically when not in use,
 - the pump or valve **must** be provided with a lock and locked shut when not in use,
 - the pipe **must** be fitted with a lockable valve at the end where it leaves the container and **must** be shut when not in use.
- Double-skinned is not adequate unless the outer skin would provide secondary containment.

3.4 Underground Storage Tanks

The Department for Environment, Food and Rural Affairs has published Groundwater Protection Code: Petrol Stations and Other Fuel Dispensing Facilities involving Underground Storage Tanks.

This code is aimed at those people who are involved in the design, construction, operation, management and decommissioning of underground storage tank facilities, both retail and non-retail. It provides guidance on the best practical option for groundwater protection, based on the type of facility, and outlines the risks to groundwater which may occur at various stages of the life cycle of a petrol station.

Guidance on the control measures which should be in place for underground storage tanks is contained within the *Group Environmental Control – Underground Storage Tanks (MOH0004-INS-00011)*.

3.5 Oil Storage Inside

Consider where the oil would escape to if spilt (eg. surface water drains at the buildings entrance) and ensure that it would be properly contained and not cause pollution.

4.0 FUEL DELIVERIES

The Project Manager **must** nominate someone responsible for supervising refuelling of tanks and bowsters.

When tanks and mobile bowsters are being refilled, the person responsible for supervising fuel deliveries **must**:

- check levels in the tank before delivery to prevent overfilling,
- NEVER overfill tanks,
- check all deliveries before discharge too ensure that the correct oil is being delivered,
- ensure that someone is present at all times while refuelling.

5.0 REFUELING VEHICLES

Drivers refuelling vehicles **must**:

- check that the correct type of fuel is being used,
- stay with the vehicle at all times while refuelling,
- not overfill the tank – allow some space ('ullage') for expansion,
- allow the nozzle to drain into the tank before removing it at the end of fuel delivery,
- ensure that the fuel cap is securely replaced,
- report and clean up any spills immediately.

6.0 LIST OF RELEVANT LEGISLATION

- Water Environment (Oil Storage) (Scotland) Regulations 2006
- Water Environment (Controlled Activities) (Scotland) Regulations 2005
- Control of Pollution (Oil Storage) (England) Regulations 2001
- Groundwater Regulations 1998
- Water Environment and Water Services (Scotland) Act 2003
- Water Resources Act 1991

7.0 FURTHER INFORMATION

Department for Environment, Food and Rural Affairs (Defra)

Web: www.defra.gov.uk

Defra is the main government department that deals with waste, water and other environmental issues. It consults on new regulations and provides guidance on legislation and best practice.

The following are available from www.defra.gov.uk.

- Groundwater Protection Code: Petrol Stations and Other Fuel Dispensing Facilities Involving Underground Storage Tanks
- Guidance Note for the Control of Pollution (Oil Storage) (England) Regulations 2001

Environment Agency (EA)

Web: www.environment-agency.gov.uk

The Environment Agency is the main environmental regulator in England and Wales and provides detailed information on legislative requirements, guidance for business and technical guidance on waste treatment and disposal.

The following are available from www.environment-agency.gov.uk.

- Concrete Bunds for Oil Storage Tanks, updated in Environment Agency publication PPG2, dated April 2010
- Masonry Bunds for Oil Storage Tanks, updated in Environment Agency publication PPG2, dated April 2010
- PPG2 Above Ground Oil Storage Tanks
- PPG8 Safe Storage and Disposal of Used Oils
- PPG26 Storage and Handling of Drums and Intermediate Bulk Containers
- PPG27 Installation, Decommissioning and Removal of Underground Storage Tanks

CIRIA

Web: www.ciria.org

CIRIA is the construction industry research and information association. Since 1960, CIRIA has delivered support and guidance to the construction, built environment and infrastructure sectors. See:

- CIRIA 'Environmental Good Practice on Site'
- Construction of Bunds for Oil Storage Tanks, CIRIA Report 163

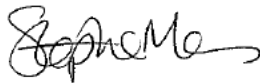
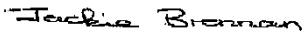
Oil Firing Technical Association for the Petroleum Industry

- OFS T100, standard for polyethylene tanks
- OFS T103, standard for "gauges for use with oil supply tanks"
- OFS E105, standard for "overfill alarms and overfill prevention devices for use with oil supply tanks"

Appendix 4T:

MOH0004-INS-00031 – Material Storage and Management

GROUP ENVIRONMENTAL CONTROL**Material Storage & Management**

 Stephen Marr Group Environmental Manager			 Jackie Brennan Group HSQE Manager
MAIN AUTHOR	CO-AUTHOR	REVIEWER	APPROVER

01	31 Jan 11	Up-dated and revised to incorporate the new Maxcel cost code contract number
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DOCUMENT NO.	MOH0004-INS-00031
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3.0 Bulk Material Storage	3
4.0 Hazardous Material Storage	4
5.0 Waste Storage	4
6.0 Further Information	5

Note – These controls must be followed and the arrangements for how they will be implemented on a contract/ yard explained in the Contract Environmental Plan/ Local Yard Environmental Procedure and/ or Methods Statements.

1.0 INTRODUCTION

The proper management and storage of materials on site and within yards is important to:

- Minimise the risk of causing pollution
- reduce wastage from exposure to elements/ spills/ poor management

This document covers storage of chemicals such as paints, solvents, emulsions, cement, mortars etc, and storage of bulk materials such as sand, aggregate, etc. Storage of fuel and oils is controlled by specific regulations, and is covered in a separate document, *Group Environmental Control - Oil Storage and Control (MOH0004-INS-00031)*.

2.0 SITE SET UP / YARD PLANNING

When planning site/ yard layout, locate area for storage of potentially polluting materials (e.g. solvents, curing and waterproofing agents, antifreeze, grout, cement, bulk material stockpiles):

- Away from sensitive area (e.g. drains, watercourse, edge of excavations)
- Away from heavily trafficked areas – if this is not possible, make sure that the materials are protected from damage by vehicle/plant impact
- Away from waste storage areas and skips
- Secure from potential vandalism as far as possible – many pollution incidents on site are caused by vandals

Designated storage areas should be provided and the Project Manager should nominate someone responsible for control of materials storage. The area should be kept tidy and well stacked to avoid damage of materials and wastage.

The materials should be properly packaged and stored to enable handling without damage to the containers which could cause leakage etc.

Materials should be protected from the elements to prevent spoiling from wind, rain, heat and cold.

3.0 BULK MATERIAL STORAGE

Bulk materials such as sand, stone and tarmac should be stored:

- in a location where rainwater run-off will not enter drains or a watercourse
- in a location clear of the floodplain of any watercourse
- in a sheltered location if possible, to prevent windblown dust
- in an allocated lay down area, preferably on hardstanding with walled bays to prevent material contamination, minimise dust and wastage.
- where walled bays are not available, materials should be stored in neatly stockpiled areas

Bagged materials, such as cement, which could be spoiled due to exposure to the elements should be stored inside wherever possible, on pallets and in its original packaging. If they have to be stored outside temporarily they should be stored off the ground on pallets, away from sensitive or heavily trafficked areas and covered with tarpaulin to protect them from the weather.

Contaminated land should be isolated, stockpiled separately, contained and covered to prevent wind or water spreading contaminants to the wider environment.

4.0 HAZARDOUS MATERIAL STORAGE

Make sure:

- All containers are fit for purpose, clearly labelled with contents, are intact and have no leakage
- Chemicals, bitumen, paints, solvents, greases, mould/ shutter release oils etc are stored in drip trays
- Hazardous liquids are stored in a designated COSHH store with controlled access
- Batteries/ fluorescent light tubes are stored in a designated covered storage area
- Hazardous materials are stored away from drains and watercourses
- Empty drums and containers are kept in a designated area and are disposed of as hazardous waste if the residue makes this necessary. (Check with the Environmental Adviser)
- Materials are stored in accordance with manufacturers' instructions eg:
 - Some materials e.g. volatile substances may require special storage on account of Health and Safety considerations. Consult the Safety Advisor for advice.
 - Some materials e.g. bitumen emulsion may have temperature or other quality control requirements for storage. Protect vulnerable materials from frost and humidity.

5.0 WASTE STORAGE

Waste should be managed in accordance with the *Group Environmental Control – Waste (MOH0004-INS-00010)*.

Wastes should be segregated as far as practicable but as a minimum inert, non-hazardous, difficult and hazardous waste streams should not be mixed. It is illegal to mix different types of hazardous waste and to mix hazardous wastes with inert and non-hazardous wastes.

Waste storage areas should be hardstanding, where possible, be located away from sensitive boundaries and watercourses and screened from external receptors. Hazardous waste containers must be located on an impermeable surface within a drip tray/ bund.

Waste containers/ skips should be in good condition and if possible covered. It is good practice to use covered / lockable skips as these minimise potential for windblown litter, unauthorised access (vandalism etc) and for the waste to get wet increasing disposal costs. By law, hazardous waste must be stored in covered containers.

Waste skips/ Containers should be clearly labelled showing the waste type/ EWC code of the waste to be placed in them.

Empty drums and containers should be kept in a designated area prior to disposal. The Empty Drum Storage Area should where possible, be located away from sensitive boundaries and watercourses and screened from external receptors.

6.0 FURTHER INFORMATION

Environment Agency (EA)

Web: www.environment-agency.gov.uk

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See CIRIA 'Environmental Good Practice on Site'