Stornoway Deep Water Port

Construction Environmental Management Document

Document History		
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1A	20/04/21	Outline Document Issued to Tenderers for Comment
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Contents

Construction Environmental Management Document	
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Contents

1 Introduction

This Construction Environmental Management Document (CEMD) has been developed to ensure that during the construction of the Stornoway Deep Water Port, appropriate mitigation is implemented to minimise environmental impacts and that this aligns with the Environmental Impact Assessment Report (Affric Limited, 2020), Marine Licences, Harbour Revision Order (HRO) and relevant Planning Consents. It sets out the various mitigation, guidance and policy requirements of the project, both from the Schedule of Mitigation and with reference to and incorporation of the Principal Contractor's environmental management systems.

Specific mitigation protocols designed for the Stornoway Deep Water Port includes:

- The Dust Management Plan (DMP);
- The Protocol for Archaeological Discoveries (PAD);
- Pollution Prevention Plan;
- Species Protection Plans (SPP);
- Noise Complaints Protocol;
- Site Waste Management Plan (SWMP);
- Peat Management Plan (PMP); and a
- Construction Traffic Management Plan (CTMP).

1.1 Implementation

The implementation of the CEMD will be through risk assessment method statements (RAMS), the construction contractor's environmental management system, and the direct application of Construction Environmental Management Plans (CEMPs) identified within this document.

1.2 Updates

The CEMD is a live document and will be regularly updated as discussed in Section 4: Document Control Process. There will be a review prior to the start of each new phase of construction to ensure the document remains fit for purpose.

1.3 References

Affric Limited, 2020, Stornoway Deep Water Port Environmental Impact Assessment Report.

Construction Environmental Management Document	
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2 Background

2.1 Consents and Licensing

The Stornoway Deep Water Port is subject to two marine licences under the Marine (Scotland) Act 2010. These are:

- A dredge and sea disposal licence – to allow dredging at the Stornoway Deep Water Port site and disposal of a proportion of the dredged spoil at the Stornoway disposal site, reference HE035 (MS-00008748); and
- A construction licence – to facilitate construction works carried out below the Mean High-Water Spring (MS-00008749).

Works above the Mean Low Water Spring (MLWS) are consented via existing powers under a Harbour Revision Orders 2020 and 2021 (reclamation, link road and works on the reclaimed platform) and Planning Consent (access road, Application Reference No: 21/00108). Re-use of excavated peat to areas to the west of the Arnish Estate Industrial Road constitute Permitted Development but must be undertaken in accordance with the Peat Management Plan agreed by SEPA. The Peat Management Plan and is included in Section 11 of this document.

Appropriates licences under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 as amended, for engineering works (CAR/S/SEPA2021 – 957) and surface water management (CAR/S/SEPA2021 – 883) have been awarded.

The contractor will have a European Protected Species (EPS) licence for disturbance to cetaceans prior to piling works being undertaken. Additional licences may be required depending on the findings of pre-construction surveys.

2.2 Basis

The main aspects of the CEMD have been extracted from the Stornoway Deep Water Port Environmental Impact Assessment Report (EIAR) (Affric Limited, 2020) produced to support the marine licence applications, HRO 2021 and the planning application. Further detail, including the basis and reasoning behind the mitigation outlined in this document, is provided in the EIAR.

Mitigation to avoid and minimise potential environmental impacts associated with the Stornoway Deep Water Port aligns to current industry best practice and the following guidance documents:

1. Construction Environmental Management Process for Large Scale Projects (The Highland Council, 2010);
2. GPP 1: A General Guide to Preventing Pollution (NIEA, SEPA, & Natural Resources Wales, 2020);
3. GPP 5: Works and Maintenance in or Near Water (NIEA, SEPA, & Natural Resources Wales, 2018a);
4. PPG 6: Working at Construction and Demolition Sites (Environmental Agency, NIEA, & SEPA, 2012);

5. PPG 7: Safe Storage – The Safe Operation of Refuelling Facilities (NIEA, SEPA, & Environment Agency, 2011);
6. PGG 18: Managing Fire Water and Major Spillages (SEPA, Environment Agency, & Environment and Heritage Service, 2000);
7. GPP 21: Pollution Incident Response Plans (NIEA, SEPA, & Natural Resources Wales, 2017);
8. GPP 22: Dealing with Spills (NIEA, SEPA, & Natural Resources Wales, 2018b);
9. GPP 26: Safe Storage – Drums and Intermediate Bulk Containers (NIEA, SEPA, & Natural Resources Wales, 2019);
10. Alien invasive Species and the Oil and Gas Industry Guidance for Prevention and Management (IPIECA & OGP, 2010);
11. Joint Nature Conservation Committee (JNCC), Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (Joint Nature Conservation Committee, 2010);
12. BS EN 5228- 1:3009 + A1 2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites (British Standards Institute, 2014);
13. Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014);
14. Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites (IAQM, 2012);
15. CIRIA: Coastal and Marine Environmental Site Guide (CIRIA, 2015);
16. Guidance Note: Controlling Light Pollution and Reducing Lightning Energy Consumption (Scottish Executive, 2007); and
17. Planning for Transport: Planning Advice Note – PAN 75 (Scottish Executive, 2005).

2.3 References

Affric Limited. (2020). Stornoway Deep Water Port Environmental Impact Assessment Report

British Standards Institute. (2014). *BS EN 5228-1:2009 +A1 2014: Code of practice for noise and vibration control on construction and open sites*. London, UK: British Standards Institute.

CIRIA. (2015). Coastal and marine environmental site guide In (pp. 180): CIRIA.

Environmental Agency, NIEA, & SEPA. (2012). *PPG 6: Work at Construction and Demolition Sites*. Retrieved from http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/.

IAQM. (2012). *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites*. Retrieved from London, UK:

IAQM. (2014). *Guidance on the Assessment of Dust from Demolition and Construction* Retrieved from iaqm.co.uk/wp-content/uploads/guidance/iaqm_guidance_report_draft1.4.pdf

IPIECA, & OGP. (2010). *Alien invasive species and the oil and gas industry: Guidance for prevention and management*. Retrieved from London, UK:

Joint Nature Conservation Committee. (2010). *Statutory Nature Conservation Agency Protocol for Minimising the Risk of Injury to Marine Mammals from Piling Noise*. Retrieved from http://jncc.defra.gov.uk/pdf/JNCC_Guidelines_Piling%20protocol_August%202010.pdf

NIEA, SEPA, & Environment Agency. (2011). The safe operation of refuelling facilities: PPG7. In (pp. 1-30): NIEA, SEPA and Environment Agency. Retrieved from

http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/.

NIEA, SEPA, & Natural Resources Wales, (2017). *GPP 21: Pollution Incident Response Plans*.

NIEA, SEPA, & Natural Resources Wales, (2018a). *GPP5: Works and Maintenance in or Near Water*.

NIEA, SEPA, & Natural Resources Wales. (2018b). *GPP 22: Dealing with spills*.

NIEA, SEPA, & Natural Resources Wales, (2019). *GPP 26: Drums and intermediate bulk containers*.

NIEA, SEPA, & Natural Resources Wales, (2020). *GPP 1: A General Guide to Preventing Pollution*.

Scottish Executive. (2005). Planning for Transport - Planning Advice Note - PAN 75. In (pp. 42): Scottish Executive.

Scottish Executive. (2007). Controlling light pollution and reducing lighting energy consumption. In (pp. 38): Scottish Executive.

SEPA, Environment Agency, & Environment and Heritage Service. (2000). PGG 18: Managing fire water and major spillages. In (pp. 6).

The Highland Council. (2010). Construction Environmental Management Process for Large Scale Projects.

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Contents

3 Roles and Responsibilities

3.1 Environmental Management Structure

It is important to define roles with regards to environmental management to ensure that it is clear to all involved who is responsible for what, and that all issues are covered. Figure 3.1 provides an overview of the interactions between the various parties involved in the construction of the Stornoway Deep Water Port.

The Environmental Clerk of Works (ECoW) will be employed by the Contractor and will work closely with the Contractor's Site Manager and site team, supervising works, inputting into RAMS and ensuring that all the elements of the CEMD and relevant consent conditions are being appropriately implemented. Stornoway Port Authority will employ an Independent Ecological Clerk of Works (IECoW) who will carry out audits to ensure the works are compliant with the relevant consents and licences. Descriptions of the various roles with regard to environmental management and training requirements are provided below.

Due to the timescale of this project, it is likely that there will be changes of personnel before the completion of the build. As such this chapter will refer to job titles only. A list of personnel and contact details can be found in Appendix 3A which will be updated as necessary throughout the project.

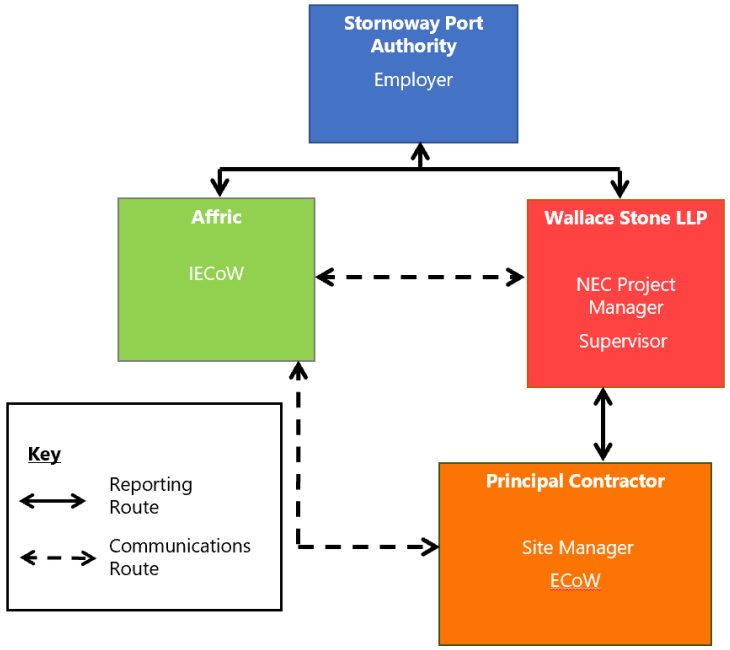

Figure 3.1: Organogram of Main Environmental Roles

3.2 Key Environmental Roles and Responsibilities

3.2.1 Stornoway Port Authority

3.2.1.1 Responsibility

Stornoway Port Authority is the client organisation commissioning the works and is responsible for appointing the Principal Contractor, NEC Project Manager and Supervisor for the construction contract, and the IECoW.

3.2.1.2 Duties

Specific environmental duties:

- To appoint the IECoW and ensure they are suitably empowered and resourced to carry out works required.
- Work with IECoW to ensure the CEMD is kept up to date.
- Have overall responsibility for ensuring that all licences are in place and their requirements are being met.

3.2.1.3 Qualification

Stornoway Port Authority's representatives should have an appropriate understanding of the licences, legal requirements and the CEMD.

3.2.2 Wallace Stone LLP: NEC Project Manager and Supervisor

3.2.2.1 Responsibility

The NEC Project Manager and Supervisor are the main link between Stornoway Port Authority and the IECoW to the Principal Contractor and as such they will be responsible for ensuring that the Principal Contractor implements appropriate mitigation, Risk Assessed Method Statements (RAMS), and other requirements as detailed within the CEMD and as requested by the ECoW and or IECoW.

3.2.2.2 Duties

Specific environmental duties include:

- To work with IECoW to update the CEMD as required.
- Ensure environmental matters are included within all regular progress and contract meetings, with minutes distributed to appropriate parties.
- To ensure environmental instructions are implemented appropriately by the Principal Contractor.
- To support the IECoW/ECoW in any event that works need to be ceased for environmental reasons and work with them to resolve issues promptly to allow works to continue.

3.2.2.3 Qualification

The NEC Project Manager and Supervisor should have an appropriate understanding of the licences, legal requirements, the CEMD, and mitigation measures for proposed construction.

3.2.3 Independent Ecological Clerk of Works (IECoW)

3.2.3.1 Responsibility

The IECoW is responsible for auditing compliance with the relevant consents, licences and relevant legislation. To provide advice in event of an incident or unexpected condition arising. The IECoW will advise Stornoway Port Authority and the NEC Project Manager and Supervisor if there are issues of non-compliance, and if they are of a scale that they would advise that works should be stopped, pending the issue or non-compliance being resolved.

3.2.3.2 Duties

The IECoW duties will include:

- Ensuring Stornoway Port Authority interests are looked after with regard to environmental performance and commitments.
- Ensuring the CEMD is up to date and carrying out updates.
- Ensuring the requirements of the CEMD are implemented appropriately through auditing.
- Reviewing RAMS prior to implementation for compliance with the CEMD
- Stopping work in event of a non-compliance, incident or unexpected condition arising which poses an imminent risk to the environment.

3.2.3.3 Qualification & Experience

The IECoW should be qualified to degree level (or equivalent) in an appropriate environmental science or engineering discipline; and be a member of an appropriate Institute. They should have attended a Joint Nature Conservation Committee (JNCC) Marine Mammal Observers course and PAM training and have appropriate experience in a range of environmental disciplines. The IECoW should have relevant construction site experience and be competent in updating CEMD/CEMPs and associated documentation and reviewing RAMS. They should have a good understanding of relevant environmental and ecological legislation and be experienced in carrying out compliance audits.

3.2.4 SPA Archaeologist

3.2.4.1 Responsibility

- Responsible for producing and facilitating the implementation of the Written Scheme of Investigation (WSI).

3.2.4.2 Duties

- Producing the WSI – now complete.
- Reviewing output of relevant surveys.
- Physical examination of finds from the seabed and producing the Archaeological Evaluation Report.
- Providing advice to the IECoW as required.

3.2.4.3 Qualifications

A member of the Chartered Institute for Archaeologists with relevant fieldwork experience.

3.2.5 Principal Contractor Site Manager

3.2.5.1 Responsibility

To act as the main point of contact on site, on behalf of the Principal Contractor.

3.2.5.2 Duties

Environmental duties will include:

- Ensuring Principal Contractor's staff and resources including sub-contractors and suppliers are briefed in advance of their arrival to site of relevant logistics, biosecurity measures, access protocols, in addition to other general environmental requirements.
- Ensuring RAMS are provided to SPA for review in a timely fashion, prior to the start of the relevant works.
- Liaise with and support ECoW in all environmental matters.
- Ensuring implementation of with agreement from the ECoW:
    - Procedures required to implement the CEMD,
    - Emergency response procedures,
    - Environmental site induction training,
    - Environmental Toolbox Talks, and
    - Environmental incident response drills.
- Ensure subcontractors comply with the requirements of CEMD.
- Make all necessary arrangements for the correct storage and handling of materials.
- Ensure all necessary walkovers, checks, inspections and tests etc. required by the CEMD are carried out, completed and recorded.
- Ensure that construction personnel allocated for tasks are those with suitable skills and experience and recommend operatives for additional training to the Contracts Manager.

3.2.5.3 Qualifications

The Principal Contractors Site Manager should have an appropriate understanding of the CEMD and a basic understanding of how construction activities can affect the environment.

3.2.6 Environmental Clerk of Works (ECoW)

3.2.6.1 Responsibility

The ECoW is responsible for ensuring appropriate steps are taken to minimise environmental impacts and risks and will act as the main point of contact with regard to environmental issues on behalf of the Principal Contractor. The ECoW will advise the Site Manager if there are environmental issues or non-compliance, and if they are of scale that they would advise that works should be stopped, pending the issue or non-compliance being resolved.

3.2.6.2 Duties

The ECoW's duties will include but are not limited to:

- Working closely with the Site Manager and IECoW to:
    - Ensure that the CEMD is kept up to date, advising the IECoW of any required updates.
    - Ensure that the PMP is kept up to date, advising the IECoW of any required updates.
    - Ensure the requirements of the CEMD are implemented appropriately including the peat management plan.
    - Liaise with regulators, stakeholders and other developments in the surrounding area, as appropriate.
- Providing input to RAMS produced by the Principal Contractor to ensure they identify and manage environmental impacts and risks in alignment with the CEMD.
- Ensure that all permits, licences and certificates are in place in advance of any works commencing, with required periodic reviews.
- Ensure that any licensing requirements are appropriately adhered to, implemented and/or closed out.
- Keep up to date with changes in environmental legislation that may affect environmental management during the construction phase.
- Carrying out regular documented inspections/audits of the site to ensure that all work is being carried out in accordance with the CEMD and RAMS.
- To carry regular checks to ensure that no environmental issues are arising, including but not limited to signs of water pollution, fugitive dust, and littering.
- To carry out pre-construction checks for protected species when required, carry out watching briefs and implement species protection plans and ensure the necessary protection of onsite ecology and biodiversity.
- Ensure appropriate inductions, environmental toolbox talks, and drills are being implemented by the Principal Contractor.
- Recognise when a topic specific expert is required and call upon them to provide support, ensure their competence, and manage their activities on site.
- Ensure that appropriate Passive Acoustic Monitoring (PAM) equipment is provided, and MMO/PAM resource is available to meet the Marine Mammal Protection Plan requirements laid out in Section 11 of the CEMD and its associated appendices.
- Be ready to assist in implementing the Principal Contractors emergency response plan.
- Ensure the SPA PM, Consultant Engineer PM/SS and the IECoW are notified of any environmental incidents.
- Where appropriate, notify statutory authorities of any environmental incident in association with the Principal Contractor SM.
- Request support from an archaeologist when required and be the Nominated Contact for any archaeological discoveries made during construction.
- Carry out investigations and produce reports regarding any environmental incidents, ensure appropriate corrective/remedial actions are taken, and Learning from Experience (LFE) information is disseminated.

- In conjunction with the Principal Contractor prepare formal monthly report for progress meetings, recording significant events, issues, audits, and forthcoming workloads.
- To maintain an environmental site diary.

3.2.6.3 Qualification & Experience

The ECoW should be qualified to degree level (or equivalent) in an appropriate environmental science or engineering discipline; and be a member of an appropriate Institute. They should have attended a Joint Nature Conservation Committee (JNCC) Marine Mammal Observers course and PAM training. The ECoW should have an appropriate level of understanding and experience to appropriately implement the CEMD and associated management plans including pollution prevention, peat, waste and the CEMP. They will also have previous experience of inputting into RAMS. The ECoW will have a good understanding of relevant environmental and ecological legislation and ecological knowledge of species potentially present on site and experience in surveying. A basic understanding of archaeology is required in order to know when to request archaeological support. To undertake noise monitoring, a certificate of competence in Environmental Noise Monitoring is required.

3.2.7 Marine Mammal Observer(s) (MMO) and PAM Operator(s)

3.2.7.1 Responsibility

Responsible for conducting visual watches and PAM searches for marine mammals and assist in the implementation of the Marine Mammal & Basking Shark Species Protection Plan (Section 16).

3.2.7.2 Duties

- Conduct pre piling/dredge disposal searches for marine mammals, basking sharks and otters.
- Work with the Principal Contractor, to agree when works can be started in line with the Marine Mammal & Basking Shark Species Protection Plan (Section 16).
- Record and report findings of observations.
- Ensure PAM equipment is installed correctly, calibrated, maintained and operational.
- Review historic data and produce reports as required.
- Ensure all marine mammal reporting is appropriately completed.

3.2.7.3 Qualifications

Attend Joint Nature Conservation Committee (JNCC) Marine Mammal Observers course and be trained and experienced in the use of PAM software and hardware, including the specific equipment selected for use by the Contractor, and have a detailed understanding of marine mammal acoustics and anthropogenic underwater noise. They should have a minimum of 3 years' field experience observing marine mammals, and practical experience of implementing the JNCC guidelines including the completion of the standard forms. Ideally, they should have relevant underpinning ecological qualifications and experience.

3.2.8 Principal Contractor Archaeologist

3.2.8.1 Responsibility

Responsible for developing the methodology for and undertaking watching briefs.

3.2.8.2 Duties

- Carrying out watching briefs.
- Providing advice and support to the ECoW in the event of a discovery.
- Support implementing the Protocol for Archaeological Discoveries (PAD) if required.

3.2.8.3 Qualifications

A member of the Chartered Institute for Archaeologists with relevant fieldwork experience.

3.3 All Workers

3.3.1.1 Responsibility

Everyone on site should be empowered to raise concerns and if appropriate stop works on environmental grounds until the ECoW can review the situation.

3.3.1.2 Duties

All workers are expected to:

- Read, sign and understand the appropriate RAMS, for the work they are undertaking.
- Raise any queries or concerns with methods or mitigation measures prior to commencing tasks.
- Carry out works in line with the RAMS.
- Report all environmental incidents including spills to the site management team.
- Ensure good housekeeping is maintain on site, especially with regard to prevention of littering.

3.3.1.3 Qualifications

All workers must attend site induction, briefings and toolbox talks relevant to the works they are undertaking to ensure understanding of environmental as well as health and safety issues.

3.4 Implementation

In reality there is likely to be more than one person performing the ECoW duties, to ensure appropriate presence on site during environmentally sensitive activities and for holiday cover etc. This will be appropriately managed with a lead ECoW identified with overall responsibility and the use of a handover system, likely to take the format of a short report and/or face to face briefing to ensure that there is awareness of recent activities and any issues arising.

Similarly, with PAM and MMO's, they may be interchangeable if appropriately trained. For other roles any changes will be managed, to ensure consistency.

Appendix 3A – Details of Key Project Personnel

Role	Company	Name	Phone	Email
Client Organisation	Stornoway Port Authority (SPA)			
NEC Project Manager	Wallace & Stone			
NEC Supervisor	Wallace & Stone			
IECoW	Affric			
SPA Archaeologist	Wessex			
Principal Contractor Site Manager	TBC			
Marine Mammal Observer(s) and PAM Operator (s)	TBC			
Principal Contractor Archaeologist	TBC			

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Contents

4 Document Control Process

Each section of the CEMD includes an issue number and the date of update along with the reason for update on the front of the section. The ECoW will have overall responsibility for the document. The ECoW will ensure that the most current version of the document is provided in electronic form to:

- Stornoway Port Authority Developments Manager
- NEC Project Manager
- NEC Supervisor
- IECoW
- Principal Contractor ECOW
- Principal Contractor Site Manager

The CEMD, will be updated during the construction phases to take account of additional detail as it becomes available as well as learning from experience. Specifically, reviews and if required updates will be made at the following points:

- Receipt of Marine Licences;
- Receipt of Planning Consent and discharges of Planning Conditions;
- Appointment of Principal Contractor;
- Receipt of EPS Licences;
- Receipt of authorisations issued by SEPA;
- Following results of protected species pre-construction surveys, and
- As required following lessons learned during the construction works.

Updates to the CEMD proposed by the Principal Contractor will be reviewed by and agreed with the IECoW. If deemed appropriate, they will be incorporated, and updates circulated as discussed above.

Any material changes to the content of the CEMD will be discussed, firstly with the IECoW, and then discussed and agreed with Marine Scotland, the Local Authority and relevant Statutory Consultees prior to implementation on site. For the avoidance of doubt, changes made to the CEMD to align it with licences do not need to be agreed with regulators, if the mitigation is agreed by through the licencing process.

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Contents

5 Auditing

5.1 Introduction

Day to day audits and checks will be carried out by the ECoW to ensure that all tasks are being carried out in line with procedures, the CEMD, Risk Assessed Method Statements (RAMS), and environmental best practice as identified within the Schedule of Mitigation. The audits will also verify if the mitigation is effective in minimising environmental impacts and risks. In addition, the IECoW will carry out audits on behalf of SPA to ensure that works are compliant with the relevant licences and consents.

5.2 IECoW Audits

IECoW audits will be carried out at least monthly, they shall be timed such that site visits are completed within 2 weeks of the start of a significant new phase of work. The purpose of the IECoW audits is to ensure legal compliance and that best practice is being implemented in terms of Environmental Management. They may check that the ECoW audit programme is being effectively implemented, but it will not duplicate the audits being carried out by the ECoW. IECoW audit topics are likely to include:

- Consent compliance – where specific conditions are followed through to ensure that they are being adhered to.
- CEMD implementation – a section of the CEMD may be chosen and compliance with it checked including implementation of underpinning RAMS.
- Site checks – walk overs to identify if the construction site is as would be expected from an environmental perspective with the aim of identifying areas for improvement, and to highlight good practices.

The ECoW is expected to facilitate the IECoW audits by providing access to any relevant documentation and explaining what is happening on the construction site and what is in place in terms of mitigation and management. The IECoW may also discuss the next construction stages to ensure that appropriate plans are in place to implement the mitigation.

5.3 ECoW Audit Programme

The frequency of audits by the ECoW is provided in Table 5.1, the aspects audited align to the aspects identified for each phase of work as discussed in CEMD Section 6. Where two tones are shown in Table 5.1, it indicates that the ECoW audit frequency will be reduced with time as the procedures becomes embedded, the reduction in frequency will be determined by the ECoW based on audit performance results.

ECoW audits associated with pollution and waste regulations will be carried out throughout the construction period irrespective of what tasks are being completed on the site.

Any environmental issues identified during health and safety audits must be reported to the ECoW.

Table 5.1: ECoW Audit Frequency

Aspects	Audit	Tasks									
		Access Road	Piling	Soil Stripping & Rock Excavation	Dredging	Land Reclamation	Link Road	Concrete Works	Fendering Systems, Furnishings & Services	Wreck Removal
Air Quality - Dust	Dust Management Plan									
	Roads Check									
Archaeology	Protocols Implemented									
Benthic Ecology	Protection Plan Implemented									
Marine Mammals & Basking Sharks	Protocols Implemented									
Materials & Waste	Material and Waste Storage									
	Litter Check									
	Waste Transfer									
Navigation	Port Safety Management System									
Noise and Vibration	Monitoring at Receptors									
	Best Practice Techniques Implemented									
	Blasting Plans									
	Working Hours									
Peat	Peat Management Plan									
Terrestrial Ecology	Protection Plan Implemented									
Traffic and Access	Delivery Audit									
Water Quality - Pollution Prevention	Sediment Plume Monitoring									
	Fuel Storage and Refuelling									
	Concrete Washout									
	Material Storage									
	Spill Kits and Emergency Procedures									

Audit Frequency key

- Not required
- Daily
- Weekly
- Monthly
- If utilised

5.4 Implementation

Audit forms including checklists will be utilised for each audit type to ensure that all items are appropriately checked and that audits are recorded in a systematic manner.

Where audits identify areas of improvement, appropriate steps will be taken to implement these. Improvements requiring immediate action will be immediately raised with the Site Manager (SM), to allow for actions to be arranged. If immediate action is not required, then the audit report will be submitted within 24 hours of the audit, to the SM, and actions agreed at the next site management meeting.

Daily checks such as dust and water quality checks when there are no issues arising and do not warrant the completion of daily audit form should be recorded in the ECoW site diary to evidence that checks were completed. Note full audits including the daily check items will be required at the frequency identified in Table 5.1.

In addition to identifying areas for improvement, areas of good practice will be highlighted and fed back to allow appropriate recognition to be given.

Audits should be stored in an accessible, electronic location to allow the IECoW to review as required.

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Contents

6 Construction Environment Management Plans

6.1 Introduction

Stornoway Port Authority take their environmental responsibilities very seriously. The Port Authority has worked closely with Affric Limited through the consenting phase to ensure environmental impacts have been minimised. Affric Limited will be appointed as the Independent Environmental Clerk of Works (IECoW) to support the construction phase. Wallace Stone, the NEC Project Manager and Supervisor, will continue to ensure that all environmental mitigation measures required within the design and construction are incorporated. The Principal Contractor will have an ISO14001 (or equivalent) approved Environmental Management System (EMS) and all works associated with the construction of the Stornoway Deep Water Port will be conducted under the provisions of this system.

Within this Construction Environmental Management Plan (CEMP), each stage of the Deep Water Port construction is discussed in turn with respect to each relevant aspect. Where appropriate, references to other sections are provided to avoid the duplication of information.

Table 6.1 provides a summary of the aspects associated with each of the construction tasks. The construction tasks are as described in Chapter 2 of the EIAR. Aspects that require specific mitigation and/or monitoring to minimise impacts are shown in red. Those shown in yellow require general mitigation or monitoring, which has been identified within the other sections of the CEMD.

The input required by the Environmental Clerk of Works (ECoW), the Archaeologist and the Marine Mammal Observer (MMO) and Passive Acoustic Monitoring (PAM) operator is detailed for each task, proportionate to the risk involved at that stage of the project. It should be noted however, that all staff have environmental and health and safety responsibilities and will undergo site induction training and task specific environmental training.

Risk Assessed Method Statements (RAMS) will be in place for specific activities to ensure that appropriate environmental protection measures are in place throughout. As discussed in Section 3.2.3, the ECoW role is to ensure appropriate measures are in place and are being adequately implemented.

Table 6.1: Aspects Associated with Each Task

Aspects	Tasks								
	Access Road	Piling	Soil Stripping & Rock Excavation	Dredging	Land Reclamation	Link Road	Concrete Works	Fendering Systems, Furnishings &	Wreck Dismantling
Air Quality - Dust									
Archaeology									
Benthic Ecology									
Marine Mammals & Basking Sharks									
Materials & Waste									
Navigation									
Noise and Vibration									
Peat									
Terrestrial Ecology									
Traffic and Access									
Water Quality - Pollution Prevention									

Key
Specific and General Requirements Apply
General Requirements
Not applicable

6.2 General Requirements

As detailed in Table 6.1 some aspects occur through multiple phases of the project and topic specific mitigation has been identified within other sections of this document. These are general requirements and as such apply to all applicable tasks and hence are not detailed under specific tasks in Sections 6.3 to 6.9 to avoid duplication.

6.2.1 Air Quality – Dust

Dust should be managed as detailed in Section 12: Dust Management Plan.

6.2.2 Archaeology

As detailed in Table 6.1 through multiple stages of the project there is a potential for previously unknown archaeological remains to be found. If they are, the Protocol for Archaeological Discoveries detailed in Section 9 should be followed.

6.2.3 Materials and Waste

Materials should be managed as detailed in Section 10 and the waste hierarchy employed throughout the works in line with Section 8.

Throughout all stages of the works good housekeeping should be employed to minimise dust and littering. Measures should be in place to ensure items are not windblown. When equipment and material is no longer required it should be removed from the construction site.

6.2.4 Navigation

Ongoing communication with the Harbour Master will be carried out to ensure that works are carried out in accordance with the Harbour Authority's (Stornoway Port Authority) navigational safety requirements. All vessels, including vessels under 10m in length, will adhere to the general principles in the Scottish Marine Wildlife Watching Code when undertaking their activities (See Section 16A).

6.2.5 Noise and Vibration

All activities will be a source of noise and some a source of vibration. As such the requirements set out in Section 14 should be adhered to for all activities.

6.2.6 Traffic and Access

Traffic and Access will be managed as detailed in Section 15: Construction Traffic Management Plan.

6.2.7 Water Quality - Pollution Prevention

The majority of activities will require materials and wastes to be stored that could give rise to pollution, hence Section 8: Waste Management Plan, Section 10: Material Management, Section 11: Peat Management and Section 13: Water Quality, should be complied with throughout the construction works. If an incident does occur the Pollution Prevention Plan detailed in Section 7 should be followed.

PRINCIPAL CONTRACTOR TO COMPLETE SECTIONS 6.3 TO 6.10 TAKING ACOUNT OF THEIR SPECIFIC CONSTRUCTION PLANS.

6.3 Access Road

6.3.1 Air Quality - Dust

6.3.2 Archaeology

6.3.3 Materials and Waste

6.3.4 Peat

6.3.5 Terrestrial Ecology

6.3.6 Traffic and Access

6.3.7 Water Quality - Pollution Prevention

6.3.8 Environmental Input

6.4 Piling

6.4.1 Marine Mammals & Basking Sharks

6.4.2 Environmental Input

6.5 Soil Stripping and Rock Excavation

6.5.1 Air Quality - Dust

6.5.2 Archaeology

6.5.3 Materials and Waste

6.5.4 Peat

6.5.5 Terrestrial Ecology

6.5.6 Traffic and Access

6.5.7 Water Quality - Pollution Prevention

6.5.8 Environmental Input

6.6 Dredging

6.6.1 Benthic Ecology

6.6.2 Marine Mammals & Basking Sharks

6.6.3 Materials and Waste

6.6.4 Navigation

6.6.5 Noise and Vibration

6.6.6 Water Quality - Pollution Prevention

6.6.7 Environmental Input

6.7 Land Reclamation

6.7.1 Air Quality - Dust

6.7.2 Materials & Waste

6.7.3 Water Quality - Pollution Prevention

6.7.4 Environmental Input

6.8 Link Road

6.8.1 Air Quality - Dust

6.8.2 Archaeology

6.8.3 Materials and Waste

6.8.4 Peat

6.8.5 Terrestrial Ecology

6.8.6 Traffic and Access

6.8.7 Water Quality - Pollution Prevention

6.8.8 Environmental Input

6.9 Concrete Works

6.9.1 Air Quality - Dust

6.9.2 Materials & Waste

6.9.3 Traffic and Access

6.9.4 Water Quality - Pollution Prevention

6.9.5 Environmental Input

6.10 Wreck Removal

6.10.1 Archaeology

6.10.2 Benthic Ecology

6.10.3 Materials and Waste

6.10.4 Navigation

6.10.5 Environmental Input

Construction Environmental Management Document	
Section Number	7
Section Title	Pollution Prevention
Issue	1B
Issue Date	18/01/2022
Author	Kirsty Macdonald, Jack Clarkson
Approved	Fiona Henderson

Document History		
Issue	Date	Reason for Change
1A	20/04/2021	Document Issue to Tenderers for Comment
1B	12/01/2022	Document for Issue to Regulator - Amended to refer to Emergency Response Plan and include Reporting Requirements

Contents

7 Pollution Prevention

7.1 Introduction

Pollution prevention measures have been developed to minimise the risk of an environmental incident occurring during the construction of the Stornoway Deep Water Port, see Sections 10, 12 and 13. These measures combine both the current UK best practice and guidance from the documents listed in Section 2.2. However, in the unlikely event of an environmental incident occurring, it is important to have a comprehensive emergency response plan in place to minimise the potential impacts.

7.2 Outline of Procedures

The emergency response plan follows the 'Source – Pathway – Receptor' model as described in GPP1 (NIEA, SEPA, & Environment Agency, 2020). In the event of an environmental incident the following will be prioritised:

- Stop the source of the pollution.
- Interrupt any pathways to the environment.
- Report the incident in as much detail as possible to site management and the ECoW.
- Clean the contaminated area and recover pollutants.
- Analyse the event to prevent further incidents.

The detailed Emergency Response Plan can be found in Appendix 7A.

The site manager and ECoW will ensure all site personnel are trained in the Emergency Response Plan through regular toolbox talks, drills, and safety briefs.

7.2.1 Reporting

The appropriate reporting needs to be carried out for water pollution incidents covered by Licences CAR/S/SEPA2021-883 & CAR/S/SEPA2021-957. In the event of a pollution incident, SEPA must be notified via its pollution hotline within 24 hours of identification of an event which has:

- Caused or could cause adverse impact to the environment or harm to human health;
- Could result in an emission to the environment that is not authorised; and
- Caused a breach of a condition within any authorisation (i.e. CAR/S/SEPA2021-883 & CAR/S/SEPA2021-957).

The initial incident reporting to SEPA should be carried out by the most appropriate person onsite at the time: ECoW/IECoW or the Site Manager.

All environmental incidents should be investigated and an appropriate incident report produced. The ECoW is responsible for ensuring the events report is produced and appropriately distributed. For water pollution incidents covered by Licences CAR/S/SEPA2021-883 & CAR/S/SEPA2021-957, the following also applies:

- Within 14 days of an event, a report must be submitted to SEPA detailing:
  (a) The reason(s) for the event;

(b) The action(s) taken to stop the event and minimise the impacts; and
(c) The action(s) taken to prevent the event from recurring.

Incident reports should be shared with the IECoW prior to submission to SEPA.

7.3 References

NIEA, SEPA, & Environment Agency. (2020). Guidance for Pollution Prevention: GPP1 - Understanding your Environmental Responsibilities - Good Environmental Practices. In (pp. 1-10): NIEA, SEPA and Environment Agency.

Appendix 7A – Emergency Response Plan

TO BE COMPLETED BY PRINCIPAL CONTRACTOR ONCE APPOINTED

Construction Environmental Management Document	
Section Number	8
Section Title	Site Waste Management Plan
Issue	1A
Issue Date	20/04/21
Author	Kirsty Macdonald
Approved	Fiona Henderson

Document History		
Issue	Date	Reason for Change
1A	20/04/21	Document Issue to Tenderers for Comment

Contents

8 Site Waste Management Plan

8.1 Introduction

Waste arising during construction will include concrete washings, wood utilised for shuttering, off-cuts of rebar metals and packaging materials associated with both constructions works and the welfare facilities.

The waste hierarchy will be employed throughout the construction works.

8.2 Waste Hierarchy Implementation

8.2.1 Reducing Waste

Where practicable, steps will be taken to avoid the production of waste. For example, the use of reusable water bottles, crockery and cutlery in the welfare facilities will prevent the need for single use plastics.

Where practical, requests should be made to suppliers to minimise packaging.

Similarly, ordering the correct quantity and types of materials will prevent unused excess materials being disposed of as waste.

8.2.2 Reuse

Where possible, materials can be reutilised. For example, wood utilised in shuttering can be utilised more than once. Concrete wash water can be reutilised to wash equipment once it has been settled out.

8.2.3 Recycle

Recycling will be facilitated by the segregation of wastes. Clearly marked and labelled waste receptacles will be provided in designated areas. Wastes suitable for recycling are likely to include wood, metals, glass, paper, plastics and oils.

8.2.4 Dispose

Solid waste not suitable for recycling will be sent to landfill as waste, or special waste, depending on its constitution. A suitable licensed waste contractor will be employed to collect wastes for recycling and disposal.

8.3 Concrete Washing

Concrete washings will be carried out in a dedicated area. Washing arisings will be collected for onsite treatment. This will include settlement and, if required, pH correction. The liquids will be reused on site as grey water if suitable or taken off site for appropriate disposal. The solids will be reused as aggregate or disposed of as solid waste.

8.4 Litter

Prior to construction works litter sweeps will be conducted on entering new areas to prevent the escape of existing litter on site into the marine environment.

All personnel working on the project will undertake site induction and a toolbox talk specific to litter. This will include information on waste management and the use of the waste receptacles provided including designated smoking area and cigarette disposal facilities. It will be made clear that littering will not be tolerated. Construction staff will be encouraged to collect any litter they see in the construction areas and, if deemed necessary, litter sweeps will be carried out.

8.5 Waste Management

Waste receptacles (bins and skips) will incorporate lids or covers to protect against vermin gaining access and wind blowing wastes out of skips, giving rise to litter.

The Principal Contractor will put in place procedures for ensuring that appropriate records are kept for all waste arisings including volumes, categories and waste carriers used, and that waste transfer notes are retained.

8.6 Monitoring

The ECoW will carry out regular waste compliance audits and review details of waste arisings to identify areas for opportunity to reduce or recycle more wastes in conjunction with the Site Manager.

Construction Environmental Management Document	
Section Number	9
Section Title	Protocol for Archaeological Discoveries
Issue	1B
Issue Date	18/01/2022
Author	Kirsty Macdonald, Jack Clarkson
Approved	Fiona Henderson

Document History		
Issue	Date	Reason for Change
1A	20/04/21	Document Issue to Tenderers for Comment
1B	18/01/22	Documented for issue to regulators - amended to include agreed WSI's and updated to include compliance Condition 3.2.6 of the awarded marine construction licence (MS-00008749).

Contents

9 Protocol for Archaeological Discoveries

9.1 Introduction

Records of archaeology have been identified within and around the development area, both onshore and offshore. Offshore archaeological records are detailed in Section 3 of Appendix 9A and onshore archaeological records are detailed in Section 2 of Appendix 9B.

9.2 Mitigation

9.2.1 Written Scheme of Investigation

SPA's Archaeologist developed Written Scheme of Investigations (WSI) for both onshore and offshore elements of the works, which were approved and agreed with the relevant regulators.

The WSI for onshore elements of the works ensures that the Principal Contractor will conduct an archaeological watching brief and outlines the watching brief methodology that is required to be undertaken.

The focus of the offshore WSI was to understand and record any known archaeological features e.g. wrecks and whether any additional surveying is required to be undertaken.

There is however, the potential for undiscovered archaeology to be present in both the on, and offshore environments. Under Condition 3.1.11 of the Marine Licence (MS-00008749), the "Licensee must ensure that Licensed Activities are carried out in accordance with the Stornoway Deep Water Port, Stornoway, Western Isles - Written Scheme of Investigation". The offshore and onshore WSI are provided as Appendix 9A and 9B respectively.

9.2.2 Onshore Archaeology

A Method Statement detailing how an archaeological watching brief will be implemented has been developed by the Stornoway Port Authority's (SPA) Archaeologist and will be produced in alignment with the WSI provided in Appendix 9B. Watching briefs will be carried out during any ground-breaking construction works in line with the approved Method Statement. The CnES Archaeologist will be granted access to inspect any construction works and to carry out monitoring during the watching brief.

9.2.3 Offshore Archaeology

9.2.3.1 Wreck Survey and Recording

The WSI (in Appendix 9A) detailed the requirements for surveying and recording of wrecks within areas of the proposed works. Initially, the SPA Archaeologist conducted a review of archival and secondary sources in order to better understand the wreck resource in the development area and whether additional surveys were required.

In 2020, a dive survey of the SS Alabama was undertaken by Leask Marine to identify which areas of the wreck are required to be removed. Since this survey, there has been no further requirement for additional surveys of this wreckage.

In 2021, a geophysical assessment (data review) of side-scan, magnetometer and multibeam echosounder surveys were conducted by Wessex Archaeology, to identify any wrecks which

may have high archaeological potential in Glumaig Bay. The survey report identified debris fields indicative of unknown wrecks. These areas were areas which were highlighted as 'should be avoided' until the archaeological significance of the debris fields can be determined. Additional survey works are therefore required and will be undertaken on the debris fields prior to construction.

Any mitigation proposed in the WSI is therefore based on the current wreck and data review surveys done prior to the start the additional survey works on the unknown debris fields. Mitigation, as proposed in the WSI, may be required to be updated prior to construction based on the findings of the additional surveys. If materials are being removed from the seabed, they will be handled and stored as detailed in the WSI.

9.2.3.2 Offshore Protocol for Archaeological Discoveries

The Protocol for Archaeological Discoveries (PAD) defines two types of Archaeological discovery:

- *'Finds'* – an object of archaeological potential; this means it has been impacted by people and may reveal something of past lives. Eco-artefacts such as animal and plant remain are also included in finds as they help us to understand the past human landscape. Finds can either be objects on the sea floor or those brought to the surface.
- *'Anomalies'* – are differences in the seabed (either digital or visual) which could be of archaeological significance and need further investigation. Anomalies should always be treated as significant until determined otherwise.

Prior to works commencing, the Contractor's Archaeologist will brief the dredge team on the significance of archaeological finds and will instruct the dredge team to report any discoveries to the Site Manager and ECoW. In the event of a find, the PAD as established by Wessex Archaeology on behalf of The Crown Estate, will be implemented. A copy of this Protocol is included as Appendix 9C of this CEMD.

If artefacts are present, the activities associated with dredging could impact the historic environment and any works which may cause further disturbance to the area will be ceased.

The find will be documented, photographed and preserved by the ECoW as per instructions in the PAD (Appendix 9C). Advice will be sought from an archaeological consultant if required and reports made to Historic Environment Scotland and CnES. A summary of the process is provided in Figure 9.1.

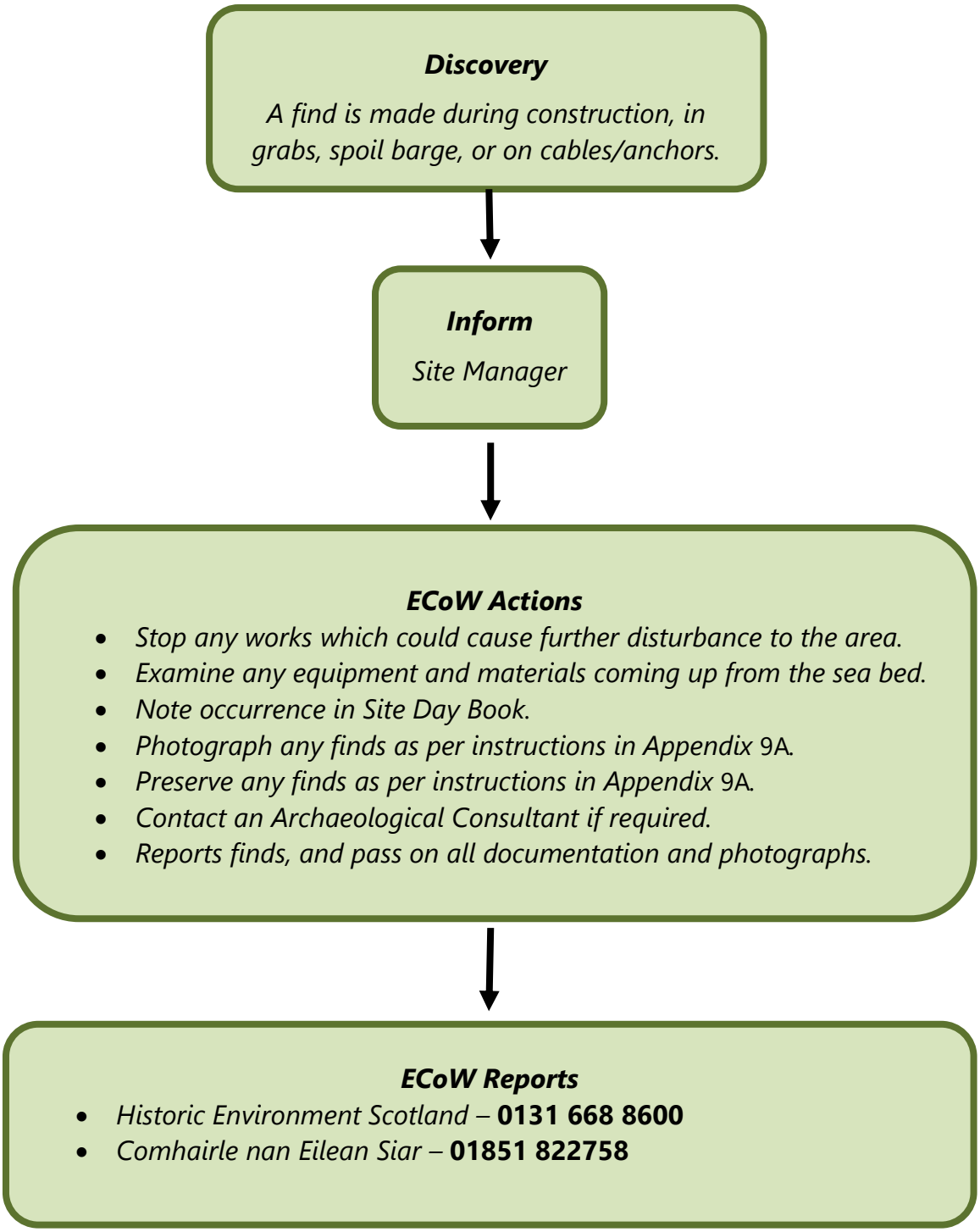

Figure 9.1: Protocol for Archaeological Discoveries

Appendix 9A – Offshore Written Scheme of Investigation

Stornoway Deep Water Port
Stornoway, Western Isles

Written Scheme of Investigation

Planning Ref.:
Accession Number:
Document Ref.: 247960.03
June 2021

wessexarchaeology

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Wessex Archaeology Ltd is a company limited by guarantee registered in England, company number 1712772. It is also a Charity registered in England and Wales number 287786, and in Scotland, Scottish Charity number SC042630. Our registered office is at Portway House, Old Sarum Park, Salisbury, Wiltshire, SP4 6EB

Document Information

Document title	Stornoway Deep Water Port, Stornoway, Western Isles
Document subtitle	Written Scheme of Investigation
Document reference	247960.03
Client name	Affric Limited
Address	Loch Duntelchaig Lochview Office, Farr, Inverness IV2 6AW
On behalf of	Stornoway Port Authority
Address	Amity House, Esplanade Quay, Stornoway HS1 2XS
Site location	Stornoway Port
County	Western Isles/ Na h-Eileanan an Iar
National grid reference	NB 42634 31050
Statutory designations	
Planning authority	Comhairle nan Eilean Siar
Planning reference	
Museum name	TBC
Museum accession code	TBC
WA project name	Stornoway Deep Water Port, Stornoway, Western Isles
WA project code	247960
Project management by	Andrew Bicket
Document compiled by	Ben Saunders, Robert MacKintosh
Graphics by	Natalia Bain

Quality Assurance

Issue	Date		Author	Approved by
1	02/06/2021	Draft to Client	RM	AB
2	07/06/2021	Internal Draft	RM, NB	AB
3	08/06/2021	External draft for Consultation	RM, NB,	AB

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Stornoway Deep Water Port
Stornoway, Western Isles

Written Scheme of Investigation

1 INTRODUCTION

1.1 Project and Planning Background

1.1.1 Wessex Archaeology has been commissioned by Affric Limited, on behalf of Stornoway Port Authority ('the client'), to produce a written scheme of investigation (WSI) for a proposed archaeological watching brief, geophysical assessment, geotechnical assessment and protocol for archaeological discoveries during construction and dredging for Stornoway Deep Water Port, centred on NGR NB 42634 31050, at Stornoway Deep Water Port (DWP), Arnish Point, Stornoway, HS2 9JY (**Figure 1**).

1.1.2 The Stornoway DWP development comprises the following main components:

- Main Quay;
- Heavy Load Area;
- Pontoon;
- Bollard Island;
- Freight Ferry Berth and Linkspan;
- Reclaimed/Levelled Area;
- Dredging;
- Access Road;
- Link Road;
- Services; and
- Navigational Elements.

1.1.3 An Environmental Impact Assessment (EIA) (Affric Limited 2020) identified impacts from the development on known heritage assets. This included the impacts on the known wrecks of *Portugal* and *Andalina* which are located within the area identified for dredging to a depth of -10m CD (-12.21m OD), and the impact on the wreck *Alabama* which will be cut down so that no sections of the wreck will be upstanding above -8m CD.

1.1.4 Following the Environmental Impact Assessment (EIA) (Affric Limited 2020), *Comhairle nan Eilean Siar (CnES)* recommend the following mitigation measures to be applied as a minimum:

- The area of the development should be surveyed with side scan sonar to an appropriate resolution and the data should be archaeologically assessed.
- Areas of potential identified from this data should be subject to further mitigation in the form of a program of archaeological works.
- The known wreck of the *Alabama* and surrounding area should be surveyed at an appropriate level of detail / data capture by side scan sonar or similar technique. These surveys should occur prior to and following on from any potential modifications / cutting of the wreck. The initial survey should be augmented by archaeological recording of the wreck itself.

- A program of palaeo-environmental sampling in the form of a coring strategy across areas of the seabed that will be impacted by the dredging regime. It cannot be overstated, that this area of the bay has the potential for being the repository for valuable palaeo-environmental information, that until now has not been assessed.

- An identified plan for the relocation / dumping of dredged material must be included.

- If blasting is included within the proposed construction methodology, an assessment of potential impacts on historic environment assets should be included with proposed methods of mitigation.

- A Protocol for Archaeological Discoveries (PAD) should be put in place throughout the dredging and constructions phases of this project.

- These measures should be outlined in agreed written schemes of investigation (WSI) and subject to reporting and archiving to the relevant authorities.

1.1.5 Historic Environment Scotland stated:

- For all other marine cultural heritage assets, known and unknown, we require up-to-date information on their nature and condition before we could comment on whether the conclusions reached in the EIAR are appropriate.

- An archaeological recording exercise should be undertaken on the wreck of the SS *Alabama* (W1) before the dismantling works take place, followed by further recording to note the condition of the wreck after the works. Some pre-deconstruction survey work has been undertaken on this wreck, but this is described as a reconnaissance survey to inform the proposed dismantling works, it does not appear to have included an archaeological recording exercise of a standard we would consider suitable for mitigation purposes.

- The production and implementation of a Protocol for Archaeological Discoveries (PAD) is proposed as mitigation for all other marine cultural heritage impacts. This PAD would set out the processes for identifying and recovering cultural heritage material during development works.

1.2 Scope of Document

1.2.1 This WSI sets out the strategy and methodology by which Wessex Archaeology will implement the archaeological works. In format and content, it conforms with current best practice and to the guidance outlined in Historic Environment Scotland's *Policy Statement* (Historic Environment Scotland 2016a) and the relevant Chartered Institute for Archaeologists' (CIfA) Standards (CIfA 2014).

1.2.2 Archaeological works will also conform to the *Dredging and Port Construction: Interactions with Features of Archaeological or Heritage Interest* guidance (PIANC 2014), and the Wessex Archaeology guidance on the *Assessment and Management of Marine Archaeology in Port and Harbour Development* (Cooper and Gane 2016).

1.2.3 This document will be submitted to Marine Scotland to allow them to consult with the CnES and HES, for comment, prior to the start of the watching brief.

1.3 Location, Topography and Geology

1.3.1 The site is located on the south and west side of Stornoway harbour, along the approach to Arnish Point.

1.3.2 The underlying geology is mapped as Stornoway Formation of conglomerate sandstones for the eastern part of Arnish Point, and Outer Hebrides Thrust Zone Mylonites Complex – Protocataclasite for the western part of the site. No superficial deposit mapping has been completed in the area (British Geological Survey online viewer).

2 ARCHAEOLOGICAL ASSESSMENT AREAS

2.1 Co-ordinate System

2.1.1 The coordinates are projected in British National Grid, EPSG: 27700.

2.2 Archaeological Assessment Areas

2.2.1 The assessment area in the original EIAR comprised an Inner Study Area (ISA) and an Outer Study Area (OSA) (Affric Limited 2020, Chapter 13). These comprised the proposed development site boundary and a 1 km buffer respectively. This encompassed all of *Cala Ghlumaig.*

2.2.2 The current study uses the proposed dredging area and the construction footprint, both with a 100 m buffer as its study area. However, all wrecks noted in the previous EIA have been included even when outside this area, particularly **WA2003/W3**.

3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

3.1 Introduction

3.1.1 The archaeological and historical background was assessed in the Environmental Impact Assessment Report (EIAR) (Affric Limited 2020), which considered the recorded historic environment resource within the proposed development site boundary. A summary of the results is presented below, with relevant entry numbers from the *Comhairle nan Eilean Siar* Historic Environment Record (HER) and CANMORE included. The marine archaeological baseline has been reassessed for this WSI, and additional sources of information are referenced as appropriate, particularly the UKHO wreck database.

3.1.2 The EIAR by Affric Limited consulted the following sources of information:

- Designation data downloaded from the Historic Environment Scotland website on 2nd February 2020;
- The National Record of the Historic Environment (NRHE), including the Canmore database and associated photographs, prints/drawings and manuscripts held by HES;
- Historic Landscape Assessment data viewed through the HLAMap website;
- The *Comhairle nan Eilean Siar* Historic Environment Record (HER) – digital data extract received on 11th March 2020;
- The National Collection of Aerial Photography (NCAP);
- Geological data available online from the British Geological Survey;

- Historic maps held by the National Library of Scotland;
- Ordnance Survey Name Books;
- Unpublished maps and plans held by the National Records of Scotland;
- Readily available published sources and unpublished archaeological reports; and
- A site walkover and setting visits that were on the 22nd February 2018.

3.2 Terrestrial Archaeological Baseline

3.2.1 Two terrestrial assets were identified by the EIAR as lying within the Inner Study Area (Affric Limited 2020, Chapter 13) - an earth and stone field boundary dyke (**WA1001**) next to the extant Arnish Fabrication Yard and the remains of a field system dating to the post-medieval period on a headland to the east of Glumaig Harbour (**WA1002**). Both of these relate to the agricultural history of the area. Canmore lists a further field system on the headland (**WA1003**). A further record is located within the construction footprint of the development, an abandoned traditional boat (**WA1004**). There are also two navigation beacons listed in Canmore (**WA1005** and **1006**). Details of these are set out in **Appendix 1** and displayed in **Figure 1**.

3.3 Marine Archaeological Baseline

EIA

3.3.1 The EIA identified 14 known maritime Heritage Assets within the study area from the Canmore Maritime database (Affric Limited 2020, Chapter 13). These included wrecks and recorded losses (i.e. documented wrecking positions where no wreck material has been found). There were 10 other entries that were discounted due to being finds, events and/or wrecks that have been removed or refloated. Following a redesign of the dredge area three of these wrecks (W2, W3 & W10) fall outwith the updated planned area to be dredged but remain within the dredge consent area applied for.

Table 1 EIAR marine gazetteer (Affric Limited 2020, Chapter 13).

Ref.	Name / Location	Type / Date	Easting	Northing	Importance
W1	Alabama: Seid Rocks, Stornoway,	Steamship, 20th Century	142380	931550	Medium
W2	Andalina: Seid Rocks, Cala Ghlumaig,	Hulk, 20th Century	142786	931111	Low
W3	Arnish: Cala Ghlumaig,	Steamship 20th Century	142642	930735	Low
W4	Bjorn: Arnish Point,	Hulk, 20th Century	142813	931043	Low
W5	Bloom: Stornoway Harbour,	Craft, 20th Century	142548	931492	Low
W6	Comrade: Stornoway, (Arbitrary Location)	Steam Drifter, 20th Century	142000	931000	Low
W7	Fisher Lassies: Stornoway Harbour, (Arbitrary Location)	Lugger, 19th Century	142000	931000	Medium
W8	Jane Nicholson: Stornoway Harbour Entrance, (Arbitrary Location)	Craft, 19th Century	142900	931300	Medium
W9	Laurel: Stornoway Harbour Entrance, (Arbitrary Location)	Craft, 19th Century	142900	931300	Medium
W10	Marjory: Arnish Point, Stornoway,	Motor Fishing Vessel, 20th Century	142549	931119	Low
W11	Portugal: Arnish Point, Stornoway,	Hulk, 20th Century	142723	931580	Low
W12	Rap: Stornoway, (Arbitrary Location)	Steamship, 20th Century	142000	931000	Medium
W13	Unknown: Stornoway Harbour Entrance, (Arbitrary Location)	Yawl, 20th Century	142900	931300	Low
W14	Unknown: Stornoway	Craft, Obstruction	142323	930836	Low

3.3.2 The 14 maritime heritage assets are set out in **Table 1**. These comprise a mixture of nineteenth and twentieth century vessels known to have sunk in and around Glumaig Harbour. Six of the assets are recorded losses (W6, W7, W8, W9, W12 and W13) so there may or may not be wreck material present at their position. The remaining nine known wrecks comprise seven named twentieth century vessels (W1 to W5, W10 and W11) known to have sunk in Glumaig Harbour, and one un-named undated wreck (W14) charted as an obstruction and visible at low water.

Current Methodology

3.3.1 The baseline has been reassessed for the purposes of this WSI. The marine themes relevant to marine archaeological baseline as assessed in this report are:

- Seabed paleogeography (for example, palaeochannels and other features that contain sedimentary deposits of archaeological interest, and derived early prehistoric artefacts e.g. stone tools, and ecofacts); and,
- Seabed features, including maritime sites (such as shipwrecks and associated material including cargo, obstructions and fishermen's fasteners) and aviation sites (aircraft crash sites and associated debris).

3.3.2 Database searches of the following sources were completed:

- The Wrecks and Obstructions database held by the United Kingdom Hydrographic Office (UKHO);

- Historic Environment Scotland Records (Canmore); and,
- *Comhairle nan Eilean Siar* Historic Environment Record.

3.3.3 A report from a geophysical survey undertaken by Aspect Land & Hydrographic Surveys Ltd was also consulted (Aspect Land & Hydrographic Surveys Ltd 2013).

3.3.4 In order to compile the marine archaeological baseline as presented in this report, where possible, the data were incorporated into a project Geographic Information System (GIS) using ArcGIS 10.6.1, enabling the data to be spatially analysed. The data were subsequently compiled into gazetteers of maritime sources within the study area. The updated marine gazetteer is contained in **Appendix 2.**

3.3.5 The national and local HER records have been discriminated between records for which there is known material on the seabed and 'recorded losses' (vessels that are known to have been lost, but do not, except by chance, have material on the seabed at their recorded loss location). A list of recorded losses within the Study Area is provided in **Appendix 3**.

3.3.6 For archaeological sites that were recorded in a national or local HER as well as the UKHO database, the co-ordinates from the UKHO are used in the gazetteer and GIS. As these relate to surveyed co-ordinates and supporting survey metadata, they are judged likely to be more accurate (unless other verifiable spatial data is available).

3.3.7 The sites in the gazetteer have been renumbered using a Wessex Archaeology numbering system, as there are additional sites from those listed in the original EIA. For clarity the EIA references will also be stated in this report.

Seabed Prehistoric

3.3.8 There are no known submerged prehistoric sites in the study area.

Paleogeographic Potential

3.3.9 There may be the potential for paleogeographic evidence to survive in the Study Area. Further assessment of the available geotechnical data is required to assess this possibility.

Designated Maritime and Aviation Assets

3.3.10 There are no designated maritime or aviation sites within the study area.

Known Maritime and Aviation Sites

3.3.11 The study area contains four charted wrecks, **WA2001/W1**; **WA2005/W5**; **WA2007/W11**; and **WA2008/W14** (**Figure 1**). These are discussed further below.

3.3.12 There are five wrecks and obstructions that the UKHO now lists as dead, i.e. they have not been detected by repeated surveys and therefore they are considered not to represent a navigational hazard (**WA2002/W2; WA2003/W3; WA2004/W4; WA2006/W10; WA2009** and **WA2010**) (**Figure 1**). Most of these records appear to have been amended to dead at the request of the Stornoway Harbourmaster in 2005/6, presumably following development or clearance work. The wrecks listed as dead were all sunk in the 20th century, although **WA2002/W2** *Andalina,* **WA2003/W3**; *Arnish* and **WA2004/W4** *Bjorn* may have been constructed in the 19th century.

3.3.13 There are no known aviation sites within the study area.

WA2001/W1: SS Alabama

3.3.14 The SS *Alabama* was a steel screw steamship built in 1899 by Charles Connell & Company, Glasgow for Det Forenede Dampskibs Selskab (DFDS), Copenhagen. It had a gross registered tonnage of 4454, a length of 375 ft, a breadth of 50 ft and a depth of 25 ft. It was wrecked in 1904 at Peninsula Point, Stornoway after dragging its anchor. It was on passage from Copenhagen for Baltimore in ballast and had halted to repair heavy weather damage.

3.3.15 The UKHO record states that the HMS *Herald* reported in 1975 that the wreck 'is intact but distorted with protruding torn plates. It lies on its side, covering an area 70 metres long and 20 metres wide. The keel lies on an orientation of 118/298 degrees. The least depth by echosounder at the southern end was 5.8 metres.'

3.3.16 RAF Brize Norton Sub Aqua Club reported in 1976 that 'the wreck located at the above position is extensive and confused, showing every sign of dispersal by explosives. The recognition of objects was difficult due to the damage and poor visibility. The wreck is covered in a fine layer of silt. The highest obstruction is believed to be a cargo boom which was at a recorded depth of 6 metres. The bulk of the wreck lies between 10.6 - 15.2 metres or the bottom.'

3.3.17 The wreck is known to have been dispersed to 6 metres below low water spring tide in 1931. As stated by RAF Brize Norton Sub Aqua Club, this may have been by explosives. Certain parts of it are also known to have been salvaged nearer the time of sinking, the Aberdeen Press and Journal reported on 04 May 1905: 'The wreck of the Danish steamer Alabama, Copenhagen (7000 tons gross), in the bunkers of which there is 1000 tons of coal, and which is lying submerged in about eight fathoms water in Stornoway Loch, was yesterday exposed for sale, and realised £490. A number of articles salved from the deck of the steamer—anchors, chains, boats, and binnacles—realised good prices.'

3.3.18 In addition, according to Leask Marine, 'there have been two attempts to blow it up and various attempts to disperse the wreckage by use of towed cables. As a result there is 'little resemblance to a vessel on viewing the remains' (Leask Marine 2019).

3.3.19 In 2020, a survey of the wreck was undertaken by Leask Marine (Leask Marine 2019; 2020). The purpose of the operation was to assess how much of the wreck projected above -8 m CD, and to make an estimate of the cost of removing these parts (Leask Marine 2019). The survey showed that the wreck has points above the -8 m LAT contour for approximately 85 m in length (Leask Marine 2020). The wreck site itself will be longer than this.

3.3.20 The diving survey reportedly found: 'that around 70 % of the identified elements are a mix between Angle Iron, I Beams and Steel Plates The thickness of the steel components ranges from 4 mm to 14 mm. Some of the identified pieces were "flexible" steel, beams or plates with high concentration of corrosion; however, several other objects still hold a considerable amount rigidity throughout the wreck' (Leask Marine 2020). In addition, 'the vessel is laying on its port side and some machinery is still on-site as is the case of a vessel winch and the propeller of the ship was found at stern of the wreck' (Leask Marine 2020). A video of the dive was recorded.

3.3.21 Other data is available regarding the SS *Alabama*:

- An image of the vessel is available at www.clydeships.co.uk/view.php?ref=4745#v
- A video of a recreational dive on the wreck from 2018 is available at https://www.youtube.com/watch?v=r6CnyTk9XB0

- There is a steel steamer report on *Alabama* at Lloyd's Register Foundation https://hec.lrfoundation.org.uk/archive-library/documents/lrf-pun-gls184-0191-r

- There is a report on the machinery of *Alabama* at Lloyd's Register Foundation https://hec.lrfoundation.org.uk/archive-library/documents/lrf-pun-gls184-0192-r

Other Wrecks

3.3.22 The other charted wrecks in the Study Area are:

- **WA2005/W5** the *Bloom*, a fishing vessel that sank in 1957 and was largely dispersed in 1958, despite not being located since, the UKHO record remains *live*;

- **WA2007/W11** the *Portugal*, a steam collier that sank in the 1950s. The wreck appeared broken up when examined in 1976. It was relocated by multibeam bathymetry survey in 2019.

- **WA2008/W14** an unknown wreck first observed in 1975. The wreck is described as approximately 20 m long with iron ribs with a small amount of timber attached, suggesting a composite construction. Site surveys have not located this site.

3.3.23 The recorded location of unknown wreck (**WA2008/W14**) is within the construction footprint (but evidence of the wreck has not been located at this location); *Bloom* (**WA2005/W5**) and *Portugal* (**WA2007/W11)** are within the dredging area (**Figure 1**).

Maritime Archaeological Potential

3.3.24 There is potential for discoveries of maritime craft from the Mesolithic to the modern period. Post-medieval and modern wrecks, as they were generally made of more substantial material, are more likely to have been discovered through surveys undertaken by UKHO and others, and thus recorded in the archaeological record. However, there is still potential for discovery of previously unrecorded wreck sites, particularly of wooden wrecks, broken up wrecks or partially buried wrecks that are more difficult to detect through geophysical survey.

3.3.25 Many vessels were lost without a record being made, and sometimes even the records that were created have since been lost (Cant, 2013). Examining the recorded losses provides an indication to the potential for further discoveries, as do the factors discussed below.

3.3.26 Recorded Losses are records for ships or aircraft that are known to have wrecked or crashed offshore, but for which the exact locations are not known. Recorded Losses are often grouped together by their general area of loss into Maritime Named Locations (displayed spatially as polygons or centre points of polygons, often associated with NRHE data), however many records (particularly from the HER dataset) are given co-ordinates (displayed spatially as points), although these are similarly unsubstantiated.

3.3.27 Recorded Losses can be considered as an indication of the potential for archaeological maritime remains to exist within the study area and the type and number of wrecks that could be present. These records relate to vessels reportedly lost or for which no physical wreck remains have ever been identified. There will be a bias in these records towards vessels dating to the post-medieval period and later, and also towards vessels that sank in inshore waters. **Table 2** shows the distribution of these documented losses according to the date of loss for those records whose positions fall within the study area. Details regarding these losses are presented in **Appendix 3**.

Table 2 Recorded Losses – summary by date

Date	Number of records of ships	Number of records of aircraft
Post-medieval	1	0
19th Century	4	0
Modern	4	0
Unknown	0	0
Total	**9**	**0**

3.3.28 The losses generally represent 19th and 20th century vessels, including those involved in national and international trade and the fishing industry.

3.3.29 There is potential for the presence of archaeological material of maritime nature spanning from the Mesolithic period to the present day within the study area. The key areas of potential are summarised in **Table 3** below.

Table 3 Summary of key areas of maritime potential

Period	Summary
Pre-1508 AD	Low potential for material associated with prehistoric maritime activities. Prehistoric maritime activities include coastal travel, fishing and the exploitation of other marine and coastal resources. Vessels of this period include rafts, hide covered watercraft and log boats.
	Low potential for material associated with later prehistoric maritime activities, including seaworthy watercraft suitable for overseas voyages to facilitate trade and the exploitation of deep water resources. Such remains are likely to comprise larger boat types, including those representing new technologies such as the Bronze Age sewn plank boats which are associated with a growing scale of seafaring activities.
	Low potential for material of Romano-British date, associated with the expansion and diversification of trade with the Continent. Watercraft of this period, where present, may be representative of a distinct shipbuilding tradition known as 'Romano-Celtic' shipbuilding, often considered to represent a fusion of Roman and northern European methods.
	Low potential for material associated with coastal and seafaring activity in the 'Dark Ages', associated with the renewed expansion of trade routes and Germanic and Norse invasion and migration. Vessels of this period may be representative of new shipbuilding traditions such as the technique.
	Low potential for material associated with medieval maritime activity, including that associated with increasing trade between the UK and Europe, the development of established ports around the southern North Sea and the expansion of fishing fleets and the herring industry. Vessels of this period are representative of a shipbuilding industry which encompassed a wide range of vessel types (comprising both larger ships and vernacular boats). Such wrecks may also be representative of new technologies (e.g. the use of flush-laid strakes in construction), developments in propulsion, the development of reliable navigation techniques and the use of ordnance.
1509 to 1815	Medium potential for post-medieval shipwrecks representative of continuing technological advances in the construction, fitting and arming of ships, and in navigation, sailing and steering techniques. Vessels of this period continued to variously represent both the clinker techniques and construction utilising the flush-laid strakes technique.
	Medium potential for post-medieval shipwrecks associated with the expansion of transoceanic communications and the opening up of the New World.
	Medium potential for post-medieval shipwrecks associated with the establishment of the Royal Navy during the Tudor period and the increasing scale of battles at sea.
	Medium potential for post-medieval shipwrecks associated with continuing local trade and marine exploitation including the transport of goods associated with the agricultural revolution.
1816 to 1913	Higher potential for the discovery of shipwrecks associated with the introduction of iron and later steel in shipbuilding techniques. Such vessels may also be representative of other fundamental changes associated with the industrial revolution, particularly with regards to propulsion and the emergence of steam propulsion and the increasing use of paddle and screw propelled vessels.

	Higher potential for the discovery of shipwrecks demonstrating a diverse array of vernacular boat types evolved for use in specific environments.
	Higher potential for wrecks associated with large scale worldwide trade, the fishing industry or coastal maritime activity including marine exploitation.
1914 to 1945	Higher potential for the discovery of shipwrecks associated with the two world wars including both naval vessels and merchant ships. Wrecks of this period may also be associated with the increased shipping responding to the demand to fulfil military requirements. A large number of vessels dating to this period were lost as a result of enemy action.
Post- 1946	Potential for wrecks associated with a wide range of maritime activities, including military, commerce, fishing and leisure. Although ships and boats of this period are more numerous, loses decline due to increased safety coupled with the absence of any major hostilities. Vessels dating to this period are predominantly lost as a result of any number of isolated or interrelated factors including human error, adverse weather conditions, collision with other vessels or navigational hazards or mechanical faults.

Aviation Archaeological Potential

3.3.30 Marine aviation archaeology receptors comprise the remains or associated remains of military and civilian aircraft that have been lost at sea. Evidence is divided into three primary time periods based on major technological advances in aircraft design: Pre-1939; 1939-1945; and post-1945.

3.3.31 Although there are currently no known aircraft crash sites located within the study area within Scotland, England and the Exclusive Economic Zone (EEZ) there is the potential for the discovery of previously unknown aircraft material, particularly in relation to Second World War. Aircraft crash sites are also difficult to identify through archaeological assessments of geophysical survey, although past experience indicates material from the site, such as engines or other material may be recorded as small obstructions or anomalies.

4 AIMS AND OBJECTIVES

4.1 Aims

4.1.1 The specific aim of this WSI is to set out the baseline resource for the known and potential archaeological assets within the Stornoway DWP site, and the mitigation strategies proposed to address the impacts identified.

4.2 Objectives

4.2.1 In order to achieve the above aim, the objectives of the watching brief are:

- To determine the presence or absence of archaeological features, deposits, structures, artefacts or ecofacts within the specified works area;
- To record and establish, within the constraints of the works, the extent, character, date, condition and quality of any surviving archaeological remains (a preservation by record);
- To place any identified archaeological remains within a wider historical and archaeological context in order to assess their importance; and
- To make available information about the archaeological resource on the site by preparing a report on the results of the watching brief.

4.2.2 The objective in relation to the marine works are:

- To fulfil the requirements of the Archaeological Curators (Historic Environment Scotland and LPA) - in respect of archaeological monitoring and mitigation of works associated with the watching brief and dredging activities aspects of this project;
- To mitigate the impact of dredging within the Stornoway DWP site via appropriate and recognised strategies;
- To propose measures for mitigating effects upon any unexpected archaeological discoveries that may be encountered during the operations associated with the development;
- To ensure that any further geophysical and geotechnical investigations associated with the project are subject to archaeological input and review with subsequent recording and sampling if necessary;
- Set out a practicable Protocol for Archaeological Discoveries, to be in place throughout the project; and
- To establish the reporting, publication, conservation and archiving requirements for the archaeological works undertaken in the course of the scheme.

5 TERRESTRIAL MITIGATION METHODS

5.1 Introduction

5.1.1 The principal contactor will be responsible for ensuring an archaeological watching brief will be undertaken. The principal contractor will set out a WSI that conforms to CIfA Standards and Guidance is signed off by the Western Isles Archaeologist and the client. All works will be undertaken in accordance with the detailed methods set out within the WSI. Any significant variations to these methods will be agreed in writing with the Western Isles Archaeologist and the client, prior to being implemented.

5.1.2 The watching brief will monitor all onshore ground-breaking works associated with construction of the Deep Water Port (**Figure 1**).

6 MARINE MITIGATION METHODS

6.1 Marine Geophysical Data Review

6.1.1 Geophysical and geotechnical surveys have previously been undertaken for the proposed development. These will be archaeologically assessed, and an Archaeological Assessment Report produced.

6.1.2 Relevant data sources with the potential for identifying archaeological remains are summarised as follows:

- Sidescan Sonar data may identify wrecks and other related debris of all periods that lie (at least in part) above the surface of the seabed;
- Magnetometer data may identify wrecks and other related debris of all periods (though principally post-medieval and modern) on the surface of and under the seabed,
- Bathymetry (Multibeam Echo Sounder may be used to characterise wrecks and other related debris of all periods that lie (at least in part) on the surface of the seabed; and
- Sub-bottom profiler data may be used to identify and characterise submerged prehistoric landscapes in conjunction with geotechnical core analysis.

6.1.3 Survey data will be reviewed by Wessex Archaeology, and will be interpreted by an archaeologist with an appropriate level of expertise. If any further items of interest are identified, Archaeological Curators will be consulted prior to any changes to the mitigation strategy.

6.1.4 Currently Multibeam Echo Sounder (MBES) data is available for the marine development area (Figure 1).

6.1.5 In addition to the existing MBES dataset side scan sonar (SSS) survey is proposed for two wreck sites (during late June 2021) – SS *Alabama* and *Portugal*.

6.2 Archaeological Exclusion Zones

6.2.1 An Archaeological Exclusion Zone of +10 m has been agreed with the Developer around the extent of *Andalina* (**WA2002**). The AEZ should be of sufficient extent to mitigate physical effects to the wreck site, as agreed with the relevant Curators.

6.3 Wreck Recording

6.3.1 The principal archaeological mitigation proposed in this WSI is the production of a basic plan based on MBES and SSS datasets of the *Alabama* and *Portugal* wrecks before they are impacted by the development works.

WA2001/W1: SS Alabama

6.3.2 The intention is to remove parts of the SS *Alabama* (W1) protruding above -8 m Chart Datum as it would otherwise be an obstruction to navigation within the Deep Water Port. It is estimated around 300 – 400 tonnes of steel will be detached from the wreck and placed within the wreck superstructure. To inform the specifics of the works to be undertaken a reconnaissance survey was carried out in March 2020 to identify elements of W1 above -8 m CD and spaces within the superstructure which items can be placed (Leask Marine 2019; 2020).

6.3.3 After a recommendation by HES, the mitigation set out in the EIAR (Affric Limited 2020) was to include a 'before and after' survey of the wreck to ensure that a suitable record was made of the wreck both before and after dismantling. This was to consist of a measured survey, to be supplemented by video footage of the dive survey. The EIAR described the 2020 Leask survey as the 'before' survey (Section 13.6.1.1).

6.3.4 Following the 2020 survey by Leask the EIAR states that 'It remains an extensive and confused wreck, with some elements of the ship's structure intact and recognisable. These include a propeller, some railings along the starboard side and some H-beam ribs of the hull. There is also much loose steel plate and associated metal debris. The wreck appears to be oriented roughly NE/SW, with the bow towards the shoreline' (Section 13.5.2.1).

6.3.5 The video footage of the dive survey was assessed by Wessex Archaeology as not having adequate coverage of the Site for informing a full archaeological assessment. Therefore, further wreck recording is proposed using the upcoming SSS and existing MBES data to constitute the ('before') pre-dredge site recording.

WA2007/W11: Portugal

6.3.6 A wreck referred to as the *Portugal*, lies within the Main Channel,[1] and is proposed for sidescan sonar survey, MBES survey prior to complete removal.

6.4 Geoarchaeological/Geotechnical Data Review

6.4.1 A substantial amount of geotechnical work has already been completed within the Stornoway DWP Site. These are set out in a number of reports:

- Causeway Geotech 2018 Stornoway Deep Water Berth: Ground Investigation. Report No.: 17-0769a Factual
- Causeway Geotech 2018 Stornoway Deep Water Berth: Ground Investigation. Report No.: 17-0769a Interpretative
- Causeway Geotech 2019 Stornoway Deep Water Port: Ground Investigation. Report No.: 19-0382
- Causeway Geotech 2020 Stornoway Deep Water Port Phase 3: Ground Investigation. Report No.: 19-1559
- Gavin and Doherty Geosolutions 2019 Stornoway Deepwater Berth GIR. Document reference: 19023-R-00-00

6.4.2 Boreholes 7 and 18 outwith the dredge area indicate shallow organic content. These are within -7m CD so potentially of archaeological interest in understanding the paleoenvironment resource within the development (Gavin and Doherty Geosolutions 2019).

6.4.3 This dataset will be archaeologically assessed to the standards of a Stage 1 geoarchaeological assessment. This will inform the understanding of paleogeographic potential based on desk-based review of geotechnical logs (Gribble and Leather 2011).

6.5 Protocol for Archaeological Discoveries

6.5.1 Unexpected material that may only be encountered during the course of the project will be addressed through adherence to the Protocol for Archaeological Discoveries (PAD) which is included in the Construction Environmental Management Document (CEMD). Prior to any

[1] "Navigation Channel At Dredge" – SDWP-WS2139-XX-00-DR-C-1003, Rev T01, received 12th May 2021.

dredging works all relevant contractors will be briefed by the Client's appointed archaeologist on the use of a PAD and the appropriate system of contacts set up.

7 POST-EXCAVATION METHODS AND REPORTING

7.1 Finds Evidence

7.1.1 All retained finds reported through the marine PAD will, as a minimum, be washed, weighed, counted and identified. They will then be recorded to a level appropriate to the aims and objectives of the watching brief. The report will include a table of finds by feature/context.

7.1.2 Where appropriate metalwork from stratified contexts will be X-rayed and, along with other fragile and delicate materials, stored in a stable environment. The X-raying of objects and other conservation needs will be undertaken by Wessex Archaeology in-house conservation staff, or by another approved conservation centre.

7.1.3 Finds will be suitably bagged and boxed in accordance with the guidance given by the relevant museum and generally in accordance with the standards of the CIfA (2014b).

7.2 Stratigraphic Evidence

7.2.1 A written description will be made of all archaeologically significant features and deposits identified through the Stage 1 geoarchaeological review of geotechnical logs and sub-bottom profiler (SBP) seismic data , ordered by period and/or feature group as appropriate.

7.3 Environmental Evidence

7.3.1 During previous geotechnical sampling Holocene and Pleistocene sediments were not competent and sub-samples pertaining to these upper, unconsolidated sediment sequences were not suitable for further assessment, and hence were not retained. The Stage 1 geoarchaeological review is confined to utilising the existing core logs and SBP datasets.

7.4 Reporting

7.4.1 Following completion of the desk-based review and the construction phase a marine archaeological technical report will be submitted for approval to the client and the Curators, within 12 weeks. Once approved, a final version will be submitted and archived.

7.4.2 The technical report will include the following elements:

- a non-technical summary;
- project number, planning reference numbers, dates of fieldwork and National Grid Reference;
- an account of the background to the project and circumstances of work;
- the methodologies used;
- a description of the archaeology identified;
- a summary of the artefactual/environmental material recovered from the Site;
- recommendations for further work, should this be warranted;
- plans and sections at an appropriate scale locating the site, location of known archaeological structures, architectural features and observations, and deposits and their extent;

- details of the archive and its proposed location
- Appendices inclusive of:
  - a detailed context index;
  - tabulation of finds data by context and by material type;
  - tabulation of small finds;
  - tabulation of environmental samples by context and potential;
  - tabulation of the graphics record; and
  - tabulation of the photographic archive.

7.4.3 A copy of the data structure report(s) and surveyed spatial digital data (.dxf or shapefile format) relating to the archaeological findings will be deposited with HES.

Publication

7.4.4 Following the completion of all fieldwork, the need for additional post excavation work and any other forms of publication will be assessed, in consultation with the Western Isles Archaeologist and the client.

OASIS and DES

7.4.5 An OASIS online record (http://oasis.ac.uk/pages/wiki/Main), including an entry for Discovery and Excavation in Scotland (DES) will be created, with key fields completed, and a .pdf version of the final report submitted. Subject to any contractual requirements on confidentiality, copies of the OASIS record will be integrated into the relevant local and national records and published through the Archaeology Data Service ArchSearch catalogue (a paper copy will also be included with the archive).

8 ARCHIVE STORAGE AND CURATION

8.1 Treasure Trove

8.1.1 If finds are made, details of the site name, location, excavating unit, point of contact for the project and composition/size of archaeological assemblage will be submitted to the Treasure Trove Unit via the 'Standard organised fieldwork reporting' and 'Reporting of finds for Treasure Trove Assessment' forms.

8.1.2 Under the laws of Treasure Trove and *bona vacantia*, all material recovered by archaeological intervention in Scotland belongs to the Crown. Material may not be removed from Scotland without the prior written permission of the Queen's and Lord Treasurer's Remembrancer. Should it be necessary to transport finds outside of Scotland then permission will be sought via an 'Application form for authority to borrow unallocated Treasure Trove for research purposes'.

8.2 Aircraft

8.2.1 The majority of aircraft wrecks are military and therefore fall under the Protection of Military Remains Act 1986. Any finds that are suspected of being military aircraft will be reported immediately to Wessex Archaeology. In the case of a military aircraft being investigated under licence, any human remains will be reported immediately.

8.3 Wreck

8.3.1 Archaeological artefacts that have come from a ship are 'wreck' for the purposes of the Merchant Shipping Act 1995. Stornoway Port Authority should ensure that the Receiver of Wreck is notified within 28 days of recovery, for all items of wreck that have been recovered.

8.4 Museum

8.4.1 The archive will be deposited with Historic Environment Scotland and Co*mhairle nan Eilean Siar* HER. The final deposition of any artefacts/ecofacts will be allocated through the Treasure Trove Unit panel.

8.4.2 Provision will be made for the cost of long-term storage in the post-fieldwork costs. The museum will receive notification following review by the Treasure Trove Unit panel and an accession number will be obtained.

8.5 Preparation of Archive

8.5.1 The complete archive, which may include paper records, graphics, artefacts, ecofacts and digital data, will be prepared following the standard conditions for the acceptance of excavated archaeological material by the receiving museum, and in general following nationally recommended guidelines (SMA 1995; CIfA 2014c; Brown 2011; ADS 2013). The archive will usually be deposited within one year of the completion of the project, with the agreement of the client.

8.6 Selection Policy

8.6.1 Wessex Archaeology follows National guidelines on selection and retention (SMA 1993; Brown 2011, section 4) will be followed. In accordance with these, and any specific guidance prepared by the receiving museum, a process of selection and retention will be followed so that only those artefacts or ecofacts that are considered to have potential for future study will be retained. The selection policy will be agreed with the museum, and fully documented in the project archive. Material not selected for retention may be used for teaching or reference collections by the museum, or by Wessex Archaeology.

8.7 Security Copy

8.7.1 In line with current best practice (eg, Brown 2011), on completion of the project a security copy of the written records will be prepared in the form of a digital PDF/A file. PDF/A is an ISO-standardised version of the Portable Document Format (PDF) designed for the digital preservation of electronic documents through omission of features ill-suited to long-term archiving.

9 OUTREACH AND SOCIAL MEDIA

9.1.1 The Developer will seek opportunities to disseminate the results of the watching brief and engage with the local community through social media, press releases, open days and volunteer involvement, while taking into account issues such as Health & Safety, confidentiality and vandalism.

10 COPYRIGHT

10.1 Archive and Report Copyright

10.1.1 The full copyright of the written/illustrative/digital archive relating to the project will be retained by Wessex Archaeology under the *Copyright, Designs and Patents Act* 1988 with all rights reserved. The client will be licenced to use each report for the purposes that it was produced in relation to the project as described in the specification. The museum, however, will be granted an exclusive licence for the use of the archive for educational purposes, including academic research, providing that such use conforms to the *Copyright and Related Rights Regulations* 2003. In some instances, certain regional museums may require absolute transfer of copyright, rather than a licence; this should be dealt with on a case-by-case basis.

10.2 Third Party Data Copyright

10.2.1 This document, the watching brief report and the project archive may contain material that is non-Wessex Archaeology copyright (eg, Ordnance Survey, British Geological Survey, Crown Copyright), or the intellectual property of third parties, which Wessex Archaeology are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable by Wessex Archaeology. Users remain bound by the conditions of the *Copyright, Designs and Patents Act* 1988 with regard to multiple copying and electronic dissemination of such material.

11 WESSEX ARCHAEOLOGY PROCEDURES

11.1 External Quality Standards

11.1.1 Wessex Archaeology is registered as an archaeological organisation with the Chartered Institute for Archaeologists (CIfA) and fully endorses its *Code of conduct* (CIfA 2014d) and *Regulations for professional conduct* (CIfA 2014e).

11.2 Internal Quality Standards

11.2.1 Wessex Archaeology is an ISO 9001 accredited organisation (certificate number FS 606559), confirming the operation of a Quality Management System which complies with the requirements of ISO 9001:2015 – covering professional archaeological and heritage advice and services. The award of the ISO 9001 certificate, independently audited by the British Standards Institution (BSI), demonstrates Wessex Archaeology's commitment to providing quality heritage services to our clients. ISO (the International Organisation for Standardisation) is the most recognised standards body in the world, helping to drive excellence and continuous improvement within businesses.

11.2.2 Wessex Archaeology operates a computer-assisted project management system. Projects are assigned to individual project managers who are responsible for the successful completion of all aspects of the project. This includes monitoring project progress and quality; controlling the project budget from inception to completion; and all aspects of Health and Safety for the project. At all stages the project manager will carefully assess and monitor performance of staff and adherence to objectives, timetables and budgets, while the manager's performance is monitored in turn by the team leader or regional director.

11.2.3 All work is monitored and checked whilst in progress on a regular basis by the project manager, and all reports and other documents are checked (where applicable) by the team leader/technical manager, or regional director, before being issued. A series of guideline

documents or manuals form the basis for all work. The technical managers in the Graphics, Finds & Analysis, GeoServices and IT sections provide additional assistance and advice.

11.2.4 All staff are responsible for following Wessex Archaeology's quality standards but the overall adherence to and setting of these standards is the responsibility of the senior management team in consultation with the team leaders/regional directors who also ensure projects are adequately programmed and resourced within Wessex Archaeology's portfolio of project commitments.

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APPENDICES

Appendix 1: Terrestrial Gazetteer

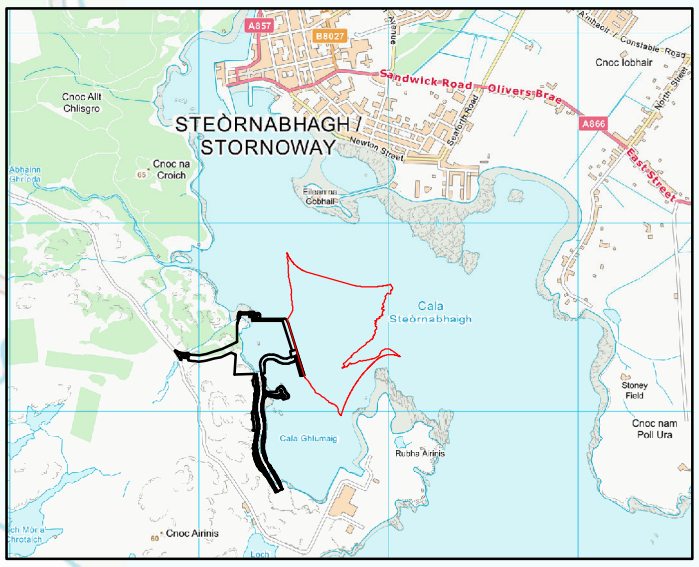
WA ID	Other References	Description	Eastings	Northings
1001	HER MWE142507	Earth and stone field boundary dyke	142311	930587
1002	Canmore 335488; HER MWE142511	Field system dating to the post-medieval period	142851	930975
1003	Canmore 335489	Field system dating to the post-medieval period	142956	931070
1004	Canmore 335487; HER MWE142506	Abandoned traditional boat	142223	931475
1005	Canmore 296439	Beacon, Sgeir Na Pacaid	142467	931100
1006	Canmore 296438	Beacon, Arnish Point	142947	931209

Appendix 2: Marine Gazetteer

WAID	EIAR	Other References	Name	Period	Description	Easting	Northing
2001	W1	UKHO 752; Canmore 102827 and 321418; MWE102827	ALABAMA	Sunk 1904	A Danish steam ship built in 1899. It had a length of 114m and a gross tonnage of 4454. It was in ballast when sunk. The wreck length is 70m. It lies on its side, the wreckage is confused and shows sign of having been dispersed by explosives. In 2013 Aspect Land & Hydrographic Surveys Ltd tentatively identified a wreck they surveyed at 142369, 931549 as the Alabama.	142356	931559
2002	W2	UKHO 749; Canmore 102826; HER MWE102826	ANDALINA	Possibly 1923	The wreck of a wooden vessel with a cargo of coal, was largely broken up with a boiler and part of the stern remaining in 1983. It was amended to dead in 2006. In 2013 Aspect Land & Hydrographic Surveys Ltd tentatively identified a wreck they surveyed at 142785, 931116 as the Andalina.	142786	931114
2003	W3	UKHO 744; Canmore 102824; HER MWE102824	ARNISH	Sunk 1923	A steam ship with a wooden hull, 37m in length and with a gross tonnage of 271. Some wreckage and a boiler were observed by divers in 1976. Amended to dead in 2005.	142642	930739
2004	W4	UKHO 746; Canmore 102825; HER MWE102825	BJORN	Sunk 1921	A wreck with a cargo of coal that was intact in 1976. Its length was 50 m. If it was named Bjorn it was possibly a steal steam ship built in 1904, a composite steamship built in 1889 or a wooden barque built in 1869. Amended to dead in 2005. A wreck surveyed by Aspect Land & Hydrographic Surveys Ltd in 2013 at 142818, 931048 was found to have a height of 1.7m above the seabed in shallow water, a significant magnetic signature and was largely intact with frames visible on the sidescan data.	142813	931047
2005	W5	UKHO 751; Canmore 296435	BLOOM	Sunk 1957	A fishing vessel that was largely dispersed in 1958. It was not located by HMS Herald in 1976, nor by multibeam bathymetry survey in 2019. However, it has not been amended to dead.	142549	931496
2006	W10	UKHO 748; Canmore 102846; HER MWE102846	MARJORY	20th Century	The wreck of a 20th century wooden motor fishing vessel, that was in an advanced stage of collapse in 1976. It was amended to dead in 2005. In 2013 Aspect Land & Hydrographic Surveys Ltd tentatively identified a wreck they surveyed at 142544, 931127 as the Marjory.	142550	931123
2007	W11	UKHO 753; Canmore 102828; HER MWE102828	PORTUGAL	20th Century	The wreck of a steam ship carrying a cargo of coal. Its mast and funnel showed above water in 1951, but were no longer visible in 1952. Wreck was broken up when examined in 1976. It was relocated by multibeam bathymetry survey in 2019.	142738	931569
2008	W14	UKHO 745; Canmore 102813; HER MWE102813	Unknown	Unknown	A wreck first observed in 1975. The wreck is approximately 20m long and has iron ribs with a small amount of timber attached, suggesting a composite construction. The wreck is in the intertidal zone.	142323	930839
2009		UKHO 64753; Canmore 324025	Unknown	20th Century	The wreck of a stranded barge first charted in 1958. By 1976 it was no longer visible and could not be located. Now considered dead.	142924	931085
2010		UKHO 65496; Canmore 324083			Foul ground thought to be steel hawser. Amended to dead in 2005.	143063	931396

Appendix 3: Recorded Losses

Canmore ID	HER ID	EIAR ID	Name	Date of Loss	Description
217463	MWE147701		Fair Hibernian	1796	A full-rigged ship, with cargo of hemp, iron and deals, travelling from Petersburg to Dublin
271980		W8	Jane Nicholson	1826	Stornoway Harbour Entrance, Lewis, North Minch
282444		W9	Laurel	1849	Stornoway Harbour Entrance, Lewis, North Minch
217516		W7	Fisher Lassies	1894	Lugger wrecked in Stornoway outer harbour.
247758	MWE147856		Exile	19th century	Stornoway Harbour Entrance, Lewis, North Minch. May have returned to service after being stranded
296474		W12	Rap	1909	Steamship stranded at Stornoway Harbour
296503		W6	Comrade	1947	Steam Drifter that blew up at Stornoway
220829	MWE147635	W13	Unknown	20th century	Unknown Yawl, Stornoway Harbour Entrance, Lewis, North Minch
214587	MWE147524		Atlantic Proctor	20th century	Motor ship wrecked at Broag, Stornoway, Lewis, North Minch



932000

2001

2007

2005

1004

2010

1006

2006

2002

1005

2009

1003

2004

931000

1002

2008

2003

1001

0 500 m

142000

143000

Coordinate system:
OSGB36 (BNG)

Scheme outline

Actual dredge area

Terrestrial heritage assets

Marine heritage assets

Date:	07/06/2021	Revision Number:	0
Scale:	1:5,000 at A3	Illustrator:	NB
Path:	T:\Projects\247960\GIS		

Site location showing the development and heritage assets

Figure 1

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Appendix 9B – Onshore Written Scheme of Investigation

Stornoway Deep Water Port
Stornoway, Western Isles

Written Scheme of Investigation for Archaeological Watching Brief

Planning Ref.: 21/00108
Document Ref.: 247960.04
November 2021

wessexarchaeology

21-23 Slaters Steps
Edinburgh
EH8 8PB

www.wessexarch.co.uk

Wessex Archaeology Ltd is a company limited by guarantee registered in England, company number 1712772. It is also a Charity registered in England and Wales number 287786, and in Scotland, Scottish Charity number SC042630. Our registered office is at Portway House, Old Sarum Park, Salisbury, Wiltshire, SP4 6EB

Document Information

Document title	Stornoway Deep Water Port, Stornoway, Western Isles
Document subtitle	Written Scheme of Investigation for Archaeological Watching Brief
Document reference	247960.02
Client name	Stornoway Port Authority
Address	Amity House, Esplanade Quay, Stornoway HS1 2XS
Site location	Stornoway Deep Water Port, Glumaig Bay
County	Western Isles/ Na h-Eileanan an Iar
National grid reference	NB 42066 31297
Planning authority	Comhairle nan Eilean Siar
Planning reference	21/00108
Museum name	TBC
Museum accession code	TBC
WA project name	Stornoway Deep Water Port, Stornoway, Western Isles
WA project code	247960
Project management by	Andrew Bicket
Document compiled by	Ben Saunders
Contributions from	Natalia Bain
Graphics by	Natalia Bain

Quality Assurance

Issue	Date		Author	Approved by
1	08/09/2021	Internal Draft	BS, NB	
2	13/09/2021	Draft for Client review	BS, NB	AB
3	17/09/2021	External Draft	BS, NB	AB
4	05/10/2021	External Draft	BS, NB	AB
5	10/11/2021	Agreed version	BS, NB	AB

Contents

List of Figures

Stornoway Deep Water Port
Stornoway, Western Isles

Written Scheme of Investigation for Archaeological Watching Brief

1 INTRODUCTION

1.1 Project and planning background

Wessex Archaeology has been commissioned by Stornoway Port Authority ('the client'), to produce a written scheme of investigation (WSI) for a proposed archaeological watching brief during construction of an access road meeting Condition 4 of the Planning Consent (Comhairle nan Eilean Siar Planning Ref. 21/00108). The works to be monitored cover an area of 1.14 ha centred on NGR NB 42066 31297, at Stornoway Deep Water Port, Arnish Point, Stornoway, HS2 9JY (**Fig. 1**).

1.1.1 The Stornoway DWP development comprises the following main components:

- Main Quay;
- Heavy Load Area;
- Pontoon;
- Bollard Island;
- Freight Ferry Berth and Linkspan;
- Reclaimed/Levelled Area;
- Dredging;
- **Access Road**;
- Link Road;
- Services; and
- Navigational Element

1.2 Scope of document

1.2.1 This WSI sets out the strategy and methodology by which the archaeological mitigation measures for the Access Road works will be implemented. In format and content, it conforms with current best practice and to the guidance outlined in Historic Environment Scotland's *Policy Statement* (Historic Environment Scotland 2016) and the Chartered Institute for Archaeologists' (CIfA) Standards and guidance for watching briefs (CIfA 2014a).

1.2.2 This document will be submitted to the Western Isles Archaeologist, archaeological advisor to the Local Planning Authority (LPA), for approval, prior to the start of the watching brief.

1.3 Location, topography and geology

1.3.1 The proposed watching brief is located at NB 42066 31297.

1.3.2 Existing ground levels average at 30m OD (c.33 m Chart Datum).

1.3.3 The underlying geology is mapped as Stornoway Formation of conglomerate sandstones for the eastern part of Arnish Point, and Outer Hebrides Thrust Zone Mylonites Complex – Protocataclasite for the western part of the site (British Geological Survey online viewer). One trial pit was excavated at 142303E 930723N which found a depth of 0.1 m of heather and vegetation and 0.6 m of firm dark brown fibrous peat laying on weathered gneiss (Causeway Geotech 2019).

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 Introduction

2.1.1 The archaeological and historical background was assessed in a prior Environmental Impact Assessment (Affric 2020), which considered the recorded historic environment resource within the study area of the development boundary. A summary of the results is presented below, with relevant entry numbers from the CnES Historic Environment Record (HER) and CANMORE included. Additional sources of information are referenced, as appropriate.

2.1.2 The EIA consulted the following sources of information:

- Designation data downloaded from the Historic Environment Scotland website on 2nd February 2020;
- The National Record of the Historic Environment (NRHE), including the Canmore database and associated photographs, prints/drawings and manuscripts held by HES;
- Historic Landscape Assessment data viewed through the HLAMap website;
- The Comhairle nan Eilean Siar Historic Environment Record (HER) – digital data extract received on 11th March 2020;
- The National Collection of Aerial Photography (NCAP);
- Geological data available online from the British Geological Survey;
- Historic maps held by the National Library of Scotland;
- Ordnance Survey Name Books;
- Unpublished maps and plans held by the National Records of Scotland;
- Readily available published sources and unpublished archaeological reports.
- A site walkover and setting visits that were on the 22nd February 2018.

2.2 Archaeological and historical context

2.2.1 Two terrestrial assets were identified by the EIAR as lying within the Inner Study Area (Stornoway Port Authority 2020, Chapter 13) - an earth and stone field boundary dyke (WA1001) next to the extant Arnish Fabrication Yard and the remains of a field system dating to the post-medieval period on a headland to the east of Glumaig Harbour (**WA1002**). Both of these relate to the agricultural history of the area. Canmore lists a further field system on the headland (**WA1003**). A further record is located within the construction footprint of the development, an abandoned traditional boat (**WA1004**). There are also two navigation beacons listed in Canmore (**WA1005** and **WA1006**). Details of these are set out in **Appendix 1** and displayed in **Figure 1**.

3 AIMS AND OBJECTIVES

3.1 Aims

3.1.1 The aims (or purpose) of the watching brief, as defined in the CIfA *Standard and guidance for an archaeological watching brief* (CIfA 2014a) are:

- To allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of the development or other works;
- To provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard; and
- To guide, not replace, any requirement for contingent excavation or preservation of possible deposits.

3.2 Objectives

3.2.1 In order to achieve the above aims, the objectives of the watching brief are:

- To determine the presence or absence of archaeological features, layers (e.g. preserved ground surfaces and deposits of material inside archaeological features), structures, artefacts or environmental evidence (e.g. wood and other plant remains) within the specified works area;
- To record and establish, within the constraints of the works, the extent, character, date, condition and quality of any surviving archaeological remains (a preservation by record);
- To place any identified archaeological remains within a wider historical and archaeological context in order to assess their significance; and
- To make available information about the archaeological resource on the site by preparing a report on the results of the watching brief.

4 FIELDWORK METHODS

4.1 Introduction

4.1.1 All works will be undertaken in accordance with the detailed methods set out within this WSI. Any significant variations to these methods will be agreed in writing with the Western Isles Archaeologist and the client, prior to being implemented.

4.1.2 Works will comprise the construction of an access road located at located NB 42066 31297 leading from the road to the site. The watching brief will monitor all onshore ground-breaking works.

4.2 Service location and other constraints

4.2.1 The Principal Contactor will be responsible for the identification and protection of any above- and below-ground services within the watching brief area/s. The Principal Contactor will also be responsible for implementation of the environmental mitigation measures set out in the Environmental Impact Assessment Report (Affric 2020).

4.3 Watching brief methods

4.3.1 The watching brief will be undertaken by at least one archaeologist, subject to the number of site operations being carried out at any one time. All mechanical excavation will be conducted with a suitable bucket for the purposes of an archaeological watching brief and constantly monitored by the watching archaeologist. A toothless ditching bucket will be used where practicable to remove surface vegetation and topsoil to provide a clean view of the initial subsoil surface. In areas of peat deposits, in order to facilitate ecological/environmental requirements a toothed bucket will be used to remove that deposit. It may be necessary to utilize a toothless bucket beneath peat deposits if further potential archaeological or buried landsurfaces are present locally.

4.3.2 Without causing unnecessary delay to the groundwork programme, the archaeologist may ask for the ground-breaking work to be temporarily halted whilst investigations are carried out. If appropriate, areas of archaeological interest will be defined and suitably protected in advance of their investigation and recording.

4.3.3 Where necessary, the surface of archaeological deposits will be cleaned by hand. A sample of the archaeological features and deposits identified will be hand-excavated and recorded, sufficient to address the aims of the watching brief. Spoil derived from both machine stripping and hand-excavation will be visually scanned for the purposes of finds retrieval, and where appropriate will also be metal-detected by trained archaeologists. Artefacts and other finds will be collected and bagged by context.

4.3.4 If extensive, complex or well-preserved archaeological remains are identified, for which the scope of the approved watching brief WSI is insufficient, the watching archaeologist will halt the groundwork, delimit the area of archaeological interest, and report immediately to the Project Manager, the independent Environmental Clerk of Works, the Principal Contractor, the client and the Western Isles Archaeologist, as a contingent excavation or revised strategy may be required. The programme, and additional resources, for any contingent excavation will be agreed with the client. Accordingly, this WSI will need revising before any further fieldwork proceeds – the revised WSI will need the approval of the Western Isles Archaeologist, on behalf of the LPA.

4.3.5 If human remains are uncovered, the specific methods outlined below (section 4.7.2) will be followed.

4.4 Recording

4.4.1 All exposed archaeological deposits and features will be recorded. A complete drawn record of excavated archaeological features and deposits will be made. This will include plans and sections, drawn to appropriate scales (generally 1:20 or 1:50 for plans, 1:10 for sections) and tied to the Ordnance Survey (OS) National Grid. The Ordnance Datum (OD: Newlyn) heights of all principal features will be calculated (as defined by OSGM15 and OSTN15) and the levels added to the drawings.

4.4.2 A full photographic record will be made using digital cameras equipped with an image sensor of not less than 10 megapixels. This will record both the detail and the general context of the principal features and the site as a whole. Digital images will be subject to managed quality control and curation processes which will embed appropriate metadata within the image and ensure long term accessibility of the image set.

4.5 Monitoring

4.5.1 The client will inform the Western Isles Archaeologist of the start of the watching brief and its progress. Reasonable access will be arranged for the Western Isles Archaeologist to make site visits in order to inspect and monitor the progress of the watching brief, subject to compliance with the Principal Contractor's site rules. Any variations to the WSI, if required to better address the project aims, will be agreed in advance with the client and the Western Isles Archaeologist.

4.6 Finds

General

4.6.1 All archaeological finds from excavated contexts will be retained, although those from features of modern date may be recorded on site and not retained. Where appropriate, soil samples may be taken and sieved to aid in finds recovery. Any finds requiring conservation or specific storage conditions will be dealt with immediately in line with *First Aid for Finds* (Watkinson and Neal 1998).

Human remains

4.6.2 Every discovery of readily identifiable human remains made during archaeological excavations will be reported by the excavation director to the local police or Procurator Fiscal's office within 24 hours. Further excavation or disturbance of the remains will cease until the excavation director is advised formally by the legal authorities that work may continue (this includes cases where remains are to be left *in situ*).

4.6.3 Any human remains (articulated or disarticulated, cremated or unburnt) discovered, will be left *in situ*, covered and protected. Following discussions with the local police or Procurator Fiscal's office, the client and the Western Isles Archaeologist, and with advice from a qualified and experienced osteoarchaeologist, the need for and appropriateness of their excavation/removal or sampling as part of the watching brief will be determined.

4.6.4 Where deemed appropriate, the human remains will be fully recorded, excavated and removed from the site in compliance with terms imposed by the Procurator Fiscal's office. Excavation procedures relating to human remains will comply with Scots Law as set out in Historic Scotland's (2016) *Operational Policy Paper 5: The Treatment of Human Remains in Archaeology*.

4.6.5 Any excavation and post-excavation processing will be carried out accordance with current

guidance documents (e.g. McKinley 2013) and the standards set out in CIfA *Technical Paper 13 Excavation and post-excavation treatment of cremated and inhumed remains*. Appropriate specialist guidance/site visits will be undertaken if required.

4.6.6 The final deposition of human remains subsequent to the appropriate level of osteological analysis and other specialist sampling/examinations will be in accordance with the terms agreed with the Procurator Fiscal's office.

4.7 Environmental sampling

4.7.1 Bulk environmental soil samples, for the recovery of plant macrofossils, wood charcoal, small animal bones and other small artefacts, will be taken as appropriate from well-sealed and dateable archaeological contexts or features. In general, features directly associated with particular activities (eg, pits, latrines, cesspits, hearths, ovens, kilns, and corn driers) should be prioritised for sampling over features, such as ditches or postholes, which are likely to contain reworked and residual material.

4.7.2 If waterlogged or mineralised deposits are encountered, an environmental sampling strategy will be devised and agreed with the Western Isles Archaeologist as appropriate.

4.7.3 Any samples will be of an appropriate size – typically 40 litres for the recovery of environmental evidence from dry contexts, and 10 litres from waterlogged deposits.

4.7.4 Following specialist advice, other sampling methods such as monolith, Kubiena or contiguous small bulk (column) samples may be employed to enable investigation of deposits with regard to microfossils (eg, pollen, diatoms) and macrofossils (eg, molluscs, insects), soil micromorphological or soil chemical analyses.

5 POST-EXCAVATION METHODS AND REPORTING

5.1 Stratigraphic evidence

5.1.1 All written and drawn records from the watching brief will be collated, checked for consistency and stratigraphic relationships. Key data will usually be transcribed into an Access database, which can be updated during any further analysis. The watching brief will be preliminary phased using stratigraphic relationships and the spot dating from finds, particularly pottery.

5.1.2 A written description will be made of all archaeologically significant features and deposits that were exposed and excavated, ordered by period and/or feature group as appropriate.

5.2 Finds evidence

5.2.1 All retained finds will, as a minimum, be washed, weighed, counted and identified. They will then be recorded to a level appropriate to the aims and objectives of the watching brief. The report will include a table of finds by feature/context.

5.2.2 Metalwork from stratified contexts will be X-rayed and, along with other fragile and delicate materials, stored in a stable environment. The X-raying of objects and other conservation needs will be undertaken by an approved conservation centre.

5.2.3 Finds will be suitably bagged and boxed in accordance with the guidance given by the relevant museum and generally in accordance with the standards of the CIfA (2014b).

5.3 Environmental evidence

5.3.1 Bulk environmental soil samples will be processed by standard flotation methods and scanned to assess the environmental potential of deposits. The flot will be retained on a 0.25 mm mesh, with residues fractionated into 5.6/4 mm, 2 mm, 1 mm and 0.5 mm and dried if necessary. Coarse fraction (>5.6/4 mm) will be sorted, weighed and discarded, with any finds recovered given to the appropriate specialist. Finer residues will be retained until after any analyses and discarded following final reporting (in accordance with the selection policy, section 6.4).

5.3.2 In the case of samples from cremation-related deposits the flots will be retained on a 0.25 mm mesh, with residues fractionated into 4 mm, 2 mm and 1 mm. In the case of samples from inhumation deposits, the sample will be artefact sieved through 9.5 mm and 1 mm mesh sizes. The coarse fractions (9.5 mm) will be sorted with any finds recovered given to the appropriate specialist together with the finer residues.

5.3.3 Any waterlogged or mineralised samples will be processed by standard waterlogged flotation methods.

5.4 Reporting

5.4.1 Following completion of the fieldwork a draft data structure report will be submitted for approval to the client and the Western Isles Archaeologist, within 12 weeks. Once approved, a final version will be submitted.

5.4.2 The data structure report will include the following elements:

- a non-technical summary;
- project number, planning reference numbers, dates of fieldwork and National Grid Reference;
- an account of the background to the project and circumstances of work;
- the methodologies used;
- a description of the archaeology identified;
- a summary of the artefactual/environmental material recovered from the Site;
- recommendations for further work, should this be warranted;
- plans and sections at an appropriate scale locating the site, location of known archaeological structures, architectural features and observations, and deposits and their extent;
- details of the archive and its proposed location
- Appendices inclusive of:
- a detailed context index
- tabulation of finds data by context and by material type;
- tabulation of small finds;
- tabulation of environmental samples by context and potential;
- tabulation of the graphics record; and
- tabulation of the photographic archive.

5.4.3 A copy of the data structure report(s) and surveyed spatial digital data (.dxf or shapefile format) relating to the archaeological findings will be deposited with HES.

Publication

5.4.4 Following the completion of all fieldwork, the need for additional post excavation work and any other forms of publication will be assessed, in consultation with the Western Isles Archaeologist and the client.

OASIS and DES

5.4.5 An OASIS online record (http://oasis.ac.uk/pages/wiki/Main),including an entry for Discovery and Excavation in Scotland (DES) will be created, with key fields completed, and a .pdf version of the final report submitted. Subject to any contractual requirements on confidentiality, copies of the OASIS record will be integrated into the relevant local and national records and published through the Archaeology Data Service ArchSearch catalogue (a paper copy will also be included with the archive).

6 ARCHIVE STORAGE AND CURATION

6.1 Treasure Trove

6.1.1 Upon completion of all fieldwork, details of the site name, location, excavating unit, point of contact for the project and composition/size of archaeological assemblage will be submitted to the Treasure Trove Unit via the 'Standard organised fieldwork reporting' and 'Reporting of finds for Treasure Trove Assessment' forms.

6.1.2 Under the laws of Treasure Trove and *bona vacantia*, all material recovered by archaeological intervention in Scotland belongs to the Crown. Material may not be removed from Scotland without the prior written permission of the Queen's and Lord Treasurer's Remembrancer. Should it be necessary to transport finds outside of Scotland then permission will be sought via an 'Application form for authority to borrow unallocated Treasure Trove for research purposes'.

6.2 Museum

6.2.1 The archive will be deposited with Historic Environment Scotland and Co*mhairle nan Eilean Siar* HER. The final deposition of any artefacts/ecofacts will be allocated through the Treasure Trove Unit panel, with the assumption being that the Museum & Tasglann nan Eilean will be the final point of deposition.

6.2.2 Provision has been made for the cost of long-term storage in the post-fieldwork costs. The museum will receive notification following review by the Treasure Trove Unit panel and an accession number will be obtained.

6.3 Preparation of archive

6.3.1 The complete archive, which may include paper records, graphics, artefacts, ecofacts and digital data, will be prepared following the standard conditions for the acceptance of excavated archaeological material by the Museum & Tasglann nan Eilean, and in general following nationally recommended guidelines (SMA 1995; CIfA 2014c; Brown 2011; ADS 2013). The archive will usually be deposited within one year of the completion of the project, with the agreement of the client.

6.4 Security copy

6.4.1 In line with current best practice (eg, Brown 2011), on completion of the project a security copy of the written records will be prepared in the form of a digital PDF/A file. PDF/A is an ISO-standardised version of the Portable Document Format (PDF) designed for the digital preservation of electronic documents through omission of features ill-suited to long-term archiving.

7 COPYRIGHT

7.1 Third party data copyright

7.1.1 This document may contain material that is non-Wessex Archaeology copyright (eg, Ordnance Survey, British Geological Survey, Crown Copyright), or the intellectual property of third parties, which Wessex Archaeology are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable by Wessex Archaeology. Users remain bound by the conditions of the *Copyright, Designs and Patents Act* 1988 with regard to multiple copying and electronic dissemination of such material.

8 HEALTH AND SAFETY

8.1.1 Health and Safety considerations will be of paramount importance in conducting all fieldwork. Safe working practices will override archaeological considerations at all times. All work will be carried out in accordance with the *Health and Safety at Work Act* 1974 and the *Management of Health and Safety at Work Regulations* 1999, and all other applicable Health and Safety legislation, regulations and codes of practice in force at the time.

8.1.2 All fieldwork staff are certified through the Construction Skills Certification Scheme (CSCS) or UK equivalent.

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ADS 2013 *Caring for Digital Data in Archaeology: a guide to good practice*. Archaeology Data Service & Digital Antiquity Guides to Good Practice

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CIfA 2014a *Standard and Guidance for an Archaeological Watching Brief*. Reading, CIfA

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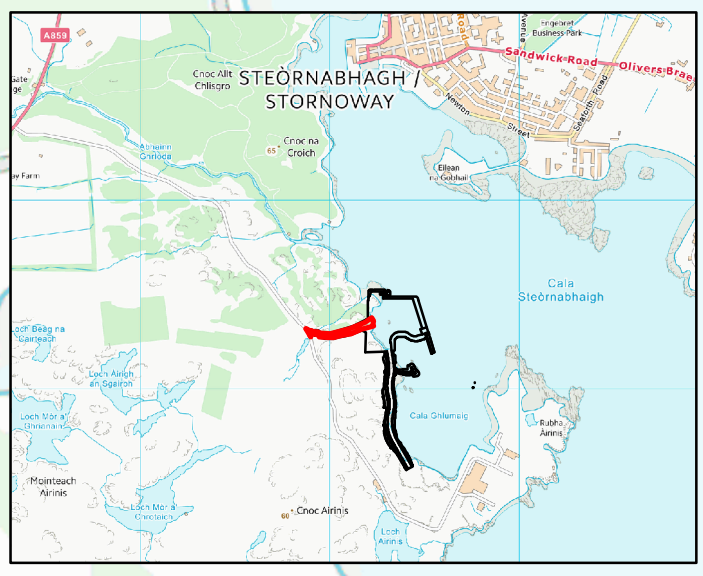
SMA 1993 *Selection, Retention and Dispersal of Archaeological Collections*. Society of Museum Archaeologists

SMA 1995 *Towards an Accessible Archaeological Archive*. Society of Museum Archaeologists

Watkinson, D and Neal, V 1998 *First Aid for Finds: practical guide for archaeologists*. United Kingdom Institute for Conservation of Historic & Artistic Works

Appendix 1: Terrestrial Gazetteer

WA ID	Other References	Description	Eastings	Northings
1001	HER MWE142507	Earth and stone field boundary dyke	142311	930587
1002	Canmore 335488; HER MWE142511	Field system dating to the post-medieval period	142851	930975
1003	Canmore 335489	Field system dating to the post-medieval period	142956	931070
1004	Canmore 335487; HER MWE142506	Abandoned traditional boat	142223	931475
1005	Canmore 296439	Beacon, Sgeir Na Pacaid	142467	931100
1006	Canmore 296438	Beacon, Arnish Point	142947	931209



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930500

142000

142500

143000

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Coordinate system:
OSGB36 (BNG)

Scheme outline

Onshore access road works

Terrestrial heritage assets

Date:	30/09/2021	Revision Number:	0
Scale:	1:5,000 at A3	Illustrator:	NB
Path:	T:\Projects\247960\GIS		

Site location showing the access road works and other development

Figure 1

Wessex Archaeology Ltd registered office Portway House, Old Sarum Park, Salisbury, Wiltshire SP4 6EB
Tel: 01722 326867 Fax: 01722 337562 info@wessexarch.co.uk www.wessexarch.co.uk

Appendix 9C – Protocol for Archaeological Discoveries

Offshore Renewables Protocol

for Archaeological Discoveries

Handout 1: Introduction

Protocol for Reporting Archaeological Discoveries
Implementation Service and Awareness Programme

The Crown Estate owns around half the foreshore and nearly the entire seabed out to the 12 nautical mile limit, and has the rights to licence areas up to 200 nautical miles offshore for renewable energy. It is anticipated that by 2020 approximately one-third of all UK energy will be produced from offshore renewables.

Following the success of the British Marine Aggregate Producers Association (BMAPA) Protocol for Reporting Finds of Archaeological Interest, The Crown Estate commissioned Wessex Archaeology to establish and implement a protocol for the offshore renewables industry.

The aim of the Protocol for Archaeological Discoveries (PAD) is to provide a system for reporting and investigating archaeological finds encountered during construction and installation work. Activities associated with renewable energy such as: placement of turbines, cable-laying, geophysical surveys and seabed sampling all have the potential to impact on the historic environment.

Process
Under the Protocol, staff who make a discovery report it to a local 'Site Champion' onboard the vessel or on site. The Site Champion then passes this report to the company's 'Nominated Contact', the person identified to deal with PAD within each developer.

Once a find is reported through the secure web-based reporting system, Wessex Archaeology's 'Implementation Service' is automatically alerted to the presence of a new find. Staff investigate every find with the help of specialists from around the country and compile detailed reports. The reports are then sent to the finder and all relevant authorities.

Awareness
To support the Protocol, Wessex Archaeology is conducting an Awareness Programme which includes visits to sites and companies as well as regular newsletters. This programme aims to raise awareness of, and confidence in, the use of the Protocol amongst staff.

This pack contains advice and guidance in support of the Protocol Implementation Service.

It includes:
Handout 1 – Introduction
Handout 2 – What are 'finds'?
Handout 3 – Reporting
Handout 4 – Photographing finds
Handout 5 – Conservation & Storage
Handout 6 – Prehistoric Finds
Handout 7 – Metalwork & Concretions
Handout 8 – Munitions & Ordnance

If any of these are missing, or you would like further copies, please contact the Protocol Team at Wessex Archaeology.

For further information please contact:
Toby Gane (Project Manager)

Wessex Archaeology
Portway House
Old Sarum Park
Salisbury, SP4 6EB
Tel: 01722 326867
Fax: 01722 337562
info@wessexarch.co.uk

Or visit Wessex Archaeology's Protocol pages on the website:
http://www.wessexarch.co.uk/projects/marine/tcerenewables

Nominated Contacts should report discoveries through the secure reporting website:
http://net.wessexarch.co.uk/orpad

THE CROWN ESTATE

Offshore Renewables Protocol

for Archaeological Discoveries

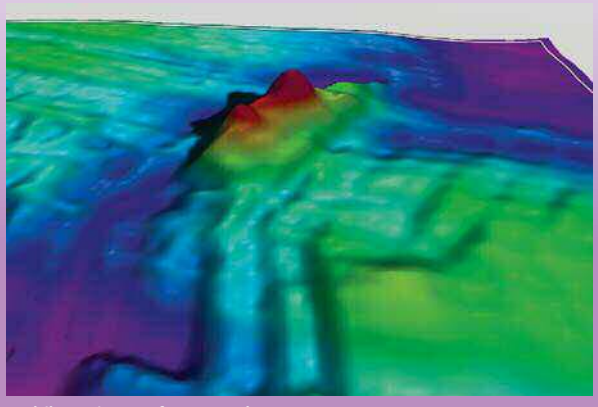
What are finds? Why should they be reported?

Finds

A 'find' is an object with archaeological potential; this means that it has been impacted by people and may be able to tell us about their past lives. A find can include objects on the seafloor as well as those brought to the surface. We include eco-artefacts as finds; these are remains of animals and plants, such as mammoth and peat, which help us to understand the past human landscape.

Anomalies

Anomalies are a little different from finds in that they are not automatically recognised as archaeological. Instead, anomalies are visual or digital differences that need to be further investigated. Anomalies should always be considered as possibly important archaeological sites until it has been determined otherwise.



Multibeam image of an anomaly

Importance

Archaeological finds are important because they can shed light on past human use of the landscape, sea and seabed. The information that discoveries provide can help archaeologists to understand the human past and protect it for future generations.

Example

The discovery of 28 handaxes with other flint implements and mammoth teeth from the seabed was described as the 'single most important find of Ice Age material from below the North Sea'. The handaxes are between 200,000-300,000 years old and their discovery is incredibly important as they indicate areas where prehistoric humans lived and worked. This example proved that evidence from the last Ice Age has survived underwater and can be found intact.

Selection of handaxes, mammoth teeth and tusk

Offshore Renewables Protocol

for Archaeological Discoveries

The reporting process

On land

Discoveries found in the intertidal zone
A find is made during construction

Discoveries found after work on site
A find or anomaly is discovered during sample analysis or while reviewing geophysical data

At sea

Discoveries made on board a vessel
A find is made on board the vessel, in grabs or attached to anchors and cables

Discoveries found on the seabed
An anomaly indicates that an object or structure has been encountered on the seabed

Project Staff
Inform Site Champion

Site Champion

Avoid further disturbance work in this area (if found during works)

Note the occurrence, in a daybook, or site log

Photograph any find(s) recovered (see Handout 4)

Arrange for any recovered find to be immersed in seawater (if waterlogged) or in a suitable, clean, covered container as appropriate (see Handout 5)

Inform the Nominated Contact and pass on all available information, including a copy of the Preliminary Record and copies of any photographs, drawings or data files

Site Champion

Cease work that may impact the seabed in that area, or move to a new location

Examine any gear, such as grapnels or ploughs, coming up from the seafloor

Note the occurrence in the vessel's log

Mark the area on navigational/survey software

Photograph any find(s) recovered (see Handout 4)

Arrange for any recovered find to be immersed in seawater (if waterlogged) or in a suitable, clean, covered container as appropriate (see Handout 5)

Inform the Nominated Contact and pass on all available information, including a copy of the Preliminary Record and copies of any photographs, drawings or data files

Report to
Nominated Contact

Offshore Renewables Protocol

for Archaeological Discoveries

Photographing finds

What is the photograph for?

The photographs that we receive of new discoveries are very important. They provide a lot of information about each object and can be sent to specialists around the country.

Tips

Make sure there is a scale in the photo – if you do not have the scale sheet provided you can use a ruler or known object, such as a coin or biro, to help show the size of the find.

Biro scale

To avoid light spots in the photo make sure any excess water is wiped off.

Make sure the photo is sharp.

Do not include too many objects in one shot.

Take photographs at different angles; the more photographs and views, the easier it is to interpret the artefact.

Take additional close-up pictures of markings or features that you think are unusual.

Detail shot

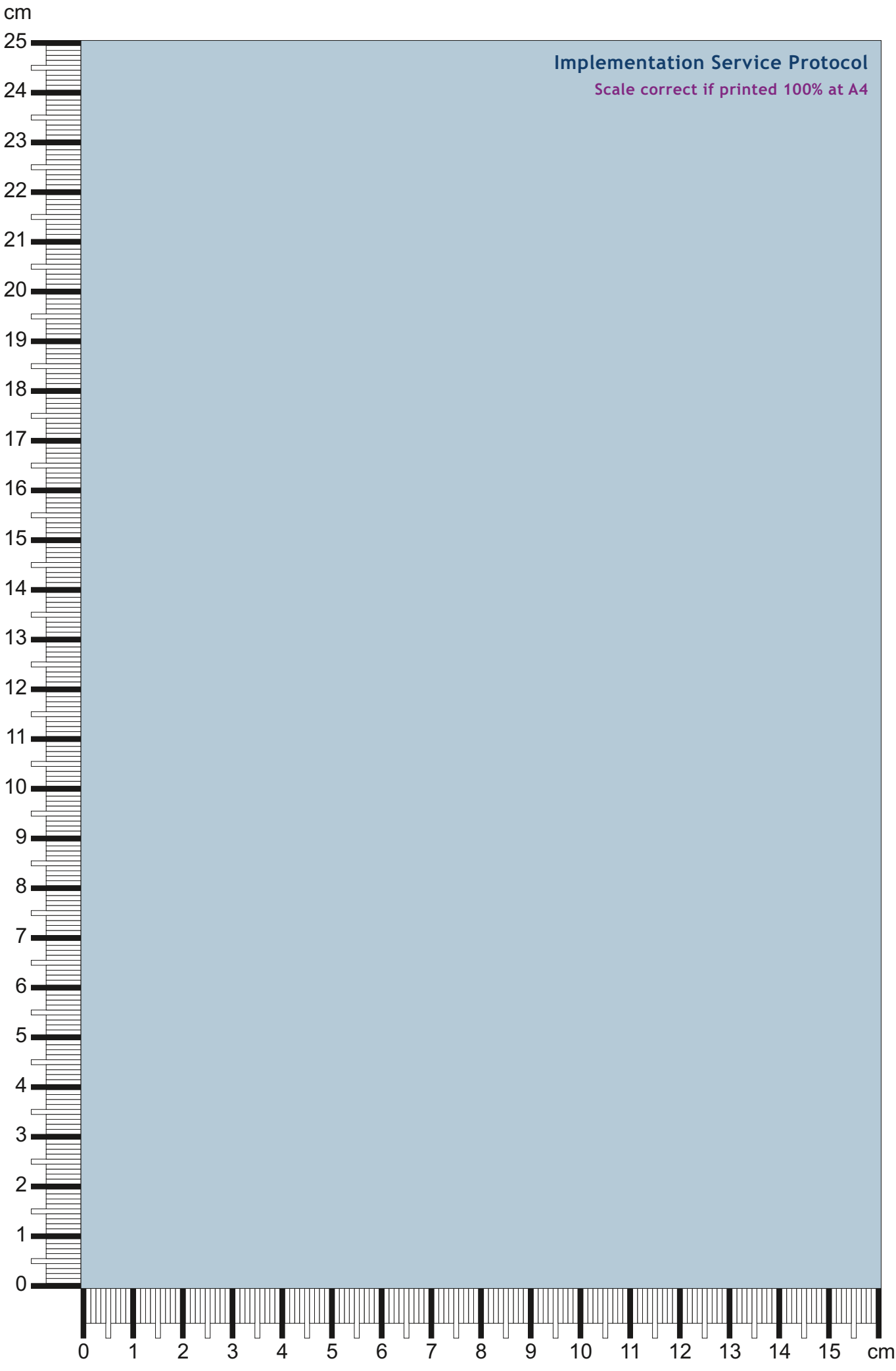
Checklist

Can someone tell from the photos:

What size the object is.
What shape it is.
What type of object it is.
What it is made of.
Whether it has any unusual markings.

Good use of scale sheet

Take photos from different angles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Offshore Renewables Protocol

for Archaeological Discoveries

Conservation and Storage

Marine finds are very fragile and can dry out quickly. Don't be fooled; even seemingly robust objects such as cannonballs can quickly degrade if they are not treated correctly.

What do I do with a wet find?

1 – Place the find into a plastic container and completely cover with seawater. If the find is large, cover as much as possible with seawater and wrap the rest in wet fabric or polythene.

2 – Label the container or wrapping and store in a cool dark area.

Example: ***Developer_0001 Nail from [Name] Offshore Windfarm Zone Discovered by J.Bloggs 01/12/2010***

3 – Check the condition of the find regularly. Change the seawater when necessary and note any cracks or flaking.

The detrimental effects of rapid drying on iron shot

What do I do with a dry find?

If a find is dry do not to place it back into water. But it is still important to label it and place in a dark, cool place.

Three rules

- Wet – Keep the object wet by covering with water in an appropriately sized container.
- Cool – The hotter something is the more likely it will corrode so place the artefact somewhere cool.
- Dark – Place the artefact away from direct contact with light, such as in a drawer or cupboard.

Things to avoid

- Supermarket bags – they contain harmful chemicals
- Drying – when wet finds dry quickly they crack and disintegrate
- Tissue paper – tissue will degrade in water
- Bubblewrap – textured wrapping can leave impressions on soft finds
- Placing different finds together – some types of material can be affected by contact with others
- Metal containers – metal can cause problems such as corrosion
- Glue – Some glues are harmful; if a find breaks don't fix it

Further advice

Advice on conservation can be sought from the Portable Antiquities Scheme (PAS) which has a network of regional archaeologists (Finds Liaison Officers or FLOs). FLOs are responsible for recording finds reported by the public and providing advice. Contact details for your local officer can be found on the PAS website:

http://www.finds.org.uk/involved/contacts.php

Offshore Renewables Protocol

for Archaeological Discoveries

Prehistoric finds

Some of the first things that spring to mind when you think of underwater archaeology are shipwrecks and aircraft wrecks. Whilst shipwrecks are important, there is a huge range of other exciting and significant artefacts that can be found under the sea.

Some of the most important finds from the seabed are stone tools. Stone tools are the oldest known technology used by man. These implements were first used in Africa 2.5 million years ago and until metal was discovered, stone was the primary resource for making tools.

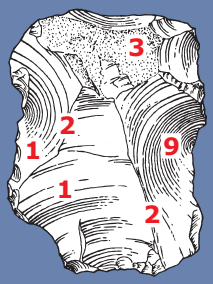
Whilst a large majority of tools are made from flint, in places where this was not available other stones were used instead.

It is not only the tools which are of interest to archaeologists, flint-knapping produces piles of waste flakes. Archaeologists examine the flakes to see what sort of tools were being made.

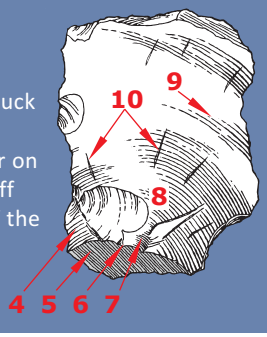
See below for some examples of handaxes, arrowheads and flakes.

How to recognise stone tools and flakes

Stone tools and flakes have recognisable features and shapes that indicate they were made by humans. The **negative flake scars** and **bulb of percussion** are some of the easiest to find.



The **bulb of percussion** is a curved raised lump left behind when a flake is struck off. The **negative scar** is a concave cone-shaped scar on the flake where it came off the core - the opposite of the bulb of percussion.



1 Negative Flake Scars
2 Ridges
3 Cortex
4 Bulb Scar
5 Butt
6 Point of Percussion
7 Cone of Percusion
8 Bulb of Percussion
9 Conical Ripples
10 Fissures

Offshore Renewables Protocol

for Archaeological Discoveries

Metalwork and Concretions

What is a concretion?

Concretions are dense clumps of hard material that develop on the surface of iron or other ferrous metals as they corrode. A concretion can form one clump around an object or become large sections on iron shipwrecks. Within a concretion the object gradually corrodes away, sometimes leaving only a hollow space. It is easy to see if a concretion has been freshly pulled off an iron object as it has a bright orange rust colour.

Why are concretions important?

Concretions can easily hide the shape of an object, making them impossible to identify. However you should not assume that concretions are unimportant; x-rays can sometimes reveal what lies underneath the concretion, or injecting filler can make a mould of the hollow shape.

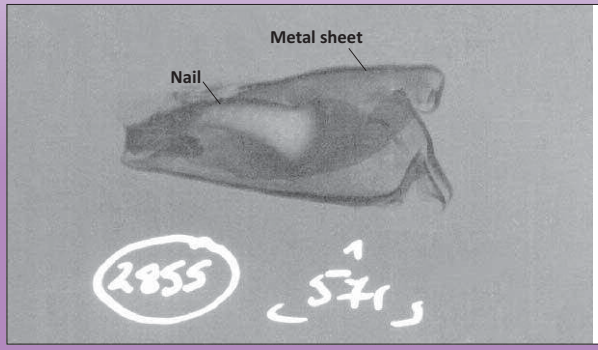
Recording

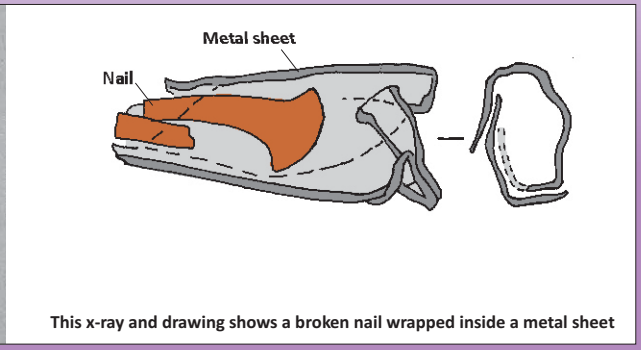
As with other types of artefacts, the more information we have the better. When recording concretions useful information includes length, width, diameter and thickness of concretion, where possible.

Keep your eyes peeled

Some people miss concretions as they can look like rocks from the seafloor. If you find something you're not sure about, report it.

A concretion can look like a rock





This x-ray and drawing shows a broken nail wrapped inside a metal sheet

Offshore Renewables Protocol

for Archaeological Discoveries

Munitions and Ordnance

Always follow Company Guidelines on the
SAFE TREATMENT OF MUNITIONS
when they are discovered

Despite long periods spent underwater munitions can still be extremely dangerous and should always be treated with caution. The appropriate response when dealing with munitions is to report them to the police, coastguard or Ministry of Defence in line with your company policy.

How common are munitions?

Up to 10% of the bombs that fell on and around the UK during WWII failed to function and so far only a fraction of these have been recovered. In addition to these 'blind' munitions, ordnance from both world wars was dumped at sea and munitions on board sunken vessels are rarely salvaged.

Fuse cap

Reporting munitions

Always follow safe working procedures when dealing with munitions. Before reporting munitions via the PAD they must be made safe or identified as inert by the police or a military Explosive Ordnance Disposal Officer (EOD). Once the items have been confirmed as safe and suitable for handling they should be reported as normal through the protocol. If you have any queries regarding the reporting of munitions please contact a member of the Implementation Service team.

Vis or Random pistol

German WWII machine gun

Ammunition

Construction Environmental Management Document	
Section Number	10
Section Title	Materials Management Plan
Issue	1B
Issue Date	18/01/2022
Author	Kirsty Macdonald, Jack Clarkson
Approved	Fiona Henderson

Document History		
Issue	Date	Reason for Change
1A	20/04/21	Document Issue to Tenderers for Comment
1B	18/01/22	Document for Issue to Regulators – updates to Section 10.2 & 10.9 to align with Marine Licences

Contents

10 Materials Management Plan

10.1 Introduction

Due to the scale of the development and the volume of materials used in construction, the storage of these materials needs to be carefully considered and appropriately managed. This includes the storage and management of fuel, hazardous substances, soils, peat and materials which may generate dust. Specific management plans have been produced for the storage and management of peat and for dust see Sections 11 and 12, respectively.

10.2 Material Requirements

The estimated quantities of the main materials associated with the construction of the Deep Water Port below Mean High Water Springs (MHWS) are provided below (as per MS-00008749):

- Sand (399,950T) - from dredge and rock blasting, for infill.
- Gravel (1,030,750T) – from dredge and rock blasting, for infill.
- Cobbles (343,900T) – from rock blasting, for infill/aggregate.
- Boulders (260,030T) – from rock blasting, for rock armouring.
- Steel (11,100T) - combi/sheet pile wall and tubular bearing piles, linkspan, fender panels, ladders, pontoon and pontoon access bridge, handrailing and miscellaneous, I.e. light towers, services, cabinets, bollards, etc;
- Timber (150T) for fender panels;
- Concrete (30,700T) - open piled finger pier, capping beam, transition slabs, ground slabs, heavy load slab, linkspan dolphin/abutment, pontoon units/floats and services trench;
- Plastic/Synthetic (3060m^2) - pipes, fenders, oil interceptors, pontoon fenders, pontoon polystyrene and pontoon walkway;
- Pipes (3000m in length, 10-40cm external diameter) - services and drainage and pontoon services;
- Other (400T) - rubber fenders.

In addition, materials including but not limited to those mentioned below will be associated with works above MHWS:

- Peat (10,885m^3) - excavated and reused onsite.
- Soil (6,940m^3) – excavated and reused onsite.
- Road surfacing materials.

10.3 Fuel and Oils

Where fuel and oils are stored, and plant is refuelled, the following will apply.

- Fuel storage should be under strict management controls and compliant with SEPA's Generally Binding Rules (GBRs) 26 and 28.
- A suitable double skinned bowser or tank (or bunded tank) will be utilised for fuel storage.
- The bowser or tank will be situated at least 10m from the water or nearest drain and protected from collision risks.

- Where oil is stored in a container, the container must be of sufficient strength and structural integrity, and, installed so as to ensure that it is unlikely to burst or leak in its ordinary use.
- Containers must be situated within a secondary containment system which have a capacity of not less than 110% of the container's storage capacity, or if there is more than one container within the system, of not less than 110% of the largest container's storage capacity.
- The distribution hose will be fitted with a shut off type filling nozzle.
- The filling nozzle will be fitted with a security lock to prevent unauthorised use.
- A drip tray will be provided below the distribution hose and nozzle when not in use.
- A fuel accountancy system will be employed.
- All refuelling will be carried out in accordance with site procedures by trained personnel in a designated area.

Where practicable, biodegradable hydraulic fluids and oils will be utilised in machinery. It should be noted however, that these bio-degradable options reduce long-term and chronic environmental effects, but still cause harm to the environment if released and hence should be handled as per other oils.

10.4 Hazardous Material

Where hazardous material is stored and used on site, the following rules will apply:

- All oils and chemicals will be subject to Control of Substances Hazardous to Health (COSHH) assessments under the COSHH Regulations 2002.
- COSHH assessments will include a section of the environment to highlight any specific precaution or mitigation requirements relevant to the site.
- Storage cabinets for COSHH items will be appropriately bunded.
- The COSHH store will be locked, access will be controlled, and an inventory of materials stored will be maintained.
- Appropriate materials will be utilised for a given task, in the appropriate quantities and concentrations.
- Appropriate quantities of materials will be precured to minimise the need to dispose of excess materials.
- The storage and handling of an explosives will be carried out in compliance with the Explosive Regulations 2014.

10.5 Soils

All soils will be appropriately stored, managed and monitored to prevent drying out and creating dust emissions as discussed in Section 12: Dust Management Plan. All soil will be reused on site as detailed in Drawing SDWP-WS2139-XX-01-DR-C-0059 included in the Peat Management Plan provided in Section 11A. The details of sequencing of soil strips, location of storage, specific management requirements and reuse for each stage of the works is included in Section 6: CEMP.

10.6 Peat

All peat will be appropriately stored, managed and monitored to prevent the drying out of material, such that successful reinstatement can be achieved, as discussed in Section 11: Peat

Management Plan. The details of sequencing of peat removal, location of storage, specific management requirements, and reinstatement for each stage of the works is included in Section 6: CEMP.

10.7 Dusty Material Storage

All materials with the potential to give rise to dust will be appropriately stored, managed and monitored to prevent the generation of dust as discussed in Section 12: Dust Management Plan.

10.8 Transport

Materials delivered by road will be appropriately contained for transport, and dust covers utilised for loads likely to generate dust. Measures will be in place to reduce mud and spoil on the highway with provision of a road sweeper and road cleaning schedule to ensure that the roads around the construction site are kept clear of mud and debris, see Section 15: Construction Traffic Management Plan.

Two-way communications with local residents and Comhairle nan Eilean Siar (CnES) will be required throughout the construction works to ensure that any transport related issues are resolved promptly.

The sourcing of materials should take into account the minimisation of greenhouse gas emissions including those associated with their transfer.

10.9 Dredge Material

Approximately 500,000m^3 (900,00 wet tonnes) of material is to be dredged to obtain a water depth of -10m Chart Datum (CD), the bulk of the material will be utilised in the land reclamation. Marine boreholes suggest that the dredge area is all in sand and gravel deposits with a low silt content, and that no underwater blasting will be required. An allowance of 50,000m^3 of unsuitable material has been made. If unsuitable material is found it can be deposited at the Stornoway Spoil Disposal Site (HE035).

10.9.1 Prior to Dredging

Prior to dredging the following should be completed/ in place:

- A meeting is to take place between the dredging vessel master and Stornoway Harbour Master to discuss and agree:
  - Sequencing of works, including timings to minimise interactions with other vessels and to avoid any interference with vessel movements in the harbour entrance channel;
  - Transportation routes and timing, to and from the spoil disposal ground;
  - Communication/Radio Protocols; and
  - Implementation of the Harbour General Directions.
- Notices to Mariners, and/or Navigation Warnings issued as appropriate.
- Marine Scotland to be notified of the date of commencement.
- Vessel master to be provided with a copy of all relevant licences.

- Vessel Master and MMO/PAM operators to be provided with copies of the Spoil Disposal Marine Mammal and Basking Shark Protocols (Section 16.2.4.2).

The Contractor must also comply with the requirements in respect of harbour traffic and floating plant set out in the Dredge section of the Civil Engineering Specification, which forms part of the Scope.

10.9.2 During Dredging

During dredging operations, the following should be implemented:

- Marine mammal observations to be carried out as detailed in CEMD Section 16.2.4.1 for all spoil disposal to the disposal site (HE035).
- No disposals to be made if marine mammals are within 200m of the disposal plant.
- Implementation of relevant sections of the SPP for Benthic Ecology, see Section 16.3.
- Transportation to dredge disposal area utilising routes agreed with the Port Manager.
- Complete dredge in sequence agreed with the Harbour Manager.
- Appropriately communicate with other vessels and the harbour master.
- Persons authorised by Marine Scotland will be permitted to inspect works.
- The dredger, barges and tugs will exhibit the required lights/shapes at all times.
- Form FEP6 to be completed for each disposal.
- Any potential archaeological finds will be immediately reported to the ECoW in accordance with Section 9 and advice sought prior to continuing to dredge, the approximate location of the removal should be marked.
- Any litter removed from the seabed should be set aside and taken ashore for disposal.
- A copy of the dredge licence, CEMD and to be onboard at all times.
- The Scottish Marine Wildlife Watching Code is to be complied with at all times (see Section 16A).
- In alignment with Section 14: Noise and Vibration, dredging in areas to the north will be carried out during the day whenever practicable, noise sensitive receptors will be informed, and monitoring will be undertaken.
- Visual checks of water quality will be carried out to ensure that any visible plumes are localised and disperse quickly.

If increases in sediment loading in the water column are not as predicted the technique will be reviewed to identify areas for improvement.

Disposals to the spoil ground will not be carried out in hours of darkness, or when weather or sea conditions are unsuitable for visual observations, unless PAM is provided at the spoil ground as detailed in Section 16.2.4.1.

10.9.3 Post Dredging

The following will be completed by the contractor post dredging and submitted to the IECoW for approval prior to submission to Marine Scotland:

- A written marine mammal report and associated MMO forms shall be submitted to Marine Scotland.
- Spoil samples and completed FEP 6 forms will be provided to Marine Scotland.

Construction Environmental Management Document	
Section Number	11
Section Title	Peat Management
Issue	1B
Issue Date	20/01/22
Author	Kirsty Macdonald
Approved	Fiona Henderson

Document History		
Issue	Date	Reason for Change
1A	20/04/21	Document Issue to Tenderers for Comment
1B	20/01/22	Document for Issue to Regulators – No Changes

Contents

11 Peat Management

11.1 Introduction

The Deep Water Port development is situated in an area with some peat coverage. Peat coverage is not continuous on the site and has been located in plateaus, hollows and watercourse valleys between rocky outcrops and heathery mounds. Large volumes of peat will be excavated and will require careful storage and management to ensure it is suitable for reuse. The predicted quantity of peat to be excavated and for reuse is 10,885m^3.

11.2 Legislation, Policy and Guidance

Peat is important in capturing carbon and acting as a carbon sink and is an important resource in tackling carbon emissions and climate change. Legislation and guidance regarding climate change and carbon regarding peat includes:

- Scotland's National Peatland Plan Working for our Future. Scottish Natural Heritage (2015).
- Scottish Government, Scottish Natural Heritage, SEPA and The James Hutton Institute (2010) Developments on Peatland: Site Surveys.
- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland.
- SEPA Regulatory Position Statement – Developments on Peat (2010).
- Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste Scottish Renewables (2012).
- Forestry Civil Engineering and SNH (2010). Floating Roads on Peat: A Report into Good Practice in Design, Construction and Use of Floating Roads in Peat with particular reference to Wind Farm Developments in Scotland.
- Towards an assessment of the state of UK Peatlands, JNCC (2011).
- Carbon Landscapes and Drainage, (2012). 'The Carbon and Water Guidelines,' www.clad.ac.uk.

11.3 Peat Management Plan

A Peat Management Plan (PMP) has been developed and addresses the management of peat during the construction phase and the restoration following the completion of construction, see Appendix 11A. Peat slide has been considered within Appendix 11B. Anything that could give rise to a higher peat slide risk than that considered will be subject to additional review.

The PMP is intended as a working document and will be updated during construction when actual peat volumes are known. A regular review and update of the peat mass balance table will be undertaken by the Principal Contractor and monitored by their ECoW and made available to the regulators if required. The ECoW will be responsible for ensuring all mitigation measures detailed in the PMP are implemented on site and the document is updated.

Appendix 11A – Peat Management Plan

Stornoway Deep Water Port

Peat Management Plan

FINAL

for

Affric Limited

Fluid Environmental Consulting Ltd
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Registration No. SC385700

Stornoway Deep Water Port

Peat Management Plan

March, 2021

Final

Prepared by :	Fluid Environmental Consulting Ltd
For :	Affric Limited
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Figures

1 Introduction

Fluid Environmental Consulting Ltd (Fluid) was commissioned by Affric Limited (Affric) to prepare an Outline Peat Management Plan (PMP) for the Stornoway Deep Water Port Project. The Deep Water Port Project comprises:

- The creation of a deep water port, rock extraction, land reclamation, peat reuse, associated levelled / reclaimed area, a haul route for large components connecting the port to Arnish Industrial Estate, and a new primary access road.
- Development components forming part of this detailed planning application include: the primary means of access, including associated drainage infrastructure, provision of a culvert under the access road and reuse of peat.
- The other components of the deep water port project will be carried out under other consenting mechanisms (Harbour Revision Order and Marine Licensing).

The site is located on the western shore of Glumaig Bay in Arnish, located 2 km south of Stornoway town centre and will link to the Arnish road that joins the A859 approximately 2km to the north west of the site. The site slopes east to the Glumaig Bay and is undulating. There is not a continuous coverage of peat on site as it tends to be located in topographical plateaus, hollows or watercourse valleys between Lewisian Gneiss rock outcrops or heathery mounds. The site slopes steeply down to the northeast along the northeast boundary and less peat was encountered on these steep slopes.

The areas relevant to this PMP are shown in Table 1 below:

Item	Description	Area (m^2)
1	Area of detailed planning application	18,500
2	Land-based area of whole Deep Water Port development (above Mean High Water Springs)	28,380

The remainder of the Deep Water Port development comprises areas that are currently below Mean High Water Springs (MHWS).

Of the area of the Deep Water Port development above MHWS the total containing peat, based on the peat probing results and modelled peat depth, is estimated to be 7,576m^2. The average peat depth within this area is 0.73m, resulting in a peat excavation volume of 5,086m^3. Further peat extraction is also required outside of the working area footprint in order to stabilise the peat above the cliff faces and manage runoff. This amounts to an additional extracted peat volume of 1,267m^3. In addition, a further 4,532m^3 of peat will be excavated in the formation of the temporary construction compound and associated access track.

The PMP has been developed due to identification of the presence of peat habitats on the proposed development site as identified through various intrusive site investigations and in the Phase I Habitat Mapping Technical Report Tracks Ecology (2020).

The PMP addresses the management of peat during the construction period for the port facility and the restoration of the site once construction has been completed. The PMP will be further developed during site construction when actual peat volumes are known.

2 Objectives

The PMP has been developed to demonstrate that peat has been appropriately considered and will be protected during the design phase of the Deep Water Port project and, should consent be granted, will be carefully managed and preserved throughout the construction and operation periods.

The PMP:

- outlines the overall approach to minimise disruption to peatland that has been taken to date;
- proposes mitigation measures that will minimise any impacts on peat;
- proposes long-term habitat restoration and management plans for key areas where peat has been identified;
- demonstrates a commitment that all further opportunities to minimise peat disturbance and extraction will be taken;
- takes account of any potential peat slide risks; and
- seeks to identify that appropriate proposals to reuse surplus peat can be accommodated within the site layout, without significant environmental or health and safety implications, to minimise risk in terms of carbon release and human health.

3 Legislation, Policy and Guidance for Peat Management

3.1 Legislation Policy and Guidance

When considered as part of a carbon landscape, peat has a capacity to act as a carbon sink. The management of peat therefore has implications for carbon emissions and climate change. There is a substantial body of legislation and guidance regarding climate change and carbon which is relevant to the management of peat including:

- Scotland's National Peatland Plan Working for our future. Scottish Natural Heritage (2015).
- Scottish Government, Scottish Natural Heritage, SEPA and The James Hutton Institute (2010) Developments on Peatland: Site Surveys.
- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland.
- SEPA Regulatory Position Statement – Developments on Peat. (2010).
- Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste Scottish Renewables, (2012).
- Forestry Civil Engineering and SNH (2010). Floating Roads on Peat: A Report into Good Practice in Design, Construction and Use of Floating Roads in Peat with particular reference to Wind Farm Developments in Scotland.
- Towards an assessment of the state of UK Peatlands, JNCC (2011).
- Carbon Landscapes and Drainage, (2012) 'The Carbon and Water Guidelines' www.clad.ac.uk.

3.2 Role of the Peat Management Plan

The PMP is intended to be a working document to be used throughout the key stages of the design, construction, operation, decommissioning and re-instatement phases of the Proposed Development as part of an overall Construction Environmental Management Plan (CEMP) as follows:

Stage 1: Pre Consent Assessment

It is necessary to show how, through site investigation and iterative design, the Proposed Development has been designed to minimise, so far as reasonably practicable, the quantity of peat which will be excavated, that volumes of peat anticipated to be excavated by the Proposed Development have been considered, and how excavated peat will be managed. The overall aim is to minimise the impacts associated with excavation of peat by using the following hierarchy of design principles:

- prevent excavation;
- reduce volumes of peat excavated; and
- reuse excavated peat in a manner to which it is suited.

This hierarchical approach comprises:

- calculation of estimated volumes of excavated peat and potential reuse volume requirements based upon the design of the Proposed Development;
- determine the overall peat balance, and identify whether the generation of excess material can be avoided, and, if not, where reductions in the volumes of excavated materials may be achieved;
- refine layout to avoid areas of deeper peat and therefore reduce carbon impacts associated with construction activities and identify how overarching principles of peat avoidance have been taken into account in the design;
- the assessment is to be consistent with and feeds into the Peat Slide Risk Assessment (PSRA); and,
- if possible, identify limitations and make recommendations for further site investigation (post-consent) to inform detailed design and any adjustment to Deep Water Port land-based areas within permissible limits, such that opportunities for further reductions in excavated peat volumes can be implemented where possible.

Stage 2: Post Consent / Pre-Construction

The peat mass balance calculations have been further developed and refined for the planning application, and prior to the relevant works commencing, as a consequence of more detailed ground investigation works which were required to inform the detailed design.

Stage 3: Construction Stage

Actual peat volumes excavated during construction will be recorded against the overall predicted volumes provided in Tables 4 to 7 of this PMP. The design of the Deep Water Port

land-based work is now fixed however, construction methods will be reviewed to avoid/minimise peat disturbance as much as possible in light of the more detailed information available once construction actually commences. A regular review and update of the peat mass balance table will be undertaken by the appointed Contractor and monitored by the Environmental Clerk of Works (ECoW) on site, and made available to regulators as required.

4 Peat Conditions

4.1 Definitions of Peat

Peat is classified as organic material over 0.5m in depth; organic material less than 0.5m depth is not defined as peat. This is in accordance the following guidance:

- The Soil Survey of Scotland (1984) defines peat as *'the organic layer or layers exceeding 50 cm depth from the soil surface and with an organic matter content of greater than 60 %';*
- The Forestry Commission use 45 cm as the critical depth for peat to occur (Understanding the GHG implications of forestry on peat soils in Scotland, 2010);
- The Macaulay Land Use Research Institute define shallow peat as having 'a prescribed depth of organic matter of 50 – 100 cm'; and
- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. Guidance on Developments on Peatland – *'peat soil is an organic soil which contains more than 60 per cent of organic matter and exceeds 50 centimetres in thickness.'*

Peat can be separated into three main layers: acrotelmic (the upper living layer), catotelmic (the middle to lower layer) and occasionally amorphous (lower layer) peat:

- Acrotelmic peat is the living layer of the peat including the peat turf or turf being a thin, floating vegetation mat layer. The acrotelm is generally found within the top layer of peat (often less than 0.5 m) depending on the degree of decomposition and fibrous nature of the peat (approximately H1 to H5 on the Von Post classification scale). The acrotelm is generally of high permeability, decreasing with depth. The water table fluctuates in this layer and conditions vary from aerobic to anaerobic. Material may be fibrous or pseudofibrous (plant remains recognisable), spongy, and when excavated strength is lost but retains integral structure and can stand unsupported when stockpiled >1 m.
- Catotelmic peat is the dead layer of peat found deeper than acrotelmic peat which has some remnant plant structures. Material has high water content and is permanently below the water table (saturated) therefore organic matter decomposes anaerobically. Some plant structures may be recognisable but are highly humified losing most of their characteristics (approximately H6 to H8 on the Von Post classification scale) and strength. Water flow through the catotelm is slow unless peat structures such as sink holes or peat pipes are present. Material should not be stockpiled greater than 1m in height as it can lead to slippage.
- Amorphous peat is highly decomposed organic material where all recognisable plant remains are absent (approximately H9 to H10 in the Von Post classification scale).

These deposits are dark brown to black in colour, plastic, are low tensile strength and are unable to stand unsupported >1 m when stockpiled.

4.2 Peat Conditions on Site

The site was assessed for peat vegetation through desktop review of maps and plans, a walkover by a hydrologist and a detailed mapping exercise using drone photography by an ecologist. Peat depths were determined through intrusive site investigation in terms of peat depth probing and coring as described in the following section under the heading Peat Surveying.

The land-based area of the whole of the Deep Water Port development (above MHWS) totals 28,380m^2 with about 8,611m^2 or 30% located on peat. The peat is generally discontinuous, particularly where bedrock is exposed at surface, however there are areas where peat has infilled hollows and is relatively deep, >2.5m, in places. To the west of the public road the peat is more continuous, except where it has been cut and removed.

Peat Surveying

Peat depth surveying was undertaken at site on a 20m grid across the land based area of the originally planned Phases 1, 2 and 4[1] of Deep Water Port development areas along with some additional areas to the west. The initial investigations were completed by Breedon Hebrides Ltd in two phases in 2018 and 2019 and comprised 376 peat probes.

Causeway Geotech undertook 9No. Rotary core boreholes; one trial pit and 6No. Russian manual cores between 8th August and 10th September 2018 as presented within the Stornoway Deep Water Port-Stage 2 Land Ground Investigation report (Causeway Geotech, January 2019).

Fluid completed a further 7 peat probes and 7 cores for peat depth verification purposes and to further examine the peat properties: (Fluid Environmental Consulting (2019).

A further 564 probes were also undertaken by Wallace Stone in 2019 and 2020.

These activities resulted in:

- The completion of 947 depth of penetration probes;
- Development of a depth of penetration map to indicate the maximum depth of probe penetration at all investigation points across the site (Figure 1);
- Development of an interpreted maximum depth of peat contour map using ArcGIS to indicate the potential peat depth based on the depth penetration probing results and verified by coring (Figures 2a and 2b);
- Examination of the variability of the depth of the acrotelm, the thickness of the catotelm and the thickness of amorphous peat;
- Calculation of the potential peat volumes that will be removed due to excavation for infrastructure based on the depth penetration probing results;

[1] Phase 3 of the Deep Water Port development is located entirely on the sea bed.

- Examination of areas where peat will be reused to allow calculation of reuse volumes; and
- Identification of areas where peat has been cut and removed.

Peat Probing Results

The depth of penetration probing indicated the presence of peat in about 56% of locations (probe depth greater than 0.5m) and organic soils or soft mineral soil rather than peat deposits in about 44% of probe locations (Table 2).

Table 2: Peat Probing Depths

Depth Range (m)	Number of probes	Percentage of probes (%)
0 to 0.5 (no peat)	421	44.4
>0. 5 – 1.0	396	41.8
>1.0 – 1.5	86	9.1
>1.5 – 2.0	18	3.0
>2.0	16	1.7
Total	**947**	**100%**

Of the 947 locations probed a total of 421 probes (44.4%) recorded depths of 0.5m or less (no peat), 396 probes (41.8%) recorded depths of penetration between >0.5m and 1.0m (peat present), indicating peat and 120 probes (12.7%) recorded depths of penetration >1.0m, indicating deep peat.

Inspection of the subsurface formation extracted in a total of 12 cores generally indicated the presence of organic soils where probe penetration depths were shallow (up to 0.5 m depth) and peat with a thin layer of acrotelm where probe penetration depths were over 0.5m depth. These formations are overlying either mineral rich soils or bedrock. An average acrotelm thickness of 0.06m has been estimated based on this sample size.

The total area of the Deep Water Port footprint on land is 28,380m^2. Across 69.7% of this area, the peat depth is less than 0.5 m in depth and therefore not considered to be located on peat deposits. A total of 28.0% of the Deep Water Port footprint on land is located on peat between 0.5 m and 1.0 m, classified as peat but not as deep peat. Deep peat, greater than 1.0 m, based on the peat depth estimation map is present at 2.4% of the Deep Water Port footprint on land. The average depth of penetration across the entire probed area based on all probes undertaken was 0.72m. A total of 0.79ha of the Deep Water Port footprint on land is therefore located on peat, of which 0.067ha is located on deep peat. These data are presented in Table 3. Peat on the site is in pockets and interspersed with areas of soils or bedrock exposure. Areas of deeper peat on site are infrequent and tend to occur in small pockets.

Table 3: Peat Depths across the Area of the Deep Water Port footprint on land

Depth Range (m)	Area of the Deep Water Port footprint on land (m^2)	Area of the Deep Water Port footprint on land (%)
0 to 0.5 (no peat)	19,769	69.7
>0. 5 – 1.0	7,939	28.0
>1.0 – 1.5	556	2.0
>1.5 – 2.0	105	0.37
>2.0	11	0.04
Total	**28,380**	**100%**

Peat cutting was observed to the west of the public road where the peat was originally deeper and more continuous and is the location of the temporary construction compound and access track (Figures 3a and 3b).

The peat survey identified two types of peat layers (acrotelm and catotelm) within the peat across the site, with no amorphous peat (identified through Von Post testing with values of H9 and H10).

Peat Coring Results

A total of 12 peat cores were completed by Causeway Geotech and Fluid to investigate the peat characteristics and verify the peat probing depths. Five of the 12 cores encountered peat (organic material in excess of 0.5m depth), with three of these identifying an acrotelm layer (fibrous material present) of thickness 0.06m, 0.08m and 0.60 m. The results of the second set of coring, including organic material depths that do not qualify as peat, indicate a more uniform range, of 0.04m to 0.08m with an estimated average thickness of 0.06 m which is considered to be more representative across the site.

Catotelm peat was encountered in all of the 5 cores with peat depths of 0.5 m or greater. The thickness of the catotelm layer varied between 0.4 m and 1.3 m.

These values have been used in calculations of volumes of peat across the site where the peat contour map indicates that peat is present (e.g. >0.5 m probe depth).

Habitat Conditions

Phase I Habitat mapping was undertaken by EnviroCentre in May 2017 and is detailed within the Preliminary Ecological Appraisal. A more detailed Phase I habitat assessment was undertaken by Tracks Ecology in April 2020.

The report by Track Ecology states: '*The Survey Area was dominated by mosaics of three main broad habitat types; wet dwarf shrub heath, dry dwarf shrub heath and blanket bog. These habitats are a typical of the west of Scotland and although specific details on the quality of these habitats cannot be confirmed the presence of disturbance from development, roads and land management practices (peat cutting, deer etc.) suggest that the habitat quality across the Survey Area is unlikely to be high.*

Blanket bog, wet dwarf shrub heath and dry dwarf shrub heath are all habitats identified as Annex 1 habitat, UKBAP habitat and Scottish Biodiversity List habitats.

In addition to these dominant habitats, numerous other habitats were present including flushes, unimproved acid grassland (some of which may be coastal with maritime species present), marshy grassland, patchy woodland, scattered trees and scrub and intertidal communities of rock, shingle and brown algal beds. All of these habitats are likely to offer some degree of conservation value, although the specific quality of each is difficult to ascertain without field based assessment.

With respect to the blanket bog this is unlikely to be of high quality although this cannot be confirmed.'

'Blanket bog within the Survey Area forms two main areas forming up to 10ha (14.5%). The largest area is that located on the west of the public road in a flat basin. This area supports sections of open water and flushed habitats with the blanket bog likely to be found in transitions and mosaics that are difficult to delineate precisely through the aerial imagery alone. The use of the digital elevation model has aided the identification of the blanket bog with the habitat generally restricted to areas of very low slope, typically less than 10 degrees.'

Peat Characteristics

The peat profile at the site comprises light brown to dark brown slightly fibrous peat beneath the present-day root mat.

There is no evidence of peat cutting or drainage channels on site to the east of the public road, however some natural watercourses do cross the site and these are not significantly incised. There has been significant peat cutting on site to the west of the public road, some of which are shown within the ecology report[2], as presented in Figure 5: Peat cutting locations of the ecology report.

Samples of peat were observed in the field as part of the peat depth probing programmes and descriptions noted with respect to its characteristics, including fibre content, decomposition and moisture content.

The Von Post test was also carried out at core locations. Von Post scores for the acrotelm ranged between H1 and H3, with an average of H2. A score of H2 is defined by Ekono (1981) (1981) as "*Almost entirely undecomposed peat which, when squeezed, releases clear or yellowish water. Plant remains still easily identifiable. No amorphous material present.*" This effectively means that there is no amorphous peat in category H3.

H scores of 5 or more begin to have amorphous material, with significant amorphous material occurring at scores of H9 and above. For the catotelm, Von Post scores ranged between H5 and H7, with an average of H6. A score of H6 is defined as "*Moderately highly decomposed peat with a very indistict plant structure. When squeezed, about one-third of the peat escapes between the fingers. The residue is very pasty but shows the plant structure more distinctly than before squeezing.*" In terms of reuse, there appears to be no evidence of the increasingly amorphous and plastic nature of that catotelm with Von Post scores of H7 and above, which is favourable in terms of stability and reuse options.

[2] Phase I Habitat Mapping, Stornoway Deep Water Port, Lewis and Harris April 2020 Tracks Ecology

Peat Slide Risk Assessment

An outline peat landslide hazard and risk assessment was completed by East Point Geo Ltd (October 2019) based on the information obtained from peat probing and coring and a desk study. The assessment indicates that there is no evidence of prior instability of the peat deposits on site, although the terracettes indicate slow downslope creep of soils under gravity, and their coincidence with areas of steepest slope does imply slope movement, admittedly on long timescales.

Assessment of site characteristics and calculation of Factor of Safety using conservative geotechnical parameters (based on literature review) indicate the majority of the site to be stable under natural conditions. However, the proximity of construction personnel to high cut faces with perched soils dipping towards the cuttings represents potentially high risks if construction takes place without mitigation. Risks to the environment are considered to be minor in comparison.

The works outline has altered slightly since the October 2019 assessment, however the three areas of increased risk shown on Figure 5.1 of the EPG report have all reduced due to this adjustment and therefore it is not considered necessary to revise the advice.

The three areas where there is an increased risk have also been avoided in the selection of areas for peat restoration.

5 Avoidance and Minimisation of Peat Disturbance

The Deep Water Port footprint on land has relatively limited interaction with the peat on site and generally avoids the deepest areas of peat with the exception of two small areas of peat >1.5m depth on the western boundary of the development either side of the access track.

The disturbance of peat will be minimised as much as practicably possible, taking into account the other constraints to the development, in order to try and reduce any peat waste on site and reduce potential carbon losses from the peat excavation process.

Throughout the construction process, the appointed Contractor will look to minimise the volumes of excavated peat. As far as possible, appropriate handling and storage of excavated materials will be undertaken such that their integrity and subsequent reuse is not jeopardised.

Further measures to minimise peat disturbance will be incorporated in the development and construction process. The following principles will be adhered to in order to:

- Avoid and/or minimise production of excavated peat;
- Reuse, where possible, excavated peat on site in landscaping and re-profiling works, to minimise visual impacts and to facilitate habitat, ecological and hydrogeological restoration, improvement and enhancement;
- Avoid and/or minimise off site reuse; and
- Avoid waste peat being sent for disposal and/or recovery off site.

All contractors will be made aware of the sensitivity of peat and wetland habitats and the ECoW will clearly mark sensitive habitats near to construction areas. Contractors will be required to work within the narrowest practical construction corridor when working in or near areas of peat.

Risk Assessment Method Statements (RAMS), will be produced prior to works being undertaken, these will include peat considerations such as minimisation of hydrological and physical disturbance. RAMS will be reviewed by the ECoW prior to works being undertaken.

6 Excavation and Reuse Volume Estimates and Strategy

The dimensions used in the peat balance calculations are related to the overall footprint of the Deep Water Port on land and the cut and fill operation.

6.1 Excavated Volumes

Peat excavation volumes associated with the project have been calculated using the GIS package ArcGIS based on the following data and assumptions:

- A contour map of assumed peat depth based on interpolation of values from probing across the site;
- Dimensions of the proposed areas for excavation of the Deep Water Port footprint on land based on the layout shape files provided;
- An estimated acrotelm depth of 0.06 m across the Deep Water Port footprint on land where peat (>0.5 m organic soil) is present based on the peat core data;
- An estimated catotelm thickness of the average depth of the peat minus the acrotelm (0.06 m) across the Deep Water Port land-based areas where peat is present, and based on the peat core data;
- No occurrence of amorphous peat; and,
- An assumption that the probe depth is representative of the actual depth of the peat (validated by the cores undertaken by the various parties).

The contoured surface of the peat created has been used to determine the average depth of peat under the excavation footprint of the Deep Water Port footprint on land and therefore the total volume of peat to be excavated as well as the volume of acrotelmic and catotelmic peat (Figures 2a & b).

Peat Excavation from Working Area

As all of the working area will be excavated to bedrock or deeper, all peat within the Deep Water Port footprint on land will be removed. The working area will be physically marked on the ground to ensure that other areas of peat are protected from the works.

Within the working area the excavated peat will contain a volume of acrotelmic peat of 8,611m^2 x 0.06m = 517m^3 and a volume of catotelmic peat of 5,228m^3. This results in a total volume of peat that will be excavated of 5,745m^3.

Within the working area the volume of non peat soils (probe depths of less than 0.5m) that will be excavated is 6,940m^3.

Peat Excavation Outside of Working Area

In addition, the peat that will abut the working area will be managed to avoid erosion and drying out (Cross Section 1) through the following:

- The peat will be cut further back, approximately 2m, from the excavated slopes due to their steep angle;
- The peat will also be reprofiled with 2 in 1 slopes, where feasible as some slopes will be too steep for reprofiling and may require a retaining system to maintain stability, as specified in the PSRA. The reprofiled slopes will not remove any acrotelm as this will effectively be peeled away and catotelm peat removed below so that the reprofiled surface is comprised of the existing acrotelm which intersects with the ground surface; and
- Shallow swale like drainage ditches will also be installed on the surface of the peat where necessary at a depth of 0.4m and width of 1m with shallow side slopes at 1 in 3 gradient.

The additional volume of peat has been calculated based on the length of the sections of peat intersecting the working area and the average peat depth in those sections as presented on Figure 4.

Tables 4 to 6 presents the calculations of this additional volume (shown in Cross Section 1) which is based on:

- The length of the section x the average peat depth x 2m width of excavation;
- The length of the section x the average peat depth x average peat depth. This is the triangular wedge of catotelmic peat that will be removed to reprofile the slope with the existing vegetation replaced on top.
- The length of the section x 0.4m (depth of swale) x 1m (width of drain base) and length of the section x 0.4m depth x ((1.2m + 1.2m)/2)
- These landscaping methods apply to peat both upgradient and downgradient of the working area with the exception of the drains as they will not be required in down gradient peat, e.g. areas 1, 2, 4, 5 and 6.

Table 4: Peat excavated due to set back distance

Section Number	Length (m)	Average Peat Depth (m)	Acrotelm volume (m^3)	Catotelm volume (m^3)	Total volume (m^3)
1	47	0.54	2.8	47.9	50.8
2	143	0.79	8.6	217.4	225.9
3	81	1.1			
4	15	0.64			
5	40	0.56	2.4	42.4	44.8
6	70	1.01	4.2	137.2	141.4
7	40	0.63	2.4	48.0	50.4
8	33	0.58	2.0	36.3	38.3
9	22	0.56	1.3	23.3	24.6
10	33	0.59	2.0	37.0	38.9
11	30	0.56	1.8	31.8	33.6
Total			**27**	**621**	**649**

Table 5: Peat excavated due to triangular wedge excavation

Section Number	Length (m)	Average Peat Depth (m)	Catotelm volume (m^3)	Total volume of peat excavated (m^3)
1	47	0.54	13.7	13.7
2	143	0.79	89.2	89.2
3	81	1.1	-	Too steep – retaining system if necessary
4	15	0.64	6.1	6.1
5	40	0.56	12.5	12.5
6	70	1.01	-	Too steep – retaining system if necessary
7	40	0.63	-	Too steep – retaining system if necessary
8	33	0.58	-	Too steep – retaining system if necessary
9	22	0.56	-	Too steep – retaining system if necessary
10	33	0.59	-	Too steep – retaining system if necessary
11	30	0.56	9.4	9.4
Total			**131**	**131**

Table 6: Peat excavated due to drain (swale) excavation

Section Number	Length (m)	Average Peat Depth (m)	Acrotelm volume (m^3)	Catotelm volume (m^3)	Total volume of peat excavated (m^3)
1	47	0.54	No drain required as down gradient		
2	143	0.79	No drain required as down gradient		
3	81	1.1	16.5	54.8	71.3
4	15	0.64	No drain required as down gradient		
5	40	0.56	No drain required as down gradient		
6	70	1.01	14.3	47.3	61.6
7	40	0.63	8.2	27.0	35.2
8	33	0.58	6.7	22.3	29.0
9	22	0.56	4.5	14.9	19.4
10	33	0.59	6.7	22.3	29.0
11	30	0.56	6.1	20.3	26.4
Total			**71**	**234**	**272**

The total volume of peat that will be excavated outside of the Working Area is therefore 1,052m^3 comprised of 91m^3 of acrotelm and 961m^3 of catotelm.

Peat Excavation in Temporary Compound Area

The area required to be excavated for the access track and construction compound is 7,859m^2 as shown on Figures 3a and 3b. The total volume of peat required to be excavated for the formation of the temporary construction compound and access track is 4,532m^3, comprised of 472m^3 of acrotelm and 4,060m^3 of catotelm.

Total volume of Excavated Peat

The total volume of peat required to be excavated for the project is therefore 10,670m^3, comprised of 1,017m^3 of acrotelm and 9,653m^3 of catotelm as detailed in Table 7.

Table 7: Total Peat Excavated

Area	Acrotelm volume (m^3)	Catotelm volume (m^3)	Total volume of peat excavated (m^3)
Excavations within Working Area	455	4,631	5,086
Set back distance around perimeter of working area	27	621	649
Triangular wedge excavation around perimeter of working area	0	131	131
Drain (swale) around perimeter of working area	63	209	272
Temporary construction compound and access	472	4,060	4,532
Total	**1,017**	**9,653**	**10,670**

In order to further determine accurate peat volumes, peat probing and / or other ground investigation techniques will be employed as necessary prior to and during the works in order to inform any micrositing options.

Final implementation of peat reuse and classification will be subject to geotechnical on-site tests e.g. shear vane testing, to determine peat stability and type and use potential.

6.2 Peat Reuse Volumes

From Table 7 above, the volume of peat that will be removed by excavation of the Deep Water Port footprint on land, including set back excavations, drains and temporary construction compound and temporary access is ~1,000m^3 of acrotelm, and ~9,650m^3 of catotelm. This volume of peat will be reused around the site in the following areas, as presented on Figures 5a, 5b and 5c and detailed in Table 8:

- On the verges along the ~2m to 3m wide sides of the access road where it is raised above ground level in a 0.5m thickness (Areas 1 and 2). The verges slope from the edge of the road down to the existing ground level.
- Reinstatement of the temporary construction compound and access track. The peat would be placed at 1.3m thick to connect to the existing peat habitat of similar thickness (1.0 to 1.5m depth) to the north and to restore the areas of cut peat that currently exist in the compound area (Area 3). This area has been selected as it encompasses three large areas of cut peat that are also impacting on adjacent peat through drainage. Any peat in this area will be removed and stored adjacent to the temporary compound for restoration after the compound is no longer required. The restoration of the whole of the compound area and access track will result in a more uniform surface of deeper peat that connects to adjacent areas of deeper peat with improved hydrological and hydrogeological conditions to maintain peat quality and reduced drainage.

- Restoration of four areas of peat cutting near the temporary construction compound, labelled as areas 4, 5, 6 and 7 on Figures 5a, 5b and 5c. The depth of the cuttings has been measured in the field and via topographic survey to determine the volume of peat that has been removed and therefore is needed for restoration to the previous ground surface. The depths are: Area 4 – 0.52m, Area 5 – 0.25m, Area 6 – 0.35m and Area 7 – 0.70m.

Photos of peat cuttings related to areas 4 to 7 on Figures 5a, 5b and 5c

Table 8: Estimated Potential Reuse Volumes

Reuse Location	Reuse Summary	Area (m^2)	Acrotelm volume (m^3)	Catotelm volume (m^3)	Total Volume (m^3)
Area 1 - Verge along raised access road margins – northern section (~1.6m x 67m)	Width of ~2.2m with 0.5m depth of peat using average 0.06m depth of acrotelm peat and 0.44m catotelm	220	13.2	96.8	110.0
Area 2 – Verge along raised access road margins – southern section (3m x 50m)	Width of ~3m with 0.5m depth of peat using average 0.06m depth of acrotelm peat and 0.44m catotelm	162	9.7	71.3	81.0
Area 3 – Reinstated construction compound and access track	Irregular area with 1.3m depth of peat using average 0.06m depth of acrotelm peat and 1.24m catotelm	7,859	471.5	9,745.2	10,216.7

Reuse Location	Reuse Summary	Area (m^2)	Acrotelm volume (m^3)	Catotelm volume (m^3)	Total Volume (m^3)
Area 4 – Reinstated cut blanket bog	Irregular area with 0.52m depth of peat using average 0.06m depth of acrotelm peat and 0.46m catotelm	754	45.2	346.8	392.1
Area 5 – Reinstated cut blanket bog	Irregular area with 0.25m depth of peat using average 0.06m depth of acrotelm peat and 0.19m catotelm	326	19.6	61.9	81.5
Area 6 – Reinstated cut blanket bog	Irregular area with 0.35m depth of peat using average 0.06m depth of acrotelm peat and 0.29m catotelm	236	14.2	68.4	82.6
Area 7 – Reinstated cut blanket bog	Irregular area with 0.70m depth of peat using average 0.06m depth of acrotelm peat and 0.64m catotelm	882	52.9	564.5	617.4
Total			**626**	**10,955**	**11,581**

Net Peat Balance

The volume of peat predicted to be excavated does not exceed the potential reuse volume so no disposal of excess peat off site is expected. The excavated peat volumes and volumes of peat to be re-used are summarised in Table 9 below (values rounded up or down as appropriate).

Table 9: Net Peat Balance

	Acrotelm volume (m^3)	Catotelm / Amorphous volume (m^3)	Total Volume (m^3)
Excavated Peat	**1,017**	**9,653**	**10,670**
Peat Reuse	**626**	**10,955**	**11,581**
Total Balance	**-391**	**1,302**	**911**

The peat restoration volumes demonstrate that there is capacity within the proposed areas to reuse all of the peat currently estimated to be excavated on site. There is also more than sufficient acrotelm to place over all catotelmic peat which will result in more favourable restoration. This can be achieved while improving the condition of the cut, degraded blanket bog and extending the area of deeper peat. It is therefore considered that this approach is consistent with SEPA requirements for excavated peat being used for improvement of existing degraded peat habitats. All locations are readily accessible due to the temporary access track and construction compound that will be developed so that there will be limited tracking over peat habitats that are not part of the proposed restoration programme.

Non Peat Soil Reuse

The 6,940m^3 of non peat soil will be used for reinstatement within the working area as shown on Drawing SDWP-WS2139-XX-01-DR-C-0059 and is included within the figures in this report. The associated tables, presented on the drawing, show the breakdown of volumes both for excavation and reuse and demonstrate balance.

7 Handling Excavated Materials

The following methodologies for excavation and temporary storage of peat are proposed but are subject to confirmation once detailed design and construction plans are in place:

- Prior to any excavations, the Contractor will produce a detailed RAMS identifying where and how excavated peat will be used in reinstatement or landscaping works. Specific requirements for the excavation, handling, storage and reinstatement of peat will be outlined in this RAMS. The Contractor will consider potential impacts on downstream hydrological receptors and also the potential for instability issues with the excavated material.
- Surveys for non-native species should be completed prior to soil stripping and peat translocation as per the Schedule of Mitigation, to ensure that no invasive non-native species (INNS) or their seeds are spread during the relocation of peats and soils. The management of any INNS found should be carried out in accordance with the Construction Environmental Management Document and activity specific Risk Assessment Method Statements.
- Areas of peat within the footprint of any excavation will have the top layer of vegetation stripped off as turf prior to construction by an experienced peat earthworks contractor. When excavating areas of peat, excavated turfs will be kept as intact as possible. Often it is easiest to achieve this by removing large turfs up to 500mm in order to keep the peat intact.
- Excavated turfs will be kept as intact as possible so as to minimise carbon losses.
- Excavated soils and turfs will be handled so as to avoid cross contamination between distinct horizons and allow reuse potential to be maximised.
- Transport of peat to temporary storage areas, restoration areas or designated spoil areas will be by low ground pressure vehicles to avoid excessive compaction of the peat.

Where peat will be used to restore cut put areas there is no requirement for peat storage as excavated peat can be placed directly into these old excavations. This only applies to about 10% of peat and therefore preliminary storage locations have been presented on Figures 5a, 5b and 5c.

Areas of temporary storage required for peat will be further identified in the Contractor's RAMS taking into account constraints and mitigation requirements identified in the environmental

information. This will describe any intended drainage, pollution prevention and material stability mitigation measures that may be required. The areas will:

- be located as close to the excavation as practicable to minimise movement;
- avoid all areas of deep peat (peat >1.0m);
- be located ideally on flat areas so that erosion and run off is limited, leachate from the material is controlled, and stability of the existing peatland in the vicinity is not affected;
- be stockpiled at least 50 m away from watercourses. This will prevent the runoff of any wetting required on stored peat and discharge into adjacent watercourses;
- located away from any sensitive habitats; and
- in locations where the water table can be kept artificially high.

The temporary stockpiles should be managed as follows:

- Any edges of cut peat that may remain exposed, or areas of peat excavation on steep slopes, will be covered with geotextile or similar approved. This will allow re-turfing and re-vegetation and reduce erosion risks.
- An up-gradient cut off ditch should be installed around the edge of the storage bund in order to collect up-gradient surface water runoff and divert water runoff from eroding the toe of the bund.
- Stockpiles should be bladed off at the side to minimise the available drying surface area.
- The design and location of stockpiles, including incorporated drainage elements, will be agreed with the ECoW and Clients Engineer prior to excavation works commencing.
- The stockpiles will be used for the minimum time possible and based on the expected programme should be in the region of 18 months.

8 Reuse of Peat

8.1 Bare Peat

There are a number of important methodologies regarding the exposure of bare peat in the peat restoration areas including:

- The amount of time any bare peat will be exposed will be minimised to preserve its integrity.
- The phasing of work should be carried out to minimise the total amount of exposed ground at any one time. By stripping turf and replacing as soon as possible after peat has been re-distributed there will be minimal areas of bare peat.
- Any peat areas on steep ground, or that remains partially bare, will be covered using geotextile or a similar method to stop erosion.

- Any areas of bare peat, where vegetation is not re-growing, will be seeded with a seed mixture obtained from the existing habitat at an appropriate time of year to maximise the likelihood of revegetation.

This approach has been shown to be effective on other peat sites and the turfs re-grow quickly both establishing vegetation and consolidating the peat. The re-vegetated areas will be monitored. Stock exclusion in these areas, if required, will continue until vegetation is properly established.

8.2 Peat Re-use associated with works

Peat reuse around and within the Deep Water Port footprint on land is an important aspect of the development as it allows an opportunity to maintain the integrity of the excavated peat, enhance habitats and create new habitats. This will be undertaken through:

- The Contractor will be required to provide appropriate plant for undertaking all reinstatement works such that no unnecessary disturbance of the ground surface occurs. In order to minimise disturbance and damage to the ground surface, any mobile plant required for reinstatement and landscaping works will be positioned on constructed access roads, hardstanding areas or existing disturbed areas wherever practicable. The use of a long reach excavator for excavations and reinstatement works is preferable as it enables sufficient room to allow initial side casting and subsequent pulling back of turfs over reinstated peat or soil.
- Reinstatement of vegetation will be focused on natural regeneration utilising peat vegetated turfs. To encourage stabilisation and early establishment of vegetation cover, where available, peat turfs (acrotelmic material) or other topsoil and vegetation turfs in keeping with the surrounding vegetation type will be used to provide a dressing for the final surface.
- Any reinstatement and re-profiling proposals will consider, and mitigate against, identified significant risks to environmental receptors. In particular, in areas of replaced peat, water management will be considered in the Contractor's RAMS to allow an appropriate hydrological regime to be re-established within areas of disturbance. Particular attention will be paid to maintaining hydrological continuity and preventing the creation of preferential subsurface flow paths.
- Peat turfs should be replaced on all disturbed areas, including constructed roadside drainage channel embankments where possible.
- Any landscaping or road batters should be limited to the areas of ground already disturbed.

8.3 Peatland Restoration

Proposed Restoration Areas

Three types of restoration are proposed for the site:

- Areas 1 and 2 are the side slopes of the raised access road;

- Area 3 is where the temporary construction compound and access track will be located. Any existing peat will be removed and stored for subsequent reinstatement across the whole of this area; and
- Areas 4, 5, 6 and 7 are areas of peat that have been cut and these cells will be backfilled, potentially with the removal and replacement of the upper layer of peat depending on condition.

These will be developed in accordance to the handling, temporary storage and reuse methodologies described above. Cross sections to show the peat restoration profiles in the existing areas of excavated peat and where the construction compound will be excavated, Areas 3 to 7, are presented in Figure 6. The peat will be reinstated with peat horizons matching the surrounding horizons/topography to maintain the hydraulic flows and ensure that the peat stays wet.

Maintaining Saturation

There are a number of critical aspects to any peat restoration programme, however managing and maintaining groundwater levels to keep the peat saturated is essential in order for the peat to not degrade and to allow the peat to grow. If surface water can be managed so that pools develop in the restored peat then the conditions for the growth of sphagnum bog mosses are promoted. The proposed areas of peat restoration offer good conditions to enable the groundwater to be controlled as they will either:

- fill in hollows of cut peat where water management can readily be enhanced with drain blocking to raise groundwater levels; and
- be placed in areas of erosion or bare ground, eroded peat or dry modified bog in flat areas where surface flows can be readily managed to infiltrate to increase peat saturation and the low permeability of the peat will slow groundwater flow combining to increase groundwater levels;

Areas 1 and 2 are minor areas of shallow peat on raised road, however they can still be maintained in a saturated state through the control of road drainage, both related to the road between them and from the connection to the existing road drainage system that is upgradient.

Monitoring

Monitoring of peat restoration areas will be completed through the installation of a number of groundwater monitoring wells (WaLRaGs) that record the minimum and maximum water levels between monthly manual readings. A rainfall gauge will also be installed to allow groundwater level fluctuations to be assessed. Habitat surveys of the restored areas will be completed at 1, 3 and 5 years to assess success.

9 Conclusions

Based on the peat depth, characteristics and distribution investigations undertaken across the land based area of the Deep Water Port and adjoining areas, all estimated peat to be excavated is planned for appropriate reuse for restoration work during the construction phase of the development.

Further investigation will be undertaken prior to works commencing to confirm peat depth, distribution and characterisation.

The Contractor, monitored by the ECoW, will maintain a record of actual peat volumes excavated and the subsequent peat reuse to compare the predicted and actual peat volumes. This record during the construction, operation, decommissioning and restoration phases of the Proposed Development will be made available for review by regulators as and when required.

10 References

Stornoway Deep Water Port-Stage 2 Land Ground Investigation report (Causeway Geotech, January 2019)

Additional Peat Coring Report August 2019 Fluid Environmental Consulting

Phase I Habitat Mapping, Stornoway Deep Water Port, Lewis and Harris. Tracks Ecology April 2020

Peat Landslide Hazard and Risk Assessment, Stornoway Deep Water Port. East Point Geo Ltd October 2019

Additional Peat Coring Report, Stornoway Deep Water Port. Fluid Environmental Consulting August 2019

Scotland's National Peatland Plan Working for our future. Scottish Natural Heritage (2015).

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SEPA Regulatory Position Statement – Developments on Peat. (2010).

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Forestry Civil Engineering and SNH (2010). Floating Roads on Peat: A Report into Good Practice in Design, Construction and Use of Floating Roads in Peat with particular reference to Wind Farm Developments in Scotland.

Towards an assessment of the state of UK Peatlands, JNCC (2011).

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The Soil Survey of Scotland (1984)

Understanding the GHG implications of forestry on peat soils in Scotland, The Forestry Commission (2010)

Figures

142000

931000

N

Cala Ghl

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KEY:

- Peat Assessment Area
- Working Area
- Infrastructure Layout
- Contour (10 m)

Peat Probes Locations
Depth of Penetration (m)

- 0 - 0,5 m
- > 0.5 - 1.0 m
- > 1.0 - 1.5 m
- > 1.5 - 2.0 m
- > 2.0 m

PROJECT

STORNOWAY DEEP WATER PORT

SCALE

1:3,500 @ A3

0 50 100 150 200 250 m

FIGURE 1

Depth of Penetration and Probe Locations (OS base)

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KEY:

- Peat Assessment Area
- Working Area
- Infrastructure Layout
- Contour (10 m)

Estimated Peat Depth (m)

- 0 - 0.5 m
- > 0.5 - 1.0 m
- > 1.0 - 1.5 m
- > 1.5 - 2.0 m
- > 2.0 - 3.0 m

PROJECT

STORNOWAY DEEP WATER PORT

SCALE

1:3,500 @ A3

0 50 100 150 200 250 m

FIGURE 2a

Estimated Peat Depth (OS base)

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KEY:

- Peat Assessment Area
- Working Area
- Infrastructure Layout
- Contour (10 m)

Estimated Peat Depth (m)

- 0 - 0.5 m
- > 0.5 - 1.0 m
- > 1.0 - 1.5 m
- > 1.5 - 2.0 m
- > 2.0 - 3.0 m

PROJECT

STORNOWAY DEEP WATER PORT

SCALE

1:3,500 @ A3

0 50 100 150 200 250 m

FIGURE 2b

Estimated Peat Depth (Aerial Image)

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KEY:

- Peat Assessment Area
- Working Area
- Infrastructure Layout
- Temporary Construction Compound

Estimated Peat Depth (m)

- 0 - 0.5 m
- > 0.5 - 1.0 m
- > 1.0 - 1.5 m
- > 1.5 - 2.0 m
- > 2.0 - 3.0 m

PROJECT

STORNOWAY DEEP WATER PORT

SCALE

1:1,500 @ A3

0 25 50 75 100 m

FIGURE 3a

Temporary Construction Compound Location (with Estimated Peat Depth)

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KEY:

- Peat Assessment Area
- Working Area
- Infrastructure Layout
- Temporary Construction Compound

PROJECT

STORNOWAY DEEP WATER PORT

SCALE

1:1,500 @ A3

0 25 50 75 100 m

FIGURE 3b

Temporary Construction Compound Location (with Aerial imagery base)

FLUID ENVIRONMENTAL CONSULTING

142000

931000

N

Cala

KEY:

- Peat Assessment Area
- Working Area
- Stornoway Layout
- Contour (10 m)
- Peat Intersecting Working Areas

Estimated Peat Depth (m)

- 0 - 0.5 m
- > 0.5 - 1.0 m
- > 1.0 - 1.5 m
- > 1.5 - 2.0 m
- > 2.0 - 3.0 m

PROJECT

STORNOWAY DEEP WATER PORT

SCALE

1:3,000 @ A3

0 50 100 150 200 m

FIGURE 4

Peat Intersecting Working Areas

FLUID ENVIRONMENTAL CONSULTING

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931000

N

1

2

3

4

5

6

7

Cala Ghl

KEY:

	Estimated Peat Depth (m)
Peat Assessment Area	0 - 0.5 m
Working Area	> 0.5 - 1.0 m
Infrastructure Layout	> 1.0 - 1.5 m
Peat Storage Areas	> 1.5 - 2.0 m
Proposed Peat Restoration Areas	> 2.0 - 3.0 m

PROJECT

STORNOWAY DEEP WATER PORT

SCALE

1:3,500 @ A3

0 50 100 150 200 250 m

FIGURE 5a

Peat Restoration and Temporary Storage Areas, Estimated Peat Depth

FLUID ENVIRONMENTAL CONSULTING

142000

931000

N

1

2

3

4

5

6

7

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KEY:

- Peat Assessment Area
- Working Area
- Infrastructure Layout
- Peat Storage Areas
- Proposed Peat Restoration Areas

PROJECT

STORNOWAY DEEP WATER PORT

SCALE

1:1,750 @ A3

0 25 50 75 100 m

FIGURE 5b

Peat Restoration and Temporary Storage Areas (Aerial Imagery base)

FLUID ENVIRONMENTAL CONSULTING

142000

931000

N

1

2

3

4

5

6

7

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KEY:

- Peat Assessment Area
- Working Area
- Infrastructure Layout
- Peat Storage Areas
- Proposed Peat Restoration Areas

Restoration Habitat Type

- Access Track Verge
- Blanket Bog
- Cut Blanket Bog
- Eroded Marshy Grassland / Wet Heath

PROJECT

STORNOWAY DEEP WATER PORT

SCALE

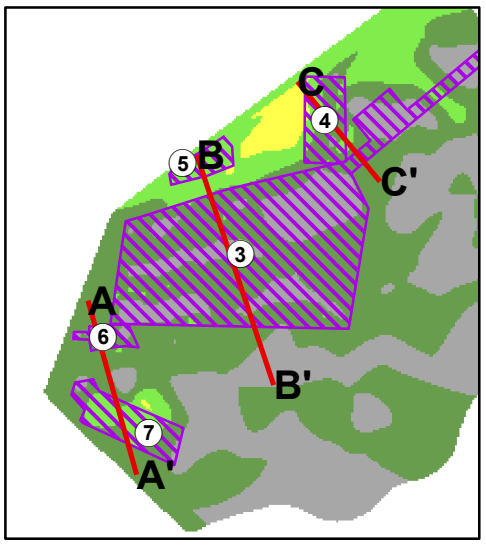
1:1,750 @ A3

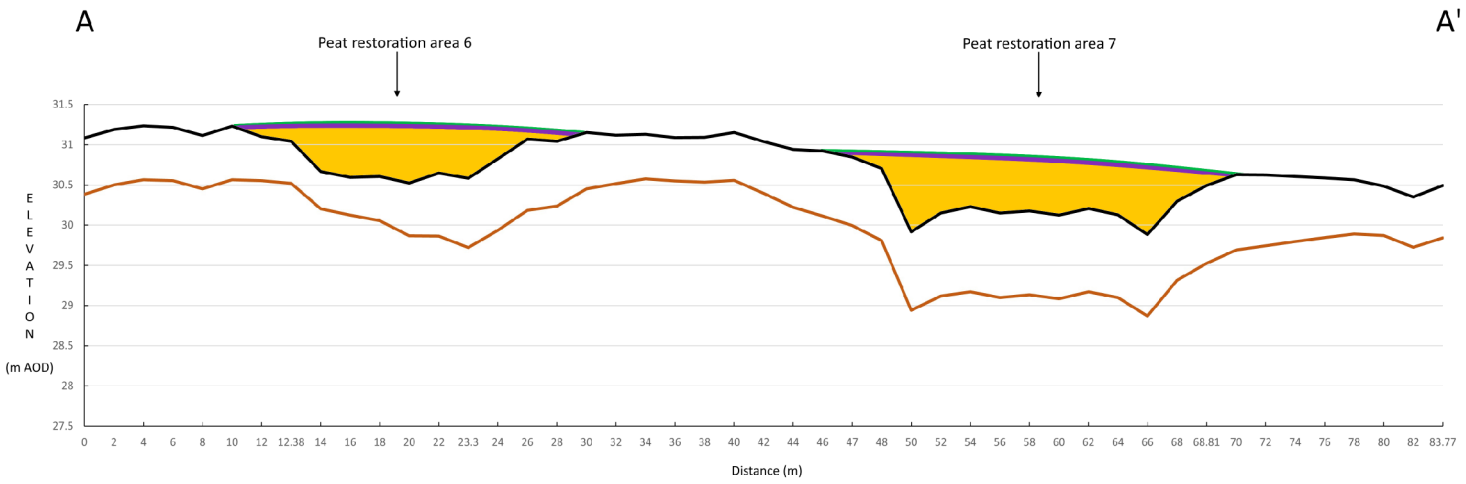
0 25 50 75 100 m

FIGURE 5c

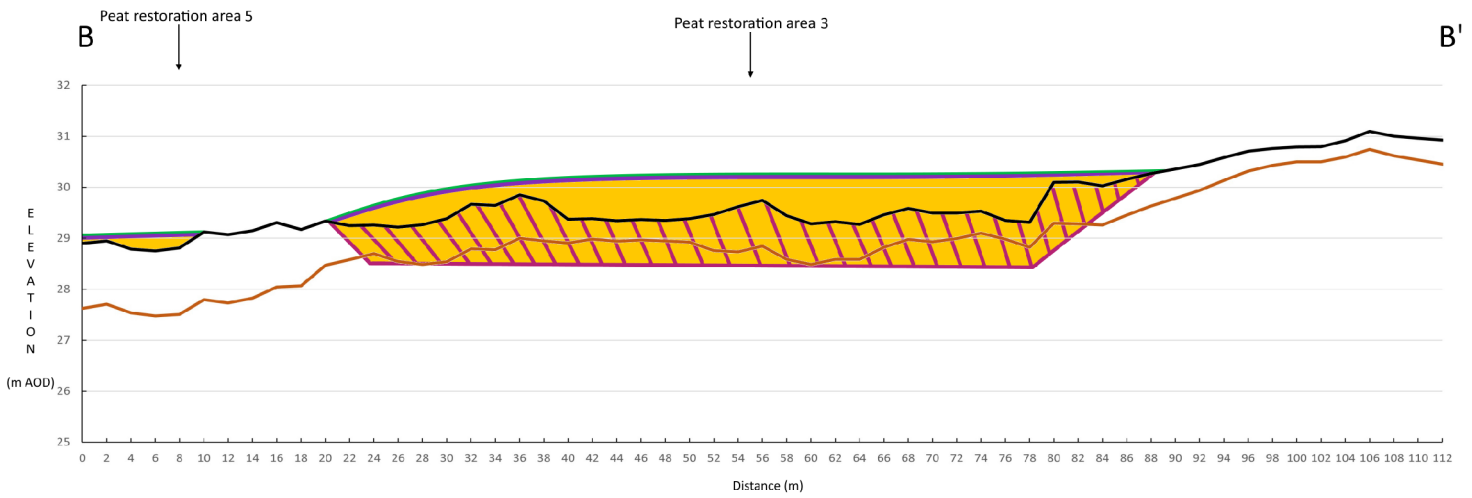
Peat Restoration, Temporary Storage Areas and Habitat Type

FLUID ENVIRONMENTAL CONSULTING

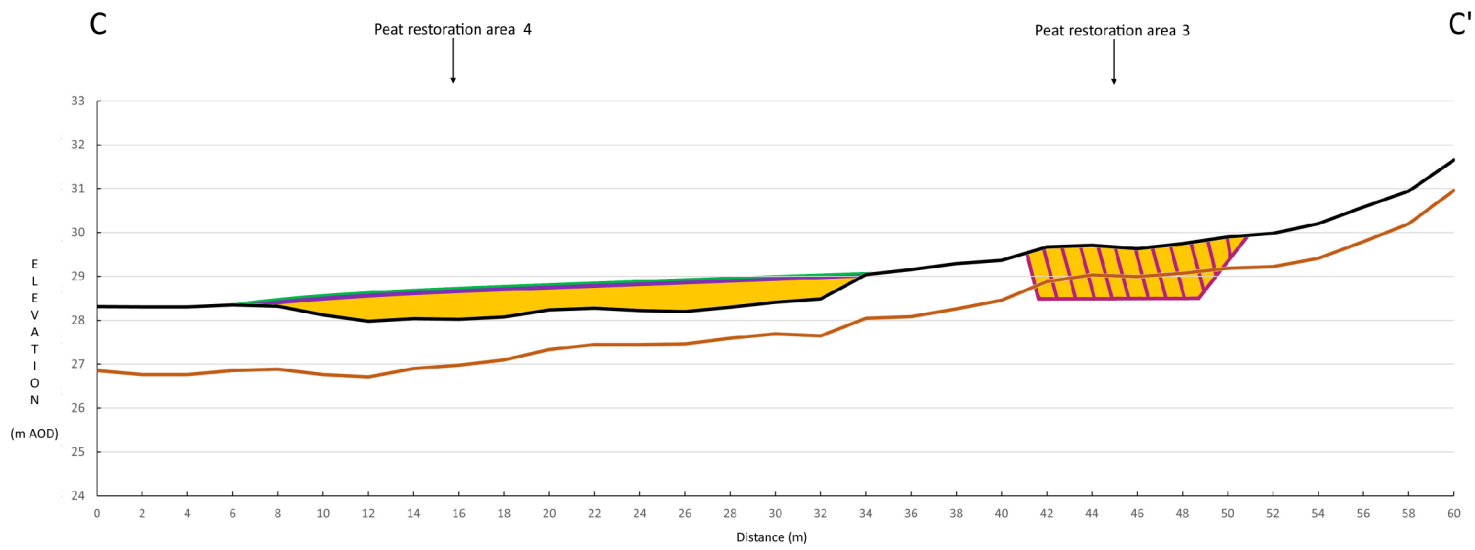




Cross Section (A-A')



Cross Section (B-B')



Cross Section (C-C')

KEY:

Legend

- Cross Sections
- Proposed Peat Restoration Areas
- Current ground surface
- Base of peat
- Acrotelm
- Post restoration ground surface
- Catotelm
- Temporary compound access road excaated to stable base, subsequently backfilled to previous surface

PROJECT

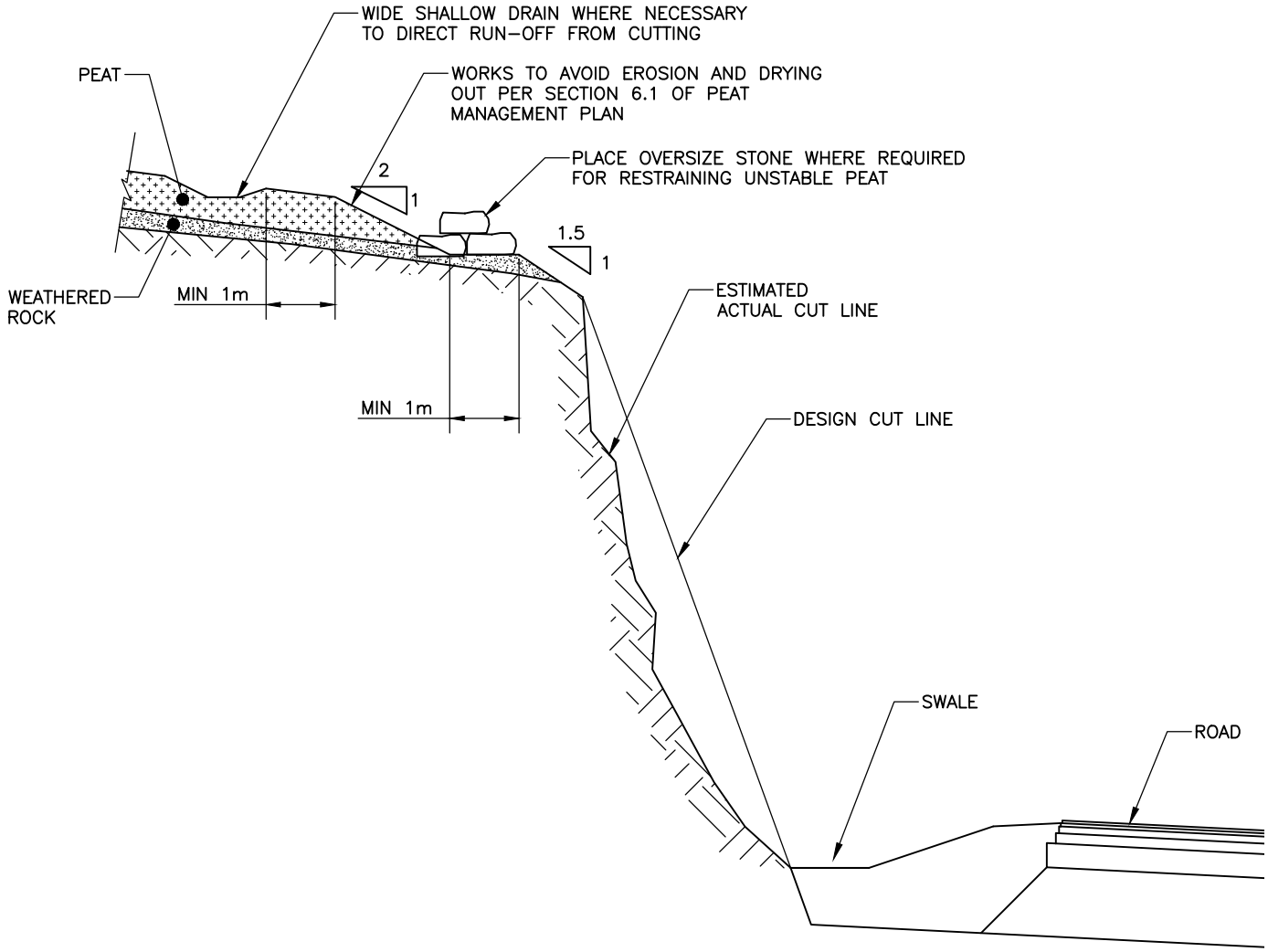
STORNOWAY DEEP WATER PORT

SCALE

FIGURE 6

Peat Restoration Areas Cross Sections

FLUID ENVIRONMENTAL CONSULTING



CROSS SECTION 1

(AS REFERRED TO IN THE PEAT MANAGEMENT PLAN)

SCALE 1:100

Wallace Stone
Consulting Civil Engineers

GLASGOW
0141 554 8233
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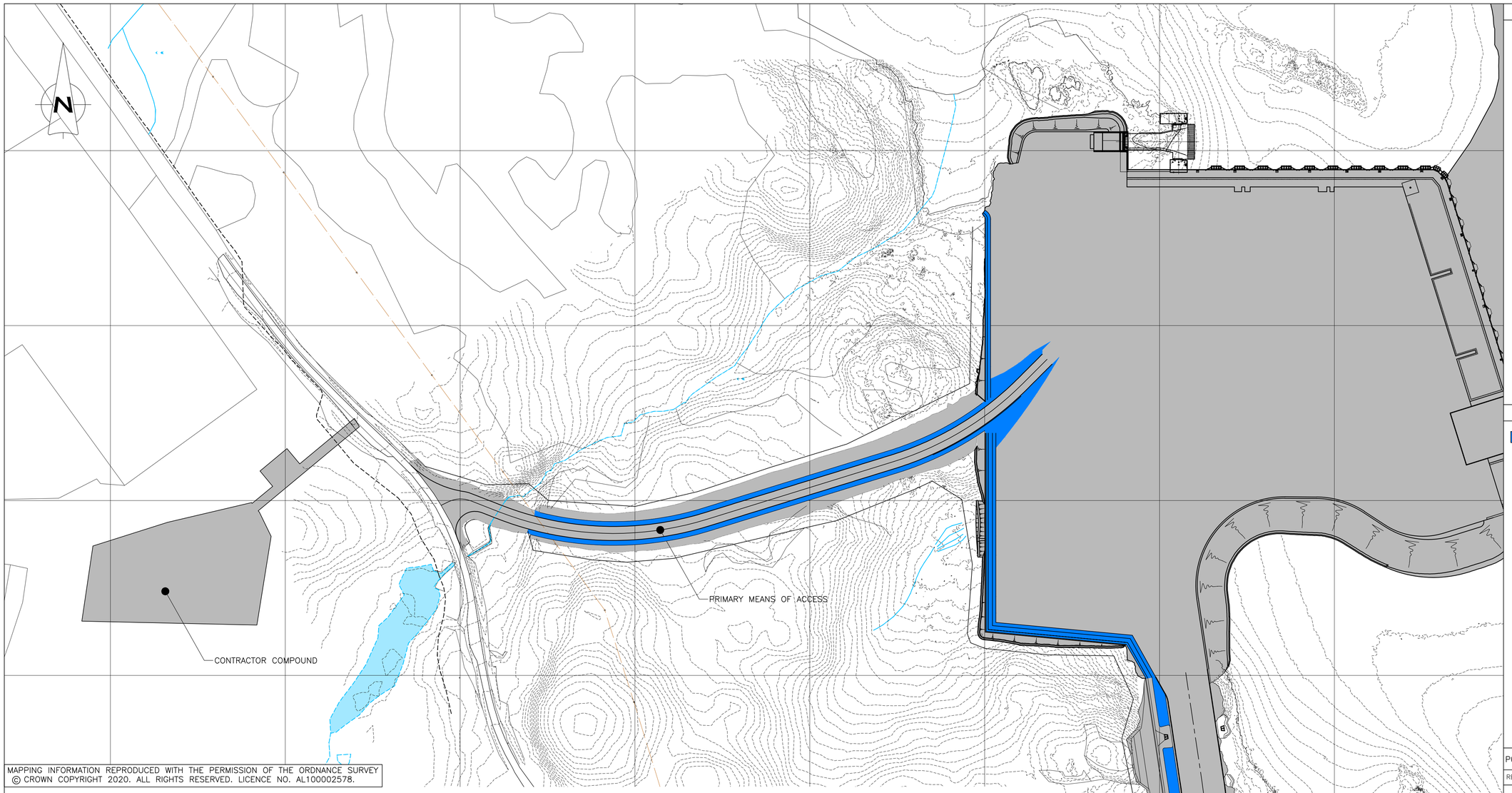
HEBRIDES
01851 612454
hebrides@wallacestone.co.uk

STORNOWAY PORT AUTHORITY
STORNOWAY DEEP WATER PORT
PEAT RESTORATION AT TOP OF CUTTING IN ROCK

DRAWING NO. SDWP-WS2139-XX-01-DR-C-SK01			P01
DRAWN: JR	DATE: OCT19	APP'D: JP	DATE: OCT19

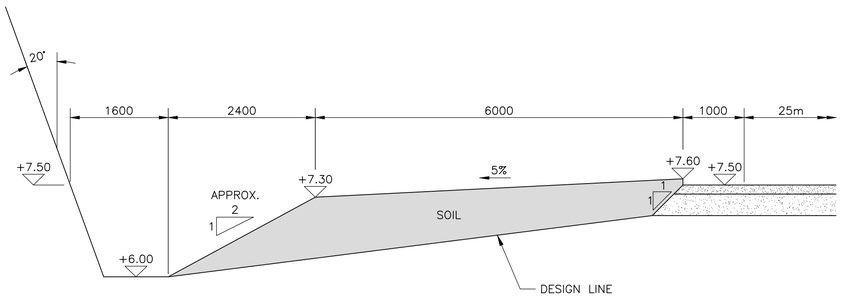


TOTAL OVER BURDEN	VOLUME (m^3)
PEAT (ACROTELM AND CATOTELM)	10,670
OTHER (SOIL, BOLDER CLAY AND WEATHERED ROCK)	6940
TOTAL	17,610

TOTAL OTHER EXCAVATED (NON–PEAT)	VOLUME (m^3)
ACCESS ROAD	1510
RECLAMATION AREA	936
LINK ROAD	4494
CONTRACTORS COMPOUND	0
TOTAL	6940

ESTIMATED POTENTIAL RE–USE VOLUMES (NON–PEAT)	VOLUME (m^3)
ACCESS ROAD – VERGES, SWALES AND DITCH	901
RECLAMATION AREA – VERGES/ROCK TRAP AND DITCH	854
LINK ROAD – VERGE/ROCK TRAP AND DITCH	5005
OTHER AREAS	313
TOTAL	7073

NET BALANCE OF NON–PEAT OVER BURDEN	VOLUME (m^3)
EXCAVATED	6940
RE–USE	7073
TOTAL BALANCE	–133



TYPICAL SECTION THROUGH LINK ROAD
VERGE/ROCK TRAP AND DITCH

SCALE 1:50

GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS ARE IN METRES AND RELATE TO CHART DATUM.
3. CHART DATUM IS 2.71m BELOW ORDNANCE DATUM.
4. TIDE LEVELS:

H.A.T	= +5.5mCD	(+2.79mOD)
M.H.W.S	= +4.8mCD	(+2.09mOD)
M.L.W.S	= +0.7mCD	(–2.01mOD)
L.A.T	= 0.0mCD	(–2.71mOD)

LEGEND

PROPOSED SOIL REUSE

REV	DATE	DETAILS	DRAWN	CHK'D	APP'D
P02	05.03.21	RETITLED & MINOR AMENDMENTS.	DA	DA	JP

AMENDMENTS

CLIENT

STORNOWAY PORT AUTHORITY

PROJECT

STORNOWAY DEEP WATER PORT

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DRAWING TITLE

PRIMARY MEANS OF ACCESS
SOIL RE–USE AREAS

DRAWN	CHECKED	APPROVED
TC	DA	JP
DATE	DATE	DATE
MAR 21	MAR 21	MAR 21

SCALE (A1)	STAGE	REV
1:1250	PLANNING	P03

DRAWING No.

SDWP–WS2139–XX–01–DR–C–0059

Appendix 11B – Peat Slide Risk Assessment

east point geo

Stornoway Deep Water Port

Peat Landslide Hazard and Risk Assessment

October 2019

Client	Fluid Environmental Consulting
Document Number	19-FEC-007-01
Author(s)	Andy Mills, Director
Approved by	David Rushton, Director
Version	01
Date	29/10/2019

evaluate
problem-solve
guide

Contents

1. Background

1.1 The Stornoway Port Authority is proposing to construct a deep water port, the 'Stornoway Deep Water Port' ('SDWP'), on the western shore of Glumaig Bay in Arnish, approximately 2km to the south of Stornoway town centre. The proposed port will require a variety of groundworks within bedrock and the overlying peat deposits to create access and level ground for various components of the development.

1.2 East Point Geo Ltd (EPG) were commissioned to undertake an outline peat landslide hazard and risk assessment following peat probing, which indicated the presence of peat in areas of proposed groundworks. In parallel, a peat management plan (PMP) has been prepared by Fluid Environmental Consulting (FEC) which accounts for excavation and re-use of peat as part of these groundworks.

1.3 Peat instability, or peat landslides, are a widely documented but relatively rare mechanism of peatland degradation that may result in damage to peatland habitats, potential losses in biodiversity and depletion of peatland carbon stores. Peat instability is manifested in a number of ways (Dykes and Warburton, 2007) all of which can potentially be observed on site either through site walkover or remotely from high resolution aerial photography or satellite imagery:

- **Minor instability:** localised and small-scale features that are not generally precursors to major slope failure and including gully sidewall collapses, pipe ceiling collapses, minor slumping along diffuse drainage pathways (e.g. along flushes); indicators of incipient instability including development of tension cracks, tears in the acrotelm (upper vegetation mat), compression ridges, or bulges / thrusts (Scottish Government, 2017); these latter features may be warning signs of larger scale major instability (such as landsliding) or may simply represent a longer term response of the hillslope to drainage and gravity, i.e. creep.

- **Major instability:** comprising various forms of peat landslide, ranging from small scale collapse and outflow of peat filled drainage lines/gullies (occupying a few-10s cubic metres), to medium scale peaty-debris slides in organic soils (10s to 100s cubic metres) to large scale peat slides and bog bursts (1,000s to 100,000s cubic metres).

1.4 Peat landslides can be summarised as one of three main types (shown in Figure 1.1). The term "peat slide" is used to refer to large-scale (typically less than 10,000 of cubic metres) landslides in which failure initiates as large rafts of material which subsequently break down into smaller blocks and slurry. Peat slides occur 'top-down' from the point of initiation on a slope in thinner peats (between 0.5m and 1.5m) and on moderate slope angles (typically 5-15°).

Figure 1.1 Characteristics landslide types in UK uplands: i) multiple peat slides with displaced slabs and exposed substrate, ii) retrogressive bog burst with peat retained within the failed area, iii) multiple peaty soil slides in a headwater area with displacement of thin soils exposing substrate (all images are at a similar scale and approximately 400m in width)

1.5 The term “bog burst” is used to refer to very large-scale (usually greater than 10,000 of cubic metres) spreading failures in which the landslide retrogresses (cuts) upslope from the point of failure while flowing downslope. Peat is typically deeper (greater than 1.0m and up to 10m) and more amorphous than sites experiencing peat slides, with shallower slope angles (typically 2-5°). Much of the peat displaced during the event may remain within the initial failure zone. Bog bursts are rarely reported in Scotland, although they have been reported on the Isle of Lewis (e.g. Bowes, 1960) in at least three locations.

1.6 The term “peaty soil slide” is used to refer to small-scale (1,000s of cubic metres) slab-like slides in organic soils (i.e. they are <0.5m thick). These are similar to peat slides in form, but far smaller and occur commonly in UK uplands across a range of slope angles (Dykes and Warburton, 2007). Their small size means that they often do not affect watercourses and their effect on habitats is minimal.

1.7 This short report provides a desk-based assessment of peat stability within the proposed development area. Potential hazards and risks are assessed and outline mitigation options recommended to minimise the potential for instability in association with construction of the SDWP. Although a site visit has not been undertaken in support of this report, site-based data have been acquired as part of the wider application and digital aerial imagery have been used to assess ground conditions.

2. The Stornoway Deep Water Port

2.1 The outline of proposed works is shown in Figure 2.1. The SDWP will comprise a 430m quay with a new freight ferry berth and a 10ha reclaimed and levelled area for port activities, general industrial, storage/distribution, heavy engineering and fabrication activities, car parking, internal access and vehicle turning areas.

2.2 Onshore groundworks will comprise the following activities (Barton Willmore, 2019):

- Excavation of 350,000m^3 of rock from the steep slopes behind the quay to provide infill material for a reclaimed area within the bay. Bulk blasting will be employed to prepare the rock for transport and use, and this will occur over the duration of construction as new material is won for each phase of development of the reclaimed area.
- Cutting, filling and reshaping land within the northwestern corner of the Site to form a new two-way access road to the Arnish Point Industrial Estate Road.
- Culverting of the Allt Poll a'Choire watercourse where it passes under the new primary access road.
- Re-use of peat excavated from areas planned for rock extraction, including by reinstatement in other parts of the site as road verges, bunds and 'reshaping of important land forms'.

2.3 Offshore groundworks (including dredging) are not considered in this report.

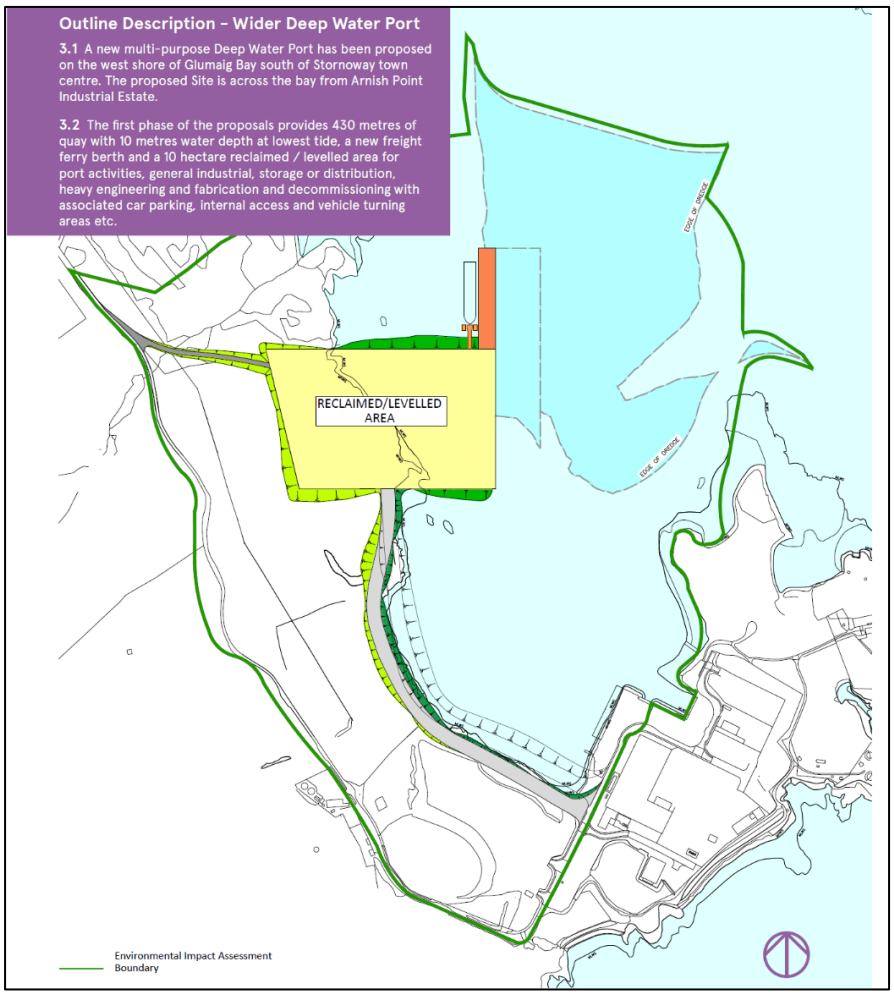

Figure 2.1 The SDWP (excerpt from Barton Willmore, 2019)

3. Approach

3.1 The following tasks have been undertaken to assess peat landslide risk associated with the proposed SDWP:

1. Geomorphological mapping of the site using digital satellite imagery and digital terrain data to identify any evidence of ground instability.
2. Stability analysis using conservative geotechnical parameters to determine the Factor of Safety in areas adjacent to proposed works.
3. Evaluation of potential landslide impacts in the event instability were to be caused by construction activities (e.g. excavation or blasting).
4. Consideration of receptors that might be impacted by landslide runout and associated risks.
5. Identification of outline mitigation measures to be incorporated in a geotechnical risk register and progressed during detailed design in the event of consent.

3.2 The following data have been used:

- 5m resolution digital terrain model (with derivates including slope, aspect, hillshade and contours).
- Results of a peat depth survey undertaken on a 20m grid by Breedons Hebrides Ltd using peat probes and by Causeway Geotech and Fluid using a Russian Corer and gouge auger respectively (coring was employed at 12 locations).
- Digital satellite imagery of the site available as a basemap layer in ArcGIS.

3.3 It should be noted that the approach presented here is a desk-study only, and has not been supported by a field visit. Therefore, some aspects of ground instability that would not be resolvable on satellite imagery alone (e.g. tension cracks, piping, etc) have not been assessed. It is recommended that in the event the proposal development is consented, a detailed walkover survey is undertaken prior to any blasting or construction activities.

4. Site Characterisation

Topography and Slope

4.1 Figure 4.1 shows elevation, slope and contours for the site. The red line boundary shown on the figure indicates the maximum extent of groundworks.

4.2 In summary:

- The east of the site adjacent to the sea comprises steeply sloping terrain on slopes typically 15° and locally up to 25°.
- To the west of these slopes and to the west of the area proposed for groundworks, the terrain undulates, with small areas of gentle slope separated by numerous hillocks and mounds.
- In the northeast of the site where the proposed access track joins the area to be reclaimed, a steep-sided and narrow valley falls SW-NE towards the shore.

4.3 Proposed groundworks include a cut face along the western side of the reclaimed area and southern side of the access track. These faces will be cut into bedrock and the overlying topsoils, including peat, where present.

4.4 The undulating nature of the topography, locally steep slopes and limited continuity of peat deposits suggest that any peat instability on site would be relatively minor compared to typical reported peat landslides which can be many hundreds of metres in length and several tens of metres in width (see Section 1). In likelihood, any landslides, should they occur, would be smaller in scale than the peaty-soil slides discussed in paragraph 1.6.

Peat Depth and Superficial Geology

4.5 Ground investigations undertaken by Causeway Geotech, Breedons Hebrides Ltd and FEC indicate that there is a variable thickness of peat across the site, averaging less than 1.0m in depth, but locally exceeding 2.0m. The left panel of Figure 4.2 shows the locations of peat depths plotted on satellite imagery of the site. The right panel shows the interpolated peat depth model derived from these probes. In summary:

- Peat depths are generally thin (0.5-1.0m) or equivalent to organic soil (<0.5m) over much of the site.
- The deepest peat (>2.0m) is located in a northwest-to-southeast aligned depression between two ridges in the centre of the site.
- Small pockets of deep peat (up to 2.0m) are present immediately south of the exit of the proposed primary access road onto the reclaimed area (within the floor of the steep-sided narrow valley (see above)).
- The southern and western limit of groundworks is typically separated from deep peat deposits other than on the southern side of the reclaimed area and within the narrow SW to NE valley.

4.6 Limited coring was undertaken (12 cores) as part of the ground investigations. Both acrotelmic and catotelmic peat are reported at the site (section 7.3.4.1; Causeway Geotech, 2019) and FEC 2019. The peat is described as "*inherent*[ly] *fibrous*" with Causeway Geotech concluding "*a low peat slide potential*". Peat is observed to directly overly bedrock that is visible in outcrop over much of the site.

4.7 Reference to BGS superficial geology basemap layers in ArcGIS shows no mapped superficial deposits.

Geomorphology

4.8 The geomorphology of the site is shown on Figure 4.3. The left panel shows the bare satellite imagery and the right panel the derived geomorphological features. These are as follows:

- **Rocky hillocks with exposed bedrock:** the centre of the site is dominated by discrete islands of bedrock, which is often exposed on west facing slopes.
- **Steep slopes, terracettes and undulating terrain:** steep slopes without exposed bedrock occur on the sides of flanks of the hillocks and facing the sea, with the thicker soils showing evidence of downslope creep as terracettes.
- **Sea cliff and beach:** at the lowest elevations, a low bedrock cliff is present, broken occasionally be gentler sand inlets.
- **Valley:** a concave valley runs from southwest to northeast in the northeast of the site – peat deposits are relatively deep here.

4.9 There is no evidence of prior instability of the peat deposits on site, although the terracettes indicate slow downslope creep of soils under gravity, and their coincidence with areas of steepest slope does imply slope movement, admittedly on long timescales.

4.10 Although peat soils are present on site, none of the characteristic geomorphological features of peat uplands are visible on satellite imagery (such as gullies, pools and hummocks, flushes, etc). This is unsurprising given the limited continuity of the peat deposits in the study area.

4.11 Given the small site, the hummocky nature of the topography, the lengths of continuous slope over which material may be mobilised and the lack of continuity of deep peat, the extent of a potential peat landslide is considered to be relatively limited.

5. Stability Analysis

Approach

5.1 Stability analysis has been undertaken using the infinite slope model to determine the factor of safety for a series of 10m x 10m cells within the area for which peat depth data has been collected. This is the most frequently cited approach to quantitatively assessing the stability of peat slopes (e.g. Scottish Government, 2017; Boylan et al, 2008; Evans and Warburton, 2007; Dykes and Warburton, 2007; Creighton, 2006; Warburton et al, 2003; Carling, 1986). The approach assumes that failure occurs by shallow translational landsliding, which is the mechanism usually interpreted for peat slides. Due to the relative length of the slope and depth to the failure surface, end effects are considered negligible and the safety of the slope against sliding may be determined from analysis of a 'slice' of the material within the slope.

5.2 The stability of a peat slope is assessed by calculating a Factor of Safety (F), which is the ratio of the sum of resisting forces (shear strength) and the sum of driving forces (shear stress) (Scottish Government, 2017):

$$F = \frac{c' + (\gamma - h\gamma_w) z \cos^2 \beta \tan \phi'}{\gamma z \sin \beta \cos \beta}$$

5.3 In this formula c' is the effective cohesion (kPa), γ is the bulk unit weight of saturated peat (kN/m^3), γ_w is the unit weight of water (kN/m^3), z is the vertical peat depth (m), h is the height of the water table as a proportion of the peat depth, β is the angle of the substrate interface (°) and ϕ' is the angle of internal friction of the peat (°). This form of the infinite slope equation uses effective stress parameters, and assumes that there are no excess pore pressures, i.e. that the soil is in its natural, unloaded condition. The choice of water table height reflects the full saturation of the soils that would be expected under the most likely trigger conditions, i.e. heavy rain.

5.4 Where the driving forces exceed the shear strength (i.e. where the bottom half of the equation is larger than the top), F is < 1, indicating instability. A factor of safety between 1 and 1.4 is normally taken in engineering to indicate marginal stability (providing an allowance for variability in the strength of the soil, depth to failure, etc). Slopes with a factor of safety greater than 1.4 are generally considered to be stable.

5.5 There are numerous uncertainties involved in applying geotechnical approaches to peat, not least because of its high water content, compressibility and organic composition (Hobbs, 1986; Boylan and Long, 2014). Peat comprises organic matter in various states of decomposition with both pore water and water within plant constituents, and the frictional particle-to-particle contacts that are modelled in standard geotechnical approaches are different in peats. There is also a tensile strength component to peat which is assumed to be dominant in the acrotelm, declining with increasing decomposition and depth. As a result, analysis utilising geotechnical approaches is often primarily of value in showing relative stability across a site given credible and representative input parameters rather than in providing an absolute estimate of stability. With this in mind, representative data inputs have been derived from published literature and used in both drained and undrained analyses.

Data Inputs

5.6 Stability analysis was undertaken in ArcMap GIS software. A 10m x 10m grid was superimposed on the full site extent and key input parameters derived for each grid cell. In total, 1,322 grid cells were analysed.

5.7 Table 5.1 shows the input parameters and assumptions for the stability analyses undertaken. The shear strength parameters c' and ϕ' are usually derived in the laboratory using undisturbed samples of peat collected in the field and therefore site specific values are often not available ahead of detailed site investigation for a development. Therefore, for this assessment, a literature search has been undertaken to identify a range of credible but conservative values for c' and ϕ' quoted in fibrous and humified peats. Factors of safety were determined using conservative ϕ' of 20° and values of 2kPa and 5kPa for c'.

Parameter	Values	Rationale	Source
Effective cohesion (c')	2, 5	Credible conservative cohesion values for humified peat based on literature review	5.5 - 6.1, peat type not stated (Long, 2005) 3, 4, peat type not stated (Long, 2005) 5, basal peat (Warburton et al., 2003) 8.74, fibrous peat (Carling, 1986) 4, peat type not stated (Dykes and Kirk, 2001) 7 - 12, H8 peat (Huat et al, 2014)
Bulk unit weight (γ)	10.5	Credible mid-range value for humified catotelmic peat	10.8, catotelm peat (Mills, 2002) 10.1, Irish bog peat (Boylan et al 2008)
Effective angle of internal friction (ϕ')	20, 30	Credible conservative friction angles for humified peat based on literature review (only 20° used in analysis)	40 - 65, fibrous (Huat et al, 2014) 50 - 60, amorphous (Huat et al, 2014) 36.6 - 43.5, peat type not stated (Long, 2005) 31 - 55, Irish bog peat (Hebib, 2001) 34 - 48, fibrous sedge pear (Farrell & Hebib, 1998) 32 - 58, peat type not stated (Long, 2005) 23, basal peat (Warburton et al, 2003) 21, fibrous peat (Carling, 1986)
Slope angle from horizontal (β)	Various	Mean slope angle per 25 m x 25 m grid cell	5 m digital terrain model of site
Peat depth (z)	Various	Mean peat depth per 25 m x 25 m grid cell	Interpolated peat depth model of site
Height of water table as a proportion of peat depth (h)	1	Assumes peat mass is fully saturated (normal conditions during intense rainfall events or snowmelt, which are the most likely natural hydrological conditions at failure)	

Table 5.1 Geotechnical parameters for drained infinite slope analysis

Results

5.8 The outputs of the drained analysis (effective stress) are shown for the less conservative combination of input parameters on the left panel of Figure 5.1 (Factor of Safety Results). The more conservative combination of input parameters (minimum c' and ϕ') are shown on the right panel and suggest that a considerable proportion of the site is either unstable (F <

1) or of marginal stability (F < 1.4) which is not consistent with site observations nor with the stability of peat in general – peat landslides are very rare occurrences given the wide distribution of peat soils in England, Scotland and Wales. The less conservative combination therefore gives more credible results, with only the steepest valley sideslopes showing marginal stability (F < 1.4).

5.9 While the majority of the site shows acceptable Factors of Safety, there are two locations with F < 2.0, as follows:

- An area of c. 50m in length at the northeast facing section of cutting above the reclaimed area (labelled 2 on Figure 5.1). This areas has F < 2.0.

- An area of c. 40m in length above the proposed link road south of the reclaimed area, where Factors of Safety are less than 1.4, indicating marginal stability and locally < 1.0 (indicating instability, labelled 3). Although F is low here, soils are too thin to be peat in this location and are organic soils (it is possible therefore that the soils are significantly stronger than the values used for the stability analysis might suggest).

5.10 Reference to the slope map (and contours) on Figure 4.1 indicates that any materials mobilised in these locations would move over the cut face and onto the working area below. A third area has locally deep peat (labelled 1 on Figure 5.1), which, while indicated to be of acceptable stability from the limit equilibrium approach, would also merit consideration in relation to risk.

5.11 It should be noted that the analysis above is preliminary and does not consider ground accelerations associated with blasting activities. Blasting may have the potential to weaken soils in the vicinity. While geotechnical approaches do exist to assess the impacts of such ground accelerations, to have value they would require accurate site-specific geotechnical data from the soils of concern, as well as a good understanding of the magnitude of ground accelerations and rate of attenuation with distance from source.

5.12 The next section of the report considers possible landslide impacts and associated mitigation measures.

6. Risk and Mitigation

Receptors

6.1 At the SDWP site, there are three main receptors:

- The marine environment (i.e. aquatic habitats).
- The terrestrial environment (i.e. peat habitats).
- Site personnel during construction and users of the SDWP land facilities during operation.

6.2 Landslide material from peat failures entering the sea does have the potential to harm aquatic habitats if debris breaks down and sinks to the seabed (where it can cover habitats; Henderson, 2005). However, given the limited volumes likely from the relatively small contributing areas upslope of the excavations, the potential for this impact is considered to be fairly limited.

6.3 Landslides may also damage the terrestrial habitats in which they occur, firstly through loss of habitat in the source zone, and secondly through smothering of habitats by runout. Again, the habitats in this location are not likely to be high quality peatland habitats, and hence the impacts on this type of receptor are also considered to be limited.

6.4 Site personnel working to construct the site access track and reclaimed / levelled parts of the port may be exposed to falling materials from the cut slopes. Equally, temporary facilities at the base of the slope and permanent facilities in the same location may also be exposed to falling or sliding material. The hazards and consequences are summarised below in Table 6.1.

Receptor	Consequence	Score	Justification for Consequence Score
Marine environment	Short term smothering of seabed close to shore, possible minor disturbance to aquatic habitats	2	Scale of instability likely to be small, reasonable chance that material would be buoyant and disperse.
Terrestrial environment	Medium term (decades) loss of rooting substrate in source area	2	Scale of instability likely to be small, habitat of relatively low value
Site workers (construction) and users (operation)	Potential loss of life	5	Loss of life would be a severe consequence (societally, financially and reputationally)

Table 6.1 Receptors considered in the consequence analysis

Assessment of Risk

6.5 A simple assessment of risk has been undertaken in line with Scottish Government (2017) Best Practice Guidance in which the F values from Section 5 are converted into qualitative scores for the 'likelihood' of a peat landslide, and the scores in Table 6.1 above are used to denote consequence. Risk is then calculated as a function of likelihood and consequence, as below and as shown in Figure 6.1:

Risk = Probability of a Peat Landslide x Adverse Consequences

		Adverse Consequence (scores bracketed)				
		Very High (5)	High (4)	Moderate (3)	Low (2)	Very Low (1)
Peat landslide likelihood (scores bracketed)	Very High (5)	High	High	Medium	Low	Low
	High (4)	High	Medium	Medium	Low	Negligible
	Moderate (3)	Medium	Medium	Low	Low	Negligible
	Low (2)	Low	Low	Low	Negligible	Negligible
	Very Low (1)	Low	Negligible	Negligible	Negligible	Negligible

Figure 6.1 Risk ranking as a product of likelihood and consequence (after Scottish Government, 2017)

6.6 Likelihood scores were assigned as follows for each of the three areas identified on Figure 5.1:

- **Area 1:** F > 3.0, Likelihood = Low (likelihood score 2).
- **Area 2:** F > 1.4 but < 2.0, Likelihood = Moderate (likelihood score 3).
- **Area 3:** F < 1.4 and locally < 1.0, Likelihood = High (likelihood score 4).

6.7 Based on these likelihoods, risk to site workers or site users under the assumption of no mitigation is calculated to be:

- Low for Area 1 (likelihood 2 x consequence 5).
- Medium for Area 2 (likelihood 3 x consequence 5).
- High for Area 3 (likelihood 4 x consequence 5).

6.8 In order to reduce these risks to acceptable levels, mitigation measures are required to either reduce the likelihood of a peat landslide or reduce the consequences, should one occur.

Mitigation Measures

6.9 Mitigation may reduce risks by reducing the likelihood of a peat landslide or by reducing the consequences. In relation to the former, the following forms of mitigation can be considered:

1. **Reducing uncertainty in the calculated likelihood by using less conservative or more representative parameters** (e.g. acquired through site investigation). This is considered likely to be of benefit since the values used in this report are derived from literature review and are for deeper peats than the thin organic soils present in the areas calculated to have the lowest F values. It is also recommended that the effects of blasting on soils above the cut slopes are considered by observation / monitoring of soil conditions during and subsequent to blasting.

2. **Reducing the likelihood of a peat landslide through engineering mitigation**, e.g. the use of retaining structures at the top of excavated slopes (to hold peat or soil in place), by allowing residual materials left at the top of slopes to drain fully (rather than pond water) and by avoiding use of plant on the slopes in question. This is also likely to be beneficial, since regardless of the calculated F values, presence of a 'hanging wall' of organic soils over a bedrock contact without any form of retention structure

would be likely to experience progressive degradation with time, even if not en masse (as a landslide).

3. **Reducing exposure of construction staff to landslide runout by site monitoring:** installation of movement markers within the peat / soil at Locations 1, 2 and 3, careful and continuous monitoring of cut faces and the soils above them during all site works (for changes in moisture content, heaving, bulging and slippage), and avoiding working immediately beneath cut slopes (e.g. through the use of long reach excavators, etc).

4. **Reducing exposure of construction staff to landslide runout by applying stop rules:** in times of adverse weather conditions, i.e. avoiding site works immediately below cut slopes during heavy rain or snowmelt.

5. **Reducing exposure of site users to landslide runout by limiting the types of facility and ground use immediately below cut slopes:** exposure to potential landslide runout would be significantly increased by occupation of buildings or structures built on the reclaimed area below the cut face. If possible, a stand-off should be applied to the cut slope within which no occupied structure should be permitted.

6. **Preparation of a Geotechnical Risk Register:** within which all ground related risks (including peat instability) are listed, providing sufficient detail on hazards, risks and control measures for the duration of construction.

6.10 If the above mitigation measures are adopted, likelihood of peat landslide may be reduced to Low or Very Low, and/or consequence to Moderate or Low (e.g. minor injury / damage to plant / short term cessation of construction), with residual risks of Low or Negligible. Mitigation measures 1- 4 and 6 are all strongly recommended and may preclude the need for measure 4, though this may still be a sensible precaution.

7. Summary, Uncertainties and Recommendations

7.1 This report provides a preliminary peat landslide risk assessment based on a desk-study appraisal of the site and peat depth data collected from the site by a third party. The assessment adopts a limit equilibrium approach to assessing the likelihood of peat stability and by reference to Scottish Government (2017) best practice guidance considers a range of site receptors to identify levels of risk.

7.2 Assessment of site characteristics and calculation of Factor of Safety using conservative geotechnical parameters (based on literature review) indicate the majority of the site to be stable under natural conditions. However, the proximity of construction personnel to high cut faces with perched soils dipping towards the cuttings represents potentially high risks if construction takes place without mitigation. Risks to the environment are considered to be minor in comparison.

7.3 The report recommends five mitigation measures to reduce these risks, including site investigation and revised stability analysis, engineering mitigation (construction of retention structures at the toe of soil covered slopes), reduction in exposure of site personnel to landslide risks by careful monitoring of soil covered slopes and ceasing works during adverse weather conditions, preparation of a geotechnical risk register to log and manage all ground related risks, and if possible limiting the types of permanent site use taking place beneath cut slopes.

7.4 While risks are present, the use of mitigation should be sufficient to enable safe site development.

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Document History		
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1B	20/01/22	Document for Issue to Regulator – No Changes

Contents

12 Dust Management Plan

12.1 Introduction

Dust can impact upon human and ecological receptors. Due to the lack of sensitive receptors in the immediate vicinity of works effects are unlikely to be significant. However, best practice should be followed, particularly on and around the Arnish Industrial Estate Road and when managing materials which may give rise to dust. Dust can become a nuisance and potentially a health hazard, especially in dry and windy conditions. Steps to be taken to minimise and monitor dust effects are detailed within this Dust Management Plan which accompanies the Construction Environmental Management Plans (CEMPs) provided in Section 6.

12.2 Dust Prevention

All delivery vehicles entering and leaving the site with potentially dust containing materials will be covered to prevent escape of dust on the public roads. Delivery vehicles will also follow appropriate route, avoiding unsurfaced roads.

The movement of dusty material, such as soils, rocks sands and gravel, will be appropriately planned to minimise the number of times dust emitting material is moved. Any materials with the potential to give rise to dust will be kept moist, to avoid dust arisings until they have been covered by geotextiles, surfacing or turfed. This is likely to require the use of mobile water bowsers or water sprays in dry weather conditions to damp down material. The covering of dust material will be conducted as soon as practicable.

Blasting will have the potential to create dust emissions. Appropriate measures specific to the blasting technique to be employed are detailed in Section 6.

The ECoW will take note of weather forecasts to ensure that measures are in place prior to periods of dry or windy weather.

Good housekeeping will be employed across the site to prevent dust emissions.

12.3 Minimising Spread and Track-Out

Construction traffic moving between the construction compound and the construction site, will have to cross the Arnish access road. The number of crossings should be minimised where practicable and appropriate measures put in place to minimise the track-out of materials onto the road. The issues associated with track-out will vary with the construction stages, for example, there will be a high risk during the soil stripping of the access road but once the road is surfaced, the risk will reduce dramatically. Appropriate measures for each stage of construction are detailed in Section 6.

12.4 Dust Monitoring

Qualitative monitoring checks of visible dust emissions and surface soiling will be conducted once each working day within the vicinity of the site boundary (internal and external) with the result of the inspection being recorded, as discussed in Section 5: Auditing.

As detailed in Section 5, audits will be undertaken by the ECoW with the audit including material storage status, inspection of the access road and local roads, and, looking for signs

of surface soiling on surfaces around the site. Frequency of audits in periods of dry weather will increase.

12.5 Dust Mitigation

If monitoring identifies an issue, steps will be taken to rectify the situation. This may include the dampening or covering of dust sources and the use of road sweepers to minimise the spread of dust through the site, and onto the public road.

Any dust complaints will be investigated, and appropriate remedial action taken.

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Contents

13 Water Quality

13.1 Introduction

The site is adjacent to the sea and has a number of small watercourses within and surrounding the development area.

The northern site compound located to the northwest of the site on the opposite side of the Arnish Road from the main development is approximately 70m from Poll a'Choire Lochan. The Lochan drains into the northern most watercourse (Allt Poll a'Choire), under the public road and through a shallow rocky gully into Glumaig Harbour. An open bottom culvert will be installed on the Allt Poll a'Choire where the access road crosses. A second watercourse, to the south, is smaller and unnamed and appears to be formed from roadside drainage and also drains into Glumaig Harbour. It is possible these watercourses are utilised by otter and measures implemented to protect water quality will also provide protection for the species, as discussed in Section 16.4. There are also groundwater dependant terrestrial ecosystems on and adjacent to the site.

The access road will utilise swales in line with the Sustainable Urban Drainage System (SuDS) Manual: CIRIA 753. The swales will be located both sides of the road, with the most westerly section of the road up to around chainage 100m (see Drawing SDWP-WS2139-XX-01-DR-C-0051) draining west towards the Allt Poll a' Choire. The remainder of the road swales will flow towards the sea down the road. Check dams will be installed in the roadside swales to limit velocities and for erosion potential.

The link road verge will carry a substantial drainage ditch, collecting runoff from the rock faces behind, and from the access road to the north. Several large diameter culverts through the road construction will be installed to carry runoff water to the sea. Culverts will also be installed on unnamed streams from the hillside which pass under the link road.

Various materials will be required for the construction of the Deep-Water Port and will require careful management as discussed in Section 10. The development will include the stripping of ground and storage of soils and peat. The management of peat is covered in the Peat Management Plan, Section 11.

It is important to ensure pollution control measures are in place to protect the surrounding environment from potentially harmful impacts which could be caused during construction, including surface water run-off.

13.2 Legislation

The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR) controls the impacts on the water environment and is regulated by the Scottish Environmental Protection Agency (SEPA).

Levels of authorisation include General Binding Rules (GBRs), Registrations and Licences with authorisation dependent on the type and scale of activities being carried out. Relevant GBR's will be complied with throughout construction.

Authorisation has been granted by SEPA under The Water Environment (Controlled Activities) (Scotland) Regulations 2011, for 'the discharge of water run-off from construction works at a construction site to the water environment' (Authorisation Number: CAR/S/SEPA2021-883) and for the engineering works to be carried out for the installation of the culvert over the Allt Poll a' Choire (Authorisation Number: CAR/S/SEPA2021-957).

13.3 Mitigation

13.3.1 Surface Water Management

The onshore construction activities must not have a significant impact on the water environment under Schedule 2 of the licence (CAR/S/SEPA2021-883) as a result of:

a) Iridescence / sheen due to oil;
b) Discolouration;
c) Deposition of solids;
d) Increased foaming; and
e) Microbiological growth.

In addition, Licence CAR/S/SEPA2021-883 states that the discharge of water run-off from the construction site must be treated by a sustainable urban drainage system or equivalent, and must not be chemically treated. Discharge of water run-off to the Lewis and Harris Coastal Catchment must not exceed 80mg/l of suspended solids and must remain at a pH level between >5 and <9.

The Pollution Prevention Plan provided in Appendix 13A details the plan to be implemented to minimise and manage surface water run-off discharge. The measures in the plan will therefore be implemented to ensure the Allt Poll a'Choire, the smaller unnamed water course, and Stornoway Harbour waters are not contaminated during construction works.

The prompt establishment of the permanent surface water drainage solutions, including the swales which will allow silts to settle out prior to discharge to sea will minimise the time temporary solutions are required.

Management of Pollutants on site will be implemented, as outlined in the Pollution Prevention Plan (Appendix 13A), Section 4.

13.3.2 Culvert Installations

Under the Schedule 2 of the simple licence (CAR/S/SEPA2021-957), engineering works involved in the installation of the culvert must only be carried out at the Allt Poll a'Choire (Grid reference NB 41899 31265). The culvert itself must be no longer than 16 m in length and must not:

a) Alter the existing bed level of the watercourse;
b) Create a step in the bed of the watercourse; or
c) Alter the existing bed width of the watercourse.

In addition, conditions in the licence under Schedule 2 state that there are restrictions as to when the works are able to take place due to the likely spawning season of fish species.

However, these restrictions do not apply in this case, as no fish species are anticipated to utilise the Allt Poll a'Choire watercourse.

The authorised activities under Licence CAR/S/SEPA2021-957 must also not have a significant impact on the water environment, and align with those stated in Section 13.3.1.

In addition, Licence CAR/S/SEPA2021-957 states that the works should avoid the removal of vegetation from banks as far as practicable. Any removed vegetation must not be disposed of into the channel and all reasonable steps should be taken to ensure the works do not result in increased erosion of the bed or banks. The works must also not result in the narrowing of the channel width or the heightening of any bank. As far as reasonably practicable, the bed and banks of the watercourse must be reinstated at the earliest opportunity to at least their condition before the works started. Although not subject to CAR licence the installation of culverts on the link road, should be implement the relevant mitigation from the Pollution Prevention Plan (Appendix 13A) so as to minimise the potential for wate pollution.

13.3.3 Dredging

As discussed in Section 10.9, there will be an increase in sediment loading during dredging operations. Visual checks of water quality will be carried out to ensure that any visible plumes are localised and disperse quickly. If increases in sediments are not as predicted, the construction technique will be reviewed to identify areas for improvement to prevent reoccurrence.

13.3.4 Emergency Response Plan

An Emergency Response Plan is included in Section 7A: Emergency Response Plan. The Emergency Response Plan details the plan as designed by the principal contractor.

Appendix 13A – Pollution Prevention Plan

Document Control

	Name	Title	Signature	Date
Author	Sophie Fallon	Senior Consultant	S. Fallon	31/08/21
Reviewer	Fiona Henderson	Managing Director	F. Henderson	03/09/21
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1C	J. Clarkson	Minor format changes	12/01/22
1	F. Henderson	For issue	12/01/22

Contents

1 Introduction

This Pollution Prevention Plan has been produced to support the Water Environment (Controlled Activities) (Scotland) Regulations 2011 as amended (CAR) Construction Site Simple Licence application to control surface water discharges for the Stornoway Deep Water Port (DWP) Development.

The purpose of this document is to provide all relevant details regarding pollution prevention and management for the site during the construction phase, in line with Supporting Guidance WAT-SG-75; Sector Specific Guidance: Construction Sites (Scottish Environment Protection Agency (SEPA), 2018).

It outlines the potential pollution sources, pathways, and receptors within the construction phase of the development, and details the proposed mitigation to manage the surface water discharge from the site. It also outlines the rapid response scenarios and subsequent management actions, and the management framework to ensure good working practises, to reduce the risk of a pollution event occurring.

1.1 Project Background

A DWP is proposed by Stornoway Port Authority (SPA) within the Stornoway Harbour limits, on the western shore of Glumaig Harbour. The development will support sustainable economic growth within the area by providing a multi-use facility.

To construct the proposed development, works will include, but are not limited to, the extraction of rock, dredging, reclamation of land, formation of a laydown area conjoining with deep water and freight ferry berths, a finger pier and linkspan. An access road connecting the DWP with the existing Arnish Road and a link road to the Arnish Industrial Estate, via the coast, will also be required.

1.1.1 Legislative Background

This development sits partly onshore and partly in the marine environment, and as such is subject to environmental legislation relating to both marine and onshore (terrestrial) environments. Both Planning Permission and consent through a Harbour Revision order (HRO) have been granted for the development. Marine construction and dredge licences are currently being determined, all of which were supported by an Environmental Impact Assessment Report (EIAR) produced by Affric Limited in 2020.

The construction work is currently out to tender, and the project is due to start construction in early 2022.

Although the onshore construction elements of this development are in an area of less than 4 hectares (the total land-based area above Mean High Water Springs (MHWS) is 2.8ha) it has more than 1 hectare with a slope of greater than 25 degrees. Construction of the onshore works will therefore require a simple licence from SEPA under CAR to discharge surface water runoff from the site.

1.2 Location

The proposed location for the Stornoway DWP is on the western coastline of Cala Ghlumaig (Glumaig Harbour), on the Isle of Lewis. The DWP has a central grid reference point of NB 42333 31164 (Drawing SDWP-WS2139-XX-00-DR-C-9036).

2 Project Description

2.1 Project Components

Chapter 2 of Volume 2 of the Stornoway DWP Environmental Impact Assessment Report (Affric, 2020) describes the project in comprehensive detail.

Any construction activities above Mean High Water Springs (MHWS) fall within the remit of the CAR Construction Site Simple Licence application. These activities comprise of the construction of the site compound, temporary access routes for construction site traffic, peat and soil stripping, rock excavation, the construction of a permanent access road and levelled area and selected areas of peat restoration. As parts of both the Link Road and Bollard Island access causeway are above MHWS they will also be considered within this application. See Drawing SDWP-WS2139-XX-00-DR-C-0061 for site plan showing the final design. Drawing SDWP-WS2139-XX-00-DR-C-0061 shows the site layout and location of the two construction compounds it also details the area of each element of the scheme and areas of soil to be stripped.

Off-shore elements below MHWS will not be considered within the CAR Construction Site Licence as these are covered by the Marine Construction Licence.

2.2 Construction Activities

It is expected that work will take in the region of two years to complete, with multiple tasks ongoing in parallel.

As discussed in Section 1.1.1, the construction contract is still to be awarded. As such the detail provided below is based on input from the client's engineers taking account of relevant guidance. The construction contractor once awarded contract will produce detailed risk assessment method statements which will provide additional detail. If the proposals give rise to a significant change to those laid out here, or the associated mitigation then this document will be updated accordingly.

2.2.1 Site Compounds

One of the early construction activities will be the construction of the site compounds including temporary access routes for site traffic. It is anticipated that the work will require two site compounds, one located on the northwest extent of the site at the start of the access road, and one located at the southernmost extent of the site near the Arnish Industrial Estate (as shown on Drawing SDWP-WS2139-XX-00-DR-C-0061).

The north compound will service the initial phases of the development, and will be used for the site office, welfare facilities, parking for site staff and visitors, with plant and materials storage during the construction of the access road an indicative layout is provided in Drawing SDWP-WS2139-XX-00-DR-C-0062. The north compound will require soil and peat stripping over an area of 5830m^2 and subsequent compacted rock-fill surfacing. Peat from this area and the main construction areas will be used for peat restoration in selected locations adjacent to the compound, as detailed in the Peat Management Plan (PMP) (Fluid Environmental Consulting Ltd, 2021).

A temporary access route to the north compound will be constructed from the existing access road to Arnish Industrial Estate (Arnish Road), approximately 100m long and 6m wide (see Drawing SDWP-WS2139-XX-00-DR-C-0062). Where possible the temporary access road to the north compound will be floated over existing peat and soil, to minimise peat and soil arisings. The temporary access road, compound area and access tracks to the peat restoration areas will be overlain with geotextile fabric, geogrid, and crushed rock imported from a local quarry. An existing roadside ditch will be culverted to allow continuous water passage through the ditch; this will be installed in line with GBR6; however, it is noted that the drain is too small to be classed as a watercourse.

Cut-off ditches will be dug around the perimeter of the compound area to minimise run-off water passing over the compound, the routes of which are shown on Drawing SDWP-WS2139-XX-00-DR-C-0062. The compound will have a designated concrete washout area, chemical store, fuel storage area and a concreting casting slab. Foul drainage from the welfare units will be contained in internal tanks for collection and offsite treatment and disposal.

The south compound near the Arnish Industrial Estate will be utilised initially for the storage of excavated soil and then for day-to-day site operations as construction works progress. This is an area of pre-existing hardstanding and already has established access from the Arnish access road, therefore it will not require any site preparation before use. The south compound will also have a designated concrete washout area chemical and fuel storage, the indicative layout is shown on Drawing SDWP-WS2139-XX-00-DR-C-0064.

2.2.2 Temporary Access Road from Arnish Road to Reclamation Area

A temporary access road will be constructed from Arnish Road to the reclamation area location for movement of rock from the blasting area to the permanent access road site works front, and to allow access and egress for the construction of the permanent access road. The west end of the indicative temporary access road route is shown on Drawing SDWP-WS2139-XX-00-DR-C-0062, after the initial section the temporary access road will follow the route of the permanent access road. It will then divert south across the hillside on a 1 in 10 gradient to the reclamation area as indicated in Drawing SDWP-WS2139-XX-00-DR-C-0063. The temporary access is approximately 200m long, 6m wide with small drainage ditches incorporated along each side.

The temporary access will be constructed by stripping peat and soil to expose the rock surface where necessary in the upper section; rock infill will be used to provide the desired slope. The quantities of soil and peat to be removed will be minimised with much of the route floated over the surface material where possible. The temporary access route will be laid with geotextile fabric and geogrid then surfaced with crushed rock fill material. The route crosses a flush habitat by utilising a series of perforated pipes wrapped within a free-draining geotextile blanket, backfilling over it with rock fill material, in line with the good practise guidance 'Floating Roads on Peat' (Forestry Civil Engineering & Scottish Natural Heritage, 2010). The temporary access road will only be in use until the permanent access road is constructed. It will be removed before the project is completed and the land reinstated with the original peat and soil arisings. These will have been stored temporarily in designated peat and soil storage areas to the south and west of the access road, as indicated in Figures 5b and 5c in the PMP.

2.2.3 Permanent Access Road

Access to the DWP will be by a two-lane bituminous surfaced road from Arnish Road. The DWP access road will be excavated at a steady downward gradient of 1 in 12 and will arrive on the west side of the levelled area (Drawing SDWP-WS2139-XX-00-DR-C-0061). Soil and Peat will be removed from the access road footprint and the areas to be levelled, utilising heavy plant. Rock blasting will then commence. The blasted rock material will be used to create the perimeter of the land reclamation area, to allow infilling works to progress. The creation of the road will interrupt the existing water run-off routes from the high points to the northeast and southwest of the access road, the one to the north slopes of the southwestern high point currently flows to the Allt Poll a'Choire. While the southern and western slopes of the northeast high point which will head south-westerly to the sea. Hence, the permanent drainage design takes account of both road run-off and surface water run-off from the adjacent catchments (Catchments 1, 2 and 3 as shown on Drawing SDWP-WS2139-XX-00-DR-C-1006.

At the start of the access road, the Allt Poll a'Choire watercourse is crossed with an open bottomed arch culvert utilised to form the crossing. This replaces an original stone culvert, the lower portions of which will remain in place. The culvert has been sized for a 1 in 200-year rainfall event and a Simple CAR Construction Licence application will be submitted for this culvert.

As shown in Drawings SDWP-WS2139-XX-01-DR-C-0051 and SDWP-WS2139-XX-01-DR-C-0052 much of the road will be in a cutting. As shown in Drawing SDWP-WS2139-XX-01-DR-C-4001, the initial section of the road prior to the culvert will drain to a ditch on the northern edge and into the Allt Poll a'Choire watercourse. The initial section to the east of the culvert will drain to the Allt Poll a'Choire via swales, around the 100-chainage mark (CH+100) as shown on Drawing SDWP-WS2139-XX-01-DR-C-0051 the slope changes such that natural flow will be away from the watercourse and head east toward the sea.

The Access Road will be surfaced in bituminous material and will be drained to swales on the north side. The south swale will drain the verge and hill-side run-off from Catchment 2. Check dams will be included in the swales to slow flow and allow any silt present to drop out prior to discharge.

2.2.4 Link Road Construction

The link road will connect the DWP with the Arnish Industrial Estate, to allow large and heavy components to be imported and exported to the Estate. As modules transported around the link road on Self-Propelled Modular Transporters (SPMTs) might be up to 40m wide, with a substantial overhang to either side of the road, the excavation area will be sufficiently wide to provide a verge 7 metres in width adjacent to the road on its landward side. This verge will carry a substantial open drain, collecting runoff from the rock faces associated with Catchments 5, 6, 7 and 8 as shown in Drawing SDWP-WS2139-XX-00-DR-C-1006. Four large culverts through the link road will carry surface runoff water from the open drain to the sea. As shown in Drawings SDWP-WS2139-XX-01-DR-C-4101 to 4103 the link road will be partly routed on levelled areas from rock blasting and partly on reclaimed land from the sea. Creation of the verge will be carried out in accordance with the peat management plan, utilising turves where practicable.

2.2.5 Bollard Island Causeway Construction

To facilitate line crew access to bollards for tying on mooring lines, a short access causeway and a turning area for small vehicles, will be constructed from rock fill as detailed in Drawing SDWP-WS2139-XX-00-DR-C-9028. This will join the existing island to the link road. The areas of land to be reclaimed as part of the Bollard Island work will be formed from the blasted rock material, which may be crushed on site if required. The existing island is above MHWS and drains to sea; the adjoining causeway will also be partly above MHWS and will also drain to sea with a permeable crushed rock surface.

2.2.6 Levelled Area

A flat area of around 7 hectares will be created at a height of +7.5m Chart Datum (CD). The area will be used for laydown of cargoes and renewables components in transit, marshalling and parking associated with the freight ferry, parking and turning of coaches serving cruise ships and general port activities (Drawing SDWP-WS2139-XX-00-DR-C-0061).

Much of the reclaimed/levelled area footprint will be reclaimed from the sea, with the remainder to the west of the area being formed by cutting into the hillside and levelling to the desired height. For clarity within this document, as this levelled area is above MHWS it will be referred to as the levelled area and referred to in isolation from the reclaimed area, which is covered by marine licensing.

An open drain around the west/south corner of the levelled area will collect any runoff from catchment 3 and 4 (see Drawing SDWP-WS2139-XX-00-DR-C-1006 for catchments) and be routed through the northern most culvert on the link road as shown on Drawing SDWP-WS2139-XX-01-DR-C-4103.

The reclamation area will be bound by piles and rock revetment to allow the infilling to take place. The rock removed from the hillside will be used to create the rock revetment and to infill the land reclamation area, as will dredged seabed material from the adjacent marine environment.

The final surfacing materials, bollards, quay headings and service installation will be put in place during the final phases of construction.

3 Pollution Risk Considerations

3.1 The Source, Pathway, Receptor Model: Pollution Linkages

A construction site and activities taking place therein will only cause harm to the environment if all these linkages are present: a source, a pathway, and a receptor, as described in GPP1 (NIEA, SEPA, & Environment Agency, 2020).

For the Stornoway DWP development, consideration will be given to potential pollutant sources and construction activities which may provide a pollution source, pathways within the site, and receptors which have the potential to be affected by a pollution event.

3.2 Potential Pollutant Sources

Potential sources of pollutants are discussed in detail below, and mitigation measures for all potential pollutant sources on the development are detailed in Section 4: Pollution Management Systems.

3.2.1 Silt

Silt is mobilised from a source by surface water, causing it to runoff as silty water. Sources of silt during the construction period are identified as:

- Stripped ground during earth works;
  - In areas cleared for road construction;
  - At the north construction compound;
  - Levelled area;
- Peat/soil temporary storage;
- Reinstated areas, until vegetation recovers;
- Rock blasting areas;
- Construction aggregate storage areas; and
- Dust.

Soil will be stripped to make way for the construction compound, access road, parts of the link road construction and to allow the levelled area to be created. Soil stripping will give rise to bare ground and exposed soils, and although exposed ground will be minimised in extent and duration as far as possible, it is a source of silts.

The DWP development is situated in an area with some peat coverage. Peat coverage is not continuous on the site and is in plateaus, hollows and watercourse valleys between rocky outcrops and heathery mounds. Peat will be excavated and will require careful storage and management to ensure it is suitable for reuse, the specifics of which are covered in the PMP. The PMP sets out guiding principles to ensure peat disturbance is minimised, and the areas of highest environmental sensitivity will be clearly marked on site.

The movement and placement of unconsolidated soils and peat materials into temporary storage or final position will also provide a source of silt, as will the reinstated areas of peat diggings until native vegetation recolonises the exposed peat.

Bedrock will be blasted from the hillside and utilised for the land reclamation area, the access road, the link road, and the Bollard Island causeway construction. The rock will primarily be split into large sizes for use as rock fill, however the blasting process will give rise to a portion of small particulates which can become a source of dust and silt. The blasted rock may be stockpiled temporarily to allow for the preparation of the receiving areas, however like the dredged material such as sand and gravel it is envisaged to be placed directly into the land reclamation areas and allowed to settle in-situ.

Dust may also be considered as a source of silt due to vehicle and plant movements on site, and to and from the site on public roads.

3.2.2 Hazardous Materials

Hazardous materials are likely to be used and stored on site. These may be (and are not limited to):

- Hydraulic fluids;
- Fuel oils;
- Cleaning products;
- Cement;
- Explosives; and
- Hazardous Waste (oil, oily rags, used storage containers).

Some hazardous materials to be used on site are miscible in water, and some are immiscible in water.

3.2.3 Concrete Washings

Concrete washings will be carried out in a dedicated area within the site compound as indicated on Drawings SDWP-WS2139-XX-00-DR-C-0062 and SDWP-WS2139-XX-00-DR-C-0064. Concrete washings are considered a pollutant due to the silty nature and high pH value of the washings and will be collected for onsite treatment.

3.2.4 Foul Water

Welfare facilities and site office accommodation units will generate foul water from both site compounds over the duration of the construction work. This will be collected onsite.

3.3 Potential Pollutant Pathways

Potential pollutant pathways are identified as routes that potential pollutants could take to reach the water environment, and possible parts of the water environment that the pollutants could reach where no mitigation is provided, fails, or in event of an accident.

On the Stornoway DWP these could be identified as three pathways: flow through the soil into groundwater i.e., percolation, direct release into a watercourse, or overland flow.

3.3.1 Percolation into Groundwater

Pollutants can percolate down into the soil and reach groundwater. Hazardous materials could be considered as a potential pollutant utilising this pathway for example in the case of an oil or fuel spill as this would percolate through the soil pathway potentially reaching groundwater. Groundwater may be connected to surface water pathways in some locations on the DWP site, and therefore may transfer pollutants to surface water pathways or receptors.

3.3.2 Direct Discharge into a Watercourse

A pollutant might enter a watercourse directly in the form of a spill directly into a watercourse. Hazardous materials may utilise this pathway; an example of this would be if a hydraulic hose burst on an excavator working directly over the Allt Poll a'Choire watercourse.

3.3.3 Overland Flow

Pollutants can flow over land to water courses under gravity. The effectiveness of the pathway will be determined by several factors:

- The topography determining the direction pollutants will move;
- The gradient of the land – steeper slopes providing a faster pathway;
- The permeability of the ground – impermeable surfaces allow pollutants to flow over them easily, whereas permeable grounds may facilitate a degree of percolation (see Section 3.3.1);
- Vegetation – the vegetation can hold up the movement of pollutants across land, slowing their spread; and
- Surface water presence - surface water run-off flows overland, hence during periods of wet weather, surface waters can aid the transfer of pollutants by this pathway. Surface water is of particular concern where silts are present as it can form 'silty water run-off'. However, it can also expedite the transport of other pollutants.

This pathway considers routes primarily associated with gravity; the site is being constructed within a hillside containing several freshwater habitats, and directly adjacent to the marine environment and therefore overland flow is considered a major pathway for potential pollutants.

Overland flow of a pollutant would consist of an oil or fuel spill flowing over land without being conveyed in surface water runoff, such as a fuel or oil spill flowing down a hillside surface under gravity.

Surface run-off within the site may lead to mobilisation of pollutants, which may be miscible (i.e., mixed into the water as a solute in solution) or immiscible, where a substance such as oil floats on the water surface. An example of this source – pathway route would be if a piece of machinery developed an oil leak which dripped onto the ground surface in wet conditions, and the surface run-off carried the oily water away from the source.

Overland flow from constructed areas without vegetation cover could also lead to mobilisation of pollutants within the site, particularly on areas with steep slopes as this could result in faster runoff with reduced chance of interception. This pathway could be surface runoff from material storage areas, from site compounds, temporary or permanent roads or haul routes, or the levelled area.

The temporary access road and the levelled area will drain into the land reclamation area during construction once the retaining bund is in place, and therefore can be considered insignificant pathways for silty water after this point as the land reclamation area will act as a settlement pond during construction. Prior to the construction of the bund, these areas will be considered alongside all other pathways for potential pollutant transfer.

The permanent road network will be surfaced with bitumen and therefore a SuDS drainage system will be in place to manage runoff once the site is developed.

3.4 Potential Pollution Receptors

3.4.1 Freshwater Features

At present surface water discharges naturally into the watercourses already present in the vicinity of the development, flowing downhill towards the sea. The largest stream is Allt Poll a'Choire to the northern end of the site. There are 2 further streams running off the hillside on the route of the Link Road.

3.4.1.1 Poll a'Choire Lochan

The Poll a'Choire Lochan is situated approximately 70m east of the north compound and serves the Allt Poll a'Choire watercourse. It is approximately 2400m^2 and lies in a basin at the top of the Allt Poll a'Choire catchment. It has a narrow outlet which channels a moderated peak flow and has no fisheries interest. It is referenced as 'unnamed lochan' on design drawings.

3.4.1.2 Allt Poll a'Choire Watercourse

The outlet of the lochan to the west of the Arnish access road drain through an area of blanket bog, under the public road and drains north through a shallow rocky gully into Glumaig Harbour, north-west of the planned levelled area. An open bottom culvert will be installed on the Allt Poll a'Choire where the access road crosses. This culvert has been

appropriately sized to accommodate a 1:200-year flood event plus an allowance for climate change of 55% peak rainfall uplift, as per https://www.sepa.org.uk/media/426913/lups_cc1.pdf. There are indications that the stream is utilised by otters who need fresh water to wash off the salt from the sea, however it is not suitable for fish due to the steep gradient it passes down.

3.4.1.3 Link Road Streams

Surface water from the hill side to the west of the Link Road makes its way toward valleys and to form two small streams which discharge directly to sea in catchments 3 and 7; the hillside catchments are described in more detail in Section 4: Pollution Management Systems. Culverts are to be placed on the end of each of the streams to maintain the flow to sea once the Link Road is constructed.

3.4.2 Marine Environment

The Stornoway DWP development lies within the SEPA water quality monitoring zone of Stornoway Harbour (Waterbody ID: 200191). Stornoway Harbour is a coastal water body in the Scotland River Basin District and is approximately 3.1km^2 in area and includes 13km of shoreline. The condition of the waterbody within this zone was categorised as 'good' overall in 2014, with the next assessment anticipated to review the status in 2021 (SEPA, 2020d). When the variables which contribute to status of the condition of the waterbody were broken down, it was identified that the degree of freedom from Non-Native Marine Species was classified as 'high', and water quality itself was classified as 'good' (SEPA, 2020a). Each of these classifications are required to be maintained in the long-term.

3.4.3 Groundwater

Several habitats were identified within the survey area that have the potential to support Ground Water Dependent Terrestrial Ecosystems (GWDTE). See Appendix J1 in Volume 3 of the EIAR (Affric, 2020), Phase 1 habitat mapping Technical Report, (Tracks Ecology Ltd, 2020), Figure 4 for more detailed analysis of the mapped habitat. Highly dependent habitats include flushes and springs which were identified throughout the site. Particularly of note is the flush habitat within the likely footprint of the temporary access track, which requires consideration as it has been identified as a highly dependent habitat.

Few areas of marshy grassland were recorded and recognised as being moderately dependent on groundwater, although these are likely to be present due to modified drainage systems and as such are considered to some degree, as artificial.

Additional areas identified as GWDTE are the large areas of wet heath habitat present, which have been recorded as widespread across the site and of moderate dependence on groundwater. It has been noted that these habitats are likely to be typical species-poor examples of habitats which are widespread and common throughout western Scotland.

3.5 Catchment Overview

Nine hillside catchments which drain into or within the DWP site once constructed are identified, using Ordnance Survey 1:25000 mapping overlain with topographic survey information on 5m contours and as built drawings. These catchments are shown in Drawing SDWP-WS2139-XX-01-DR-C-1006 Catchment Plan. Table 3.5.1 shows the hillside catchment area and estimated run-off data utilised in the development of the pollution prevention plan.

The Annual rainfall measured at Stornoway airport between 1981 – 2010 was 1248.5mm, spread over 205 days of rainfall so on average 6mm of rain fell on each wet day (Met Office, 2021). To give an understanding of the volumes of water needing to be managed from each area of the site it has been assumed that 6mm of rain will fall on wet days. It should, however, be noted that the amount of rain falling on the catchment is much more than the volume of water which will run off, as much of the water will percolate into the ground as opposed to flow over the surfaces. Furthermore, not all the catchments will run through a construction area.

The permanent drainage system has considered flood events and climate change, this is not deemed proportionate for temporary construction surface water management conditions. If severe weather is forecast during the construction period, appropriate additional measures will be implemented specific to the status of the works and risks posed at that time.

Table 3.5.1: Hillside Catchments in the Stornoway DWP

Catchment	Area (m^2)	Estimated (wet day) Daily Runoff (m^3)
C1	3,500	21
C2	9,500	57
C3	3,500	21
C4	11,400	68
C5	10,200	61
C6	11,500	69
C7	84,500	507
C8	19,900	119
C9	245,450	1527

To calculate run-off estimates for the permanent SuDS elements, ADAS 345 Method for very small catchments (less than or equal to 40ha) has been used to size drains and culverts appropriately. Design Manual for Roads and Bridges (DMRB) HA106/04 recommends that a 1 in 75-year return period should be used for drainage systems dealing with flow from natural catchments; the ADAS formula used estimates run-off for a 1 in 75 return period and growth curves are used to obtain 1 in 200 return period run-offs. Conservatively, the run-off estimates have been factored by 1.55 or 55% for the West Rainfall Uplift Region (https://www.sepa.org.uk/media/426913/lups_cc1.pdf). Details of the calculations made to inform SuDS elements can be found in Appendix 1.

3.6 Pollution Risks

As discussed in Section 3.1 there is a need to have a source, a pathway, and a receptor for a pollution risk to be present. Each potential pollutant source will be considered in turn regarding the construction activities within each area of the DWP site. The environmental impacts of the constructed development were assessed fully in the EIAR (Affric, 2020). The tables in Sections 3.6.1 to 3.6.4 below utilise the same probability and impact magnitude matrices as the EIAR, and resultant significance rating.

3.6.1 Silt

Silts associated with bare ground, exposed soils and stored materials and particulates from blasting can give rise to silty water run off when surface water runs over them. Silty water can flow into watercourses if unmitigated. Silty water can cause deoxygenation, affect photosynthesis and lead to siltation in watercourses, all of which can have knock on ecological effects. The sources (scenarios on site/activities) which could give rise to silts/particulates, the associated pathways, and receptors are summarised in Table 3.6.1. This is a qualitative assessment of the significance of impact (without mitigation in place) and is based on professional judgement regarding the construction phase only.

Table 3.6.1: Source – Pathway – Receptor Analysis for Silt

Source	Scenario/ Activity	Pathway	Receptor	Probability	Impact Magnitude	Impact Significance
Exposed soils in north compound (5830m^2) and peat restoration areas (1810m^2).	Ground clearance for north compound/ access routes to peat restoration areas.	Silt mobilised in surface run-off from part of Catchment 9 reaching the Lochan.	Poll a'Choire Lochan.	**Probable**: existing open ditch from compound area, to Lochan.	**Low**: not full area as some will drain to the north, increased sediment in water column, will drop out over a short period of time in the still water.	**Minor**
Exposed soils in north compound (5830m^2) and peat restoration areas (1810m^2).	Ground clearance for north compound access road.	Silt mobilised in surface run-off from part of Catchment 9 to the roadside ditch.	Allt Poll a'Choire watercourse.	**Unlikely:** the ground will only be exposed for a short time before being covered in geotextile and crushed rock.	**Low**: increased sediment in water column, will drop out over in a short period of time due to low flow rates in the drainage ditch.	**Negligible**
Exposed soils in north compound (5830m^2) and peat restoration areas (1810m^2).	Ground clearance for north compound/ access routes to peat restoration areas.	Silt mobilised from Lochan into watercourse.	Allt Poll a'Choire watercourse.	**Very Unlikely:** lochan would likely capture silts/silts would drop out before reaching the watercourse.	**Low: small** increased sediment would drop out over time or be washed out to sea.	**Negligible**
Exposed soils during Temporary access road construction.	Peat/Soil stripping.	Silt mobilised in surface run-off (Catchment 2).	Allt Poll a'Choire watercourse.	**Probable**: area is steeply sloped, and in proximity to the watercourse when working uphill of or adjacent to the culvert, in the upper 40-50m (approx.) of the temporary access road only.	**Medium**: Increased sediment would drop out over time or be washed out to sea.	**Moderate**
Exposed soils during Temporary access road construction.	Peat/Soil stripping.	Silt mobilised in surface run-off (Catchment 1 and 3)	Marine Environment.	**Probable:** Silts may reach marine environment at lower section due to proximity to marine environment.	**Low:** small localised, short-term impacts on marine environment, sediment would quickly disperse and drop out.	**Minor**

Source	Scenario/ Activity	Pathway	Receptor	Probability	Impact Magnitude	Impact Significance
Exposed soils during Access Road construction 7540m^2.	Peat/Soil stripping.	Silt mobilised in surface run-off.	Allt Poll a'Choire water course.	**Probable**: area is steeply sloped, and ground may be exposed in sections during construction, adjacent to watercourse.	**Medium**: around a third of the area could drain this way, increased sediment would drop out over time or be washed out to sea.	**Moderate**
Exposed soils during Access Road construction 7540m^2.	Peat/Soil stripping.	Silt mobilised in surface run-off.	Marine Environment.	**Probable:** Silts may reach marine environment at lower section due to proximity to marine environment.	**Low:** small localised, short-term impacts on marine environment, sediment would quickly drop out.	**Minor**
Exposed soils during Link Road construction 24,300m^2.	Peat/Soil stripping.	Silt mobilised in surface run-off.	Link Road streams.	**Probable**: area is steeply sloped, and ground may be exposed in small sections during construction.	**Low**: short term impacts to small sections of freshwater environment close to sea affected by small sections of stripping works	**Minor**
Exposed soils during Link Road construction 24,300m^2.	Peat/Soil stripping.	Silt mobilised in surface run-off.	Marine Environment.	**Probable:** Silts may reach marine environment	**Low:** localised, short-term impacts on marine environment, sediment would quickly disperse and drop out.	**Minor**
Exposed surfaces on temporary material stockpiles near culvert on Access Road.	Material stockpiling in temporary storage areas.	Silt mobilised in surface run-off.	Allt Poll a'Choire watercourse.	**Probable**: although flat and level temporary storage areas have been identified on site as suitable for material storage, surrounding areas are steeply sloped and therefore run-off is likely from surrounding area.	**Medium**: Increased sediment would drop out over time or be washed out to sea.	**Moderate**
Rock fines from blasting rock	Rock removal/ blasting operations.	Silt mobilised in surface run-off.	Link Road streams.	**Very Unlikely**: The amount is considered insignificant as	**Medium**: Some impacts to freshwater	**Negligible**

Source	Scenario/ Activity	Pathway	Receptor	Probability	Impact Magnitude	Impact Significance
faces at the link road location.				only small areas of blasting near link road streams.	environment due to proximity.	
Rock fines from blasting rock face at the levelled area.	Rock removal/ blasting operations.	Silt mobilised in surface run-off.	Marine Environment.	**Likely**: bedrock will be blasted from rock-face in large boulders and some small fines may be present.	**Low**: Some impacts to marine environment due to close proximity.	**Minor**
Mud & Silt carried on plant from construction operations.	Plant & Vehicle movements (on-site).	Silt mobilised in surface run-off.	Allt Poll a'Choire watercourse, Poll a'Choire Lochan, Link Road streams.	**Probable**: Plant and Vehicles moving around site are likely to collect sediments, due to the nature of the construction work.	**Low**: very small to no impact to freshwater environment as the access routes temporary surfacing will act as a trap for sediment.	**Minor**
Mud & Silt from construction operations.	Vehicle & Plant washing in the north compound.	Silt mobilised in surface run-off.	Allt Poll a'Choire watercourse, Poll a'Choire Lochan.	**Unlikely**: The amount of silt mobilised from plant and vehicles is considered insignificant.	**Low**: very small to no impact to freshwater environment as this will take place in the compound.	**Negligible**

In summary, site mobilisation works at the north construction compound and peat/soil stripping at the upper end of temporary and permanent access road could have up to moderate impacts upon the Allt Poll a'Choire watercourse, and hence works in this area need particular consideration. Impacts on the link road streams, and the marine environment are minor at most without mitigation. Mitigation measures are considered in Section 4.

3.6.2 Hazardous Materials

Hazardous substances used during the construction phase will be stored securely within the site compounds, however the nature of the works will require frequent movement of fuels, oils, and chemicals, both within the plant working around the site and for refuelling. Table 3.6.2 summarises the sources of hazardous materials, the associated pathways, and receptors on site. This is a qualitative assessment of the significance of impact (outwith mitigation in place) and is based on professional judgement regarding the construction phase only. The environmental impacts of the constructed development were assessed fully in the EIAR (Affric, 2020).

Table 3.6.2: Source – Pathway – Receptor analysis for Hazardous Materials

Source	Scenario	Pathway	Receptor	Probability	Impact Magnitude	Impact Significance
Fuel Storage Bowser (20m^3 of Diesel) in **north** site compound.	Loss of full containment, spillage to ground.	Percolation to groundwater and/or overland via drainage channel	Poll a'Choire lochan.	**Unlikely** Loss of containment only possible due to catastrophic event such as collision or tank failure.	**Medium:** Medium impact to freshwater environment, due to 20m^3 in small lochan	**Minor**
Fuel Storage Bowser (20m^3 of Diesel) in **north** site compound.	Loss of full containment, spillage to ground.	Percolation to groundwater	Groundwater.	**Unlikely** Loss of containment only possible due to catastrophic event such as collision or tank failure.	**Low:** Low impact to groundwater due to distance from GWDTE.	**Minor**
Fuel Storage Bowser (20m^3 of Diesel) in **north** site compound.	Loss of full containment, spillage to ground.	Percolation to groundwater and/or overland via drainage channel	Allt Poll a'Choire watercourse.	**Unlikely** Loss of containment only possible due to catastrophic event such as collision or tank failure.	**Medium:** Medium impact to freshwater environment, due to close proximity.	**Minor**
Fuel Storage Bowser (20m^3 of Diesel) in **south** site compound.	Loss of full containment, spillage to ground.	Percolation to groundwater and/or overland	Marine environment.	**Unlikely** Loss of containment only possible due to catastrophic event such as collision or tank failure.	**Low:** Minor or no impact to marine environment, due to limited groundwater interaction with marine environment and location of store away from sea.	**Minor**
Refuelling Activities in **north** site compound.	Loss of full containment during mobile refuelling (<20l).	Percolation to groundwater and/or overland via drainage channel	Poll a'Choire lochan.	**Probable:** Refueling will take place many times in the compund, increasing the chances of human error.	**Low**: small volumes of fuel lost hence, impact to freshwater environment localised.	**Minor**

Source	Scenario	Pathway	Receptor	Probability	Impact Magnitude	Impact Significance
Refuelling Activities during construction.	Loss of full containment during mobile refuelling (<20l).	Percolation to groundwater and/or overland via drainage channels.	Allt Poll a'Choire watercourse.	**Probable:** Multiple refuelling activities carried out, increasing probability of human error.	**Low**: small volumes of fuel lost hence, impact to freshwater environment localised.	**Minor**.
Refuelling Activities during construction.	Loss of full containment during mobile refuelling (<20l).	Percolation to groundwater.	Groundwater.	**Probable:** Refuelling activities may be carried out in areas near GWDTE due to distance from either site compound, increasing probability of human error.	**Low**: Minor impact to freshwater environment.	**Minor**
Refuelling Activities during construction.	Loss of full containment during mobile refuelling (<20l).	Direct discharge to watercourse.	Allt Poll a'Choire watercourse.	**Very unlikely**: Refueling should not be completed near the watercourse.	**Low:** small volumes of fuel lost hence, impact to freshwater environment localised.	**Negligible**
Refuelling Activities during construction.	Loss of full containment during mobile refuelling (<20l).	Overland flow.	Marine environment.	**Probable:** Multiple refuelling activities carried out, increasing probability of human error.	**Low:** small volumes of fuel lost hence, impact to freshwater environment localised.	**Minor**
Mobile Plant working on site.	Loss of hydraulic fluid, due to pipe burst.	Percolation to groundwater, direct to waterbody, or overland flow.	Groundwater.	**Probable:** Hydraulic pipes fail from time to time.	**Low**: Localised impacts on water quality, in small volumes of fluid.	**Minor**
Mobile Plant working on site.	Loss of hydraulic fluid, due to pipe burst.	Percolation to groundwater, direct to waterbody, or overland flow.	Poll a'Choire lochan.	**Probable:** Hydraulic pipes fail from time to time.	**Low**: Short term localised reversible impacts on water quality as substances can be recovered from surface water.	**Minor**

Source	Scenario	Pathway	Receptor	Probability	Impact Magnitude	Impact Significance
Mobile Plant working on site.	Loss of hydraulic fluid, due to pipe burst.	Percolation to groundwater, direct to waterbody, or overland flow.	Allt Poll a'Choire watercourse.	**Probable:** Hydraulic pipes fail from time to time.	**Low**: Short term localised reversible impacts on water quality.	**Minor**
Mobile Plant working on site.	Loss of hydraulic fluid, due to pipe burst.	Percolation to groundwater, direct to waterbody, or overland flow.	Marine environment.	**Probable:** Hydraulic pipes fail from time to time.	**Low**: Short term localised reversible impacts on water quality.	**Minor**
COSHH Store: Hydraulic Fluids, Oils, Chemicals, all within north site compound.	Loss of containment during handling etc. of hydraulic fluids, maintenance oils, chemicals, will all be small volumes of 5l to 1000l.	Percolation to groundwater, or Overland flow via drainage channel.	Poll a'Choire lochan.	**Unlikely**: Appropriate storage and usage of materials in line with COSHH assessments.	**Medium** Localized impacts on water dependant on material as lochan relatively small volume.	**Minor**
COSHH Store: Hydraulic Fluids, Oils, Chemicals, all within north site compound.	Loss of containment during handling etc. of hydraulic fluids, maintenance oils, chemicals, will all be small volumes of 5l to 1000l.	Percolation to groundwater, or Overland flow via drainage channel.	Allt Poll a'Choire watercourse.	**Unlikely**: Appropriate storage and usage of materials in line with COSHH assessments.	**Medium L**ocalised impacts on water dependant on material, likely to be reversible over time.	**Minor**

Source	Scenario	Pathway	Receptor	Probability	Impact Magnitude	Impact Significance
COSHH Store: Hydraulic Fluids, Oils, Chemicals, all within south site compound.	Loss of containment during handling etc. of hydraulic fluids, maintenance oils, chemicals, will all be small volumes of 5l to 200l.	Percolation to groundwater, or Overland flow.	Marine environnment.	**Unlikely**: Appropriate storage and usage of materials in line with COSHH assessments.	**Low:** Short term localised reversible impacts on water quality.	**Negligible**

3.6.3 Concrete Washings/ Cementitious materials

Concrete and cement washings or loss of wet cementitious material are considered as pollutants due to the potential environmental impacts they may cause, especially within freshwater environments due to the significant pH changes they can generate. The sources of cementitious material, the associated pathways, and receptors are summarised in Table 3.6.3. This is a qualitative assessment of the significance of impact (outwith mitigation in place) and is based on professional judgement regarding the construction phase only.

Table 3.6.3: Source – Pathway – Receptor analysis for Cementitious Materials

Source	Scenario	Pathway	Receptor	Probability	Impact Magnitude	Impact Significance
Concrete washings within north site compound.	Loss of containment.	Percolation to groundwater, or overland flow.	Poll a'Choire Lochan.	**Probable:** Multiple concrete washing activities carried out, increasing probability of human error.	**Medium:** Medium impact to freshwater environment, due to close proximity.	**Moderate**
Concrete washings within south site compound.	Loss of containment.	Overland flow.	Marine environment.	**Probable:** Multiple concrete washing activities carried out, increasing probability of human error.	**Minor:** Minor impact to marine environment, due to relatively small volumes.	**Minor**
Concrete/ Mortar from pours in-situ on Allt Poll a'Choire watercourse culvert.	Loss of containment.	Direct discharge to waterbody.	Allt Poll a'Choire watercourse.	**Probable**: multiple pours on site could lead to increased chance of human error.	**Medium**: Medium impact to freshwater environment due to high pH value of concrete materials in wet form.	**Moderate**

Although concrete pours and washing out of plant and apparatus are normal construction practices, mitigation is required due to the proximity of multiple pours directly adjacent to Allt Poll a'Choire watercourse. Sealing of shuttering and best construction practice regarding washouts reduce the probability of any loss of containment, and this is discussed further within Section 4.1: Management of Pollutants at Source.

3.6.4 Foul Water

Foul water is a potential pollutant due to the bioactive nature of human waste. If untreated sewage enters a watercourse, microorganisms decompose it, using oxygen from the water for aerobic respiration. As a result, there is less dissolved oxygen in the water, so aquatic organisms may be unable to survive. Foul water will be generated at each compound on the DWP site and will be contained within storage tanks associated with each welfare unit or office accommodation unit; it will be removed off-site via tanker for disposal and treatment when required. This is normal practise for a construction site compound, although there is potential for a spill as illustrated in Table 3.6.4.

Table 3.6.4: Source – Pathway – Receptor analysis for Foul Water

Source	Scenario	Pathway	Receptor	Probability	Impact Magnitude	Impact Significance
North Compound welfare/office units.	Loss of containment (spill due to tank rupture or during emptying).	Percolation into groundwater, or overland flow.	Poll a'Choire lochan.	**Probable:** Multiple empties carried out, increasing probability of human error. Also a possibility of tank rupture due to collision by site plant within compound.	**Medium**: Medium impact to freshwater environment due to bioactive nature of foul water.	**Moderate Significance**: Mitigation measures required.
South Compound welfare/office units.	Loss of containment (spill due to tank rupture or duringf emptying).	Percolation into groundwater, or overland flow.	Marine environment.	**Probable:** Multiple empties carried out, increasing probability of human error. Also a possibility of tank rupture due to collision by site plant within compound.	**Medium**: Medium impact to freshwater environment due to bioactive nature of foul water.	**Moderate Significance**: Mitigation measures required.

4 Pollution Management Systems

The best practise management process for dealing with pollution is the pollution control hierarchy, as detailed in the in the Guidance for Pollution Prevention for Dealing with Spills (GPP22: Dealing with Spills (NIEA, SEPA, & Natural Resources Wales, 2018b). The hierarchy has five steps as follows:

1. Contain at source;
2. Contain close to source;
3. Contain on the surface;
4. Contain in the drainage system; then
5. Contain on/in the watercourse.

Contain at source (1), is associated with the primary containment, for example by ensuring that containers, tanks, and pipework are fit for purpose, and inspected regularly.

Temporary bunds, drip trays or plant nappies may be utilised on plant equipment, where potential risks have been identified to contain spills close to source (2). In addition, if a spill were to occur outwith a bund, spill booms can be utilised to surround a spill and prevent it spreading from the source.

If it has not been possible to contain a spill close to source, steps will be taken to prevent it entering a watercourse or drain (3) for example using booms near the watercourse.

At later stages of the construction there may be drains which could be utilised to contain pollutants (4) or built into the scheme design as part of the temporary construction infrastructure to manage surface water. An example of this is a trenched water control system (cut-off ditches) around the north compound on the site, to ensure run-off from surrounding areas does not enter the compound where there is potential for contamination to occur. The silt control arrangements for the outflows from the cut-off ditches (see Section 4.2) provide a suitable location for spill management measures to be installed, i.e., oil booms to remove oils from the surface of the water, or barriers to allow miscible liquors to be contained so that they can be pumped into containers for suitable offsite management.

The worst-case scenario is that a potential pollutant reaches a water course or the sea. If the substance floats on water e.g., oil, then booms can be utilised to contain the spill on the watercourse (5) to allow it to be recovered.

Early intervention is required to allow the early steps of the pollution control hierarchy to be utilised. As most risks will arise as a direct result of works being undertaken, there should be someone present, hence all staff working on the project will be trained to a sufficient level, to know what to do in the event of a spill. Areas where potential pollutants are stored will be under a regular inspection regime, to ensure that any problems are identified promptly to allow action to be taken.

This guidance relates to spills such as an oil or fuel spill, however the hierarchy and associated procedures are adaptable for dealing with silty water, or any other pollutant. Pollution prevention measures in line with GPP22 have been developed to minimise the risk of an environmental incident occurring during the construction of the Stornoway DWP. These measures combine both the current UK best practice and guidance from these additional documents:

- Construction Environmental Management Process for Large Scale Projects (Highland Council, 2010);
- GPP 1: Understanding your environmental responsibilities – good environmental practices. (NIEA, SEPA, and Natural Resources Wales, 2020);
- GPP 5: Works and maintenance in or near water. (Natural Resources Wales, NIEA, and SEPA 2018a);
- PPG 6: Working at Construction and Demolition Sites (Environment Agency, NIEA, & SEPA, 2012);
- PPG 7: Safe Storage – The Safe Operation of Refuelling Facilities (NIEA, SEPA, & Environment Agency, 2011);
- GPP 13: Vehicle washing and cleaning (2017)
- PGG 18: Managing Fire Water and Major Spillages (SEPA, Environment Agency, & Environment and Heritage Service, 2000);
- GPP 21: Pollution Incident Response Planning (2021);
- The SuDS Manual (CIRIA, 2015).

The management of potential pollutants will be detailed within the CEMD for the Stornoway DWP. The mitigation measures in the Schedule of Mitigation along with the Health and Safety analysis within the Principal Contractor tender returns, and the detailed analysis within this document provides a complete understanding of the sources, pathways, and receptors of potential pollutants for the development.

4.1 Management of Pollutants

As identified in Section 3.6, the significance of potential pollutants on the site may deem mitigation measures are required at source to minimise the potential release into pathways identified on the DWP site. These are considered in line with the pollution control hierarchy described earlier in Section 4. General mitigation measures are identified in Tables 4.1.1 to 4.1.4 below. The specific surface water management measures required for various activities are discussed in Section 4.2. Additional mitigation regarding the use of cement is covered in Section 4.3.

Table 4.1.1: General Mitigation Measures for Silt

Operation	Pollutant	Mitigation measures
Soil and peat stripping operations.	Silt from exposed soils.	• Minimise the amount of time stripped ground is exposed. • Do not disturb an area until it is necessary for construction to proceed. • Silt fencing to be installed as appropriate to protect water courses downhill of soil strips. • Any edges of cut peat or stripped soil that may remain exposed, or areas of peat excavation or soil stripping on steep slopes, will be temporarily covered with top vegetated layer as soon is practicably possible to minimise the source of silt and reduce erosion. Permanent re-turfing and re-vegetation will be carried out at the earliest opportunity to reduce erosion risks. Any areas which do not re-vegetate will be seeded with locally derived seed to encourage vegetation growth.
Material stockpiling.	Silt from exposed soils on material stockpiles.	• Locate storage areas as close to the excavation as practicable to minimise movement (as per the Peat Management Plan (Fluid Environmental Consulting Ltd, 2021). They will be located ideally on flat areas so that erosion and run off is limited, leachate from the material is controlled, and stability of the existing peatland in the vicinity is not affected. • Locate storage areas away from watercourses or sensitive habitats to prevent the runoff of any wetting required on stored peat and discharge into adjacent watercourses or affecting sensitive habitats. • Minimise the amount of time that stockpiles are exposed, by utilising covers or temporary/permanent seeding. • Silt fencing to be installed as appropriate to protect water courses downhill of soil strips
Rock blasting.	Silt/fines from rock blasting and removal.	• Consider damping down blasted area during blasting operations to limit dust production.
Plant and Vehicle movements (around site).	Silt generated from general. construction operations.	• Plant access routes to be signed clearly to avoid unnecessary tracking on undisturbed ground.; track only on designated routes. • Consideration to trackway/bog-mats if traffic routes become saturated or ground conditions deteriorate during construction phase. • Site speed limits to be adhered to at all times to reduce dust pollution.

Operation	Pollutant	Mitigation measures
Plant and Vehicle movements (on public roads).	Silt generated from general construction operations.	• Monitor silt deposits on access roads from haulage lorries; brush or scrape affected roads to reduce dust and mud deposits and dispose of material collected appropriately. • Crushed rock delivered by road will be appropriately contained for transport, and dust covers utilised for loads likely to generate dust.
Plant and Vehicle washing within compounds.	Silt generated from general construction operations.	• Only in designated area within site compound. • All washing water to be collected in an impermeable sump and passed through water treatment plant for reuse. • Solids in a re-usable condition to be placed in land reclamation area, otherwise disposed of as solid waste.

Table 4.1.2: General Mitigation Measures for Hazardous Materials

Operation	Pollutant	Mitigation measures
All construction work involving plant & machinery.	Oil, hydraulic fluid or fuel leaks from plant and machinery.	• Plant and machinery to be well maintained and regularly inspected before and during operations, including daily pre-use checks to reduce the likelihood of hydraulic pipe bursts, fuel tank leaks, etc. • When not in use, plant to have drip trays or plant nappies underneath. • Immediate access to spill kits in the vicinity of the construction work. • Should any leaks be identified after the works have commenced, the plant will be moved away from watercourses and/or the marine environment and isolated immediately with the use of spill kits. • Spill kits will be on site at all times and the contents replaced promptly if used. • Where practicable, biodegradable hydraulic fluids and oils will be utilised in machinery. It should be noted however, that these bio-degradable options reduce long-term and chronic environmental effects, but still cause harm to the environment if released and hence should be handled as per other oils.
Fuel storage/ refuelling operations in compounds.	Fuel leaks from fuel storage bowsers.	• Fuel storage will be under strict management controls and compliant with SEPA's General Binding Rules (GBRs) 26 and 28. • o A suitable double skinned bowser or tank (or bunded tank) will be utilised for fuel storage. o The bowser or tank will be situated at least 10m from the water or nearest drain and protected from collision risks. o The distribution hose will be fitted with a shut-off type filling nozzle. o The filling nozzle will be fitted with a security lock to prevent unauthorised use. o A drip tray will be provided below the distribution hose and nozzle when not in use. • A fuel accountancy system will be employed.

Operation	Pollutant	Mitigation measures
		• Refuelling will be carried out in designated areas, by trained operatives following site refuelling procedures. The refuelling procedure will consider best practice laid out in GPP2 and PPG6.
Refuelling operations on site.	Fuel leaks from fuel storage bowsers.	• Refuelling will only be carried out on site when impractical to travel back to the site compound. • Refuelling will be carried out by trained operatives following site refuelling procedures. The refuelling procedure will consider best practice laid out in GPP2 and PPG6. • Immediate access to spill kits for fuels and oils in the vicinity of the refuelling location.
Chemical/oil storage in site compounds.	Hydraulic fluids, fuel oils, cleaning products, cement.	• Where oil and chemicals are stored in a container, the container must be of sufficient strength and structural integrity, and, installed in such a way that it is unlikely to burst or leak during ordinary use. • Containers must be situated within a secondary containment system which have a capacity of not less than 110% of the container's storage capacity, or if there is more than one container within the system, of not less than 110% of the largest container's storage capacity. This may be in the form of a COSHH storage cabinet • All oils and chemicals will be subject to Control of Substances Hazardous to Health (COSHH) assessments under the COSHH Regulations 2002. • COSHH assessments will include a section of the environment to highlight any specific precaution or mitigation requirements relevant to the site. • Chemicals which could react with each other will be stored separately (with separate bunding). • The chemical/oil storage will be locked, access will be controlled, and an inventory of materials stored will be maintained. • The chemical/oil storage will be situated at least 10m from the water or nearest drain and protected from collision risks. • Appropriate materials will be utilised for a given task, in the appropriate quantities and concentrations. • Appropriate quantities of materials will be precured to minimise the need to dispose of excess materials.
Storage and use of explosives.	Hazardous Materials storage in site compounds and on site.	• The storage and handling of an explosives will be carried out in compliance with the Explosive Regulations 2014.

Table 4.1.3: General Mitigation Measures for Concrete Washings

Pollutant Source Operation	Potential Pollutant	Mitigation Measures
Concrete washing.	Concrete washing wastewater.	• Concrete washing will only be carried out in a designated area within site compounds, on an impermeable surface at least 10 metres from any watercourse or surface water drain. • Washing arisings will be collected for onsite treatment. This will include settlement and, if required, pH correction. If not suitable for reuse liquids will be tankered off site for appropriate disposal. The solids will be disposed of as solid waste.

Table 4.1.4: General Mitigation Measures for Foul Water

Pollutant Source	Potential Pollutant	Mitigation Measures
Use of welfare and office accommodation units within each compound.	Foul Water.	• Locate welfare units and office accommodation units in a designated area of the compounds away from plant movements to avoid collisions from plant. • When emptying for disposal, ensure tanker operator follows protocol for avoidance of spills. • Appropriate spill kits available in event of an incident arising.

4.2 Surface Water Runoff

As discussed in Section 3.6.1 certain activities give rise to increased silt pollution risks and require additional mitigation measures to those discussed in Table 4.1.1 to manage the risk of silty water reaching a watercourse. The catchments referenced in this section are shown in Drawing SDWP-WS2139-XX-00-DR-C-1006.

The north site compound is located in Catchment 9. Catchment 9 is a shallow valley, with water running towards the low point at Poll a'Choire lochan. The north site compound is in the north-east corner of the catchment hence only the water immediately to the west of the compound is likely to flow into the compound area. A cut-off ditch will be dug around the perimeter as Shown in Drawing SDWP-WS2139-XX-00-DR-C-0062, in order to divert the surface run-off away from the compound area. This will eliminate excess water from running onto the compound and mobilising any pollutants in the compound. The use of the cut-off ditch will ensure the surface water volumes managed at the site compound are only that which have been derived from rainwater falling within the site compound, and not from elsewhere in Catchment 9. The cut off ditches will run via open ditches to Poll a'Choire lochan to the south and to an existing drain which ultimately connects into Allt Poll a'Choire to the north. Silt controls will be placed in the open drainage ditches near the north compound, this is likely to be a check dam, however if the topography doesn't accommodate this then silt mats or strawbales may be used. As discussed in Section 4 they will be designed to accommodate spill management in case of a pollution incident.

The creation of access routes to the north compound, and the peat restoration areas in the vicinity will also require specific surface water mitigation measures as due to the proximity to the roadside ditch, which runs directly into the Allt Poll a'Choire watercourse. During the soil/peat stripping for these access routes, and haulage of material, straw bales may be placed in the roadside ditch to allow any silts to drop out of suspension. This task will be short in duration and the straw bales can be removed once the ground is covered with geotextile fabric, geogrid, and crushed rock surfacing material.

During construction of the temporary access road, drainage ditches will be constructed either side of the road complete with check dams, to slow down waterflow to allow time for silts to drop out and water to soak away. The temporary access road route has not been confirmed however, it will likely pass through Catchments 9, 2, 3, and 4.

The permanent access road will utilise swales with check dams in line with the SuDS Manual: CIRIA 753. The swales will be located both sides of the road, with the most westerly section of the road up to around chainage 100m (see Drawing SDWP-WS2139-XX-01-DR-C-0051) draining west in Catchment 2 towards the Allt Poll a'Choire watercourse. The remainder of the road swales will flow towards the sea down the road. The prompt establishment of the permanent surface water drainage solutions, including the swales which will allow silts to settle out prior to discharge to sea will minimise the time temporary solutions are required.

Temporary surface water management for the permanent access road shall align with those identified in Table 4.1.1. Depending on the exact sequencing of works, temporary ditches may be used to minimise surface water reaching the construction works, and to collect run off from construction works. Check dams will be utilised in temporary ditches to slow waterflow to allow silt to drop out prior to watercourses.

The link road verge will carry a substantial drainage ditch, collecting runoff from the rock faces behind, and from the access road to the north. Several large diameter culverts through the road construction will be installed to carry runoff water to the sea, one of which will accommodate a small unnamed watercourse, to the south which appears to be formed from roadside drainage and currently drains into Glumaig Harbour. The design for the Link Road drainage is detailed in drawings SDWP-WS2139-XX-01-DR-C-4101 to 4103. When these culverts are installed, a similar protocol will be adopted as the Allt Poll a'Choire culvert installation, in terms of silt management in the channel. The link road culverts are pre-cast concrete pipe culverts and therefore the specific mitigation regarding concrete pours will not apply. However, best practise techniques will be employed to manage any silty water when installing culverts such as using straw bales to catch any suspended fines in catchments 4, 5, 6, 7 and 8.

The reclaimed area will be formed by creating an enclosed area utilising rock fill and piles and in filling it with dredged spoil and material won by blasting. The enclosure will not be sealed as the rock fill will be porous and it will have a weir to allow seawater to escape, however it will in effect act as a large settling tank. Hence, once the enclosure is constructed, any run off from catchments 1, 2, 3 and 4 arising not captured by the permanent drainage installed to that point, will settle out in the land reclamation area.

4.3 Cement Works Specific Measures

During the installation of the culvert on the Allt Poll a'Choire watercourse, and during construction of the temporary/permanent access road around the watercourse, specific mitigation will be utilised due to the proximity to the receptor. The culvert will be installed under a separate CAR licence, and a full method statement will be supplied for this application. However, specific mitigation measures employed during this task will be:

- All concrete washouts to be undertaken in north site compound in designated area.
- Shuttering and framework to be installed and managed by competent, trained individuals to ensure best practise pollution control.
- In event of a formwork failure, cement pour should be immediately halted, and steps taken to minimise the loss of cement to watercourse. Appropriate spill kits to manage cementitious materials, fuels and oil spills are required at this location during this element of construction.

5 Emergency Response Plan

The emergency response plan follows the 'Source – Pathway – Receptor' model as described in GPP1 (NIEA, SEPA, & Environment Agency, 2020).

In the event of an environmental incident the following will be prioritised:

- Stop the source of the pollution.
- Interrupt any pathways to the environment.
- Report the incident in as much detail as possible to site management and the Environmental Clerk of Works (ECoW), who will report to SEPA if necessary.
- Clean the contaminated area and recover pollutants.
- Analyse the event to gain learning to prevent further incidents.

5.1 Emergency Response to a Pollution Event

The Principal Contractor Site Manager will be responsible for the emergency response to a pollution event.

The site team will be briefed and trained regularly in pollution event scenarios and briefed on the task-specific potential pollutants to ensure there is a complete understanding on the immediate responses required to manage any pollution event. This will include a briefing on the location of the spill kits in place for each task.

5.1.1 Unexpected circumstances

Scenario planning for the Stornoway DWP development considered the events in Table 5.1.1 below, and the management of these scenarios.

Table 5.1.1: Management Plan for Unexpected Circumstances

Unexpected event	Potential pollutants	Management Plan actions
Fire	Oils/fuels Firefighting foam	• Follow site fire plan. • Fire extinguishers appropriately specified and located on site, NB Only tackle with fire extinguishers if safe to do so, call emergency services. • Minimise the leakage from the source if possible. • Data sheets stored on site for all chemicals, enabling proactive management and provide information to fire service regarding specific hazards. • Where practicable contain fire run-off for collection and offsite treatment/disposal. • Implement post event clean-up of any pollution.
Flooding	Silty runoff	• Cover and/or contain any unprotected surfaces or material stockpiles. • Divert clean water away from the exposed ground surfaces where possible. • Install extra check drains within temporary drainage where required and consider digging temporary side ditches to take extra flow and allow settlement of silty water. • Ensure run-off pathways are clear of debris to allow clear passage of flow to swales/vegetated buffer strips.
Accident using plant or machinery	Fuel/oil spills in immediate area of plant, or into adjacent watercourse	• Check for damage prior to movement. • Minimise any leakage from the source if possible. • Contain any pollutant with spill kit equipment. • • Devise a plan to recover situation taking account of potential for loss of fuels, hydraulic fluids etc. • Dispose of soiled equipment/soils correctly.
Vandalism of plant	Fuel/oil spills in immediate area of plant	• Check for damage prior to movement. • Minimise any leakage from the source if possible. • Contain the pollutant with spill kit equipment. • Dispose of soiled equipment/soils correctly.
Leaks or spills from plant or machinery	Fuel/oil spills in immediate area of plant	• Minimise the leakage from the source if possible. • Contain the pollutant with spill kit equipment. • Dispose of soiled equipment/soils correctly.

Unexpected event	Potential pollutants	Management Plan actions
Leaks or spills from COSHH store	Oils or lubricant spills in site compound	• Minimise the leakage from the source if possible. • Contain the pollutant with spill kit equipment. • Dispose of soiled equipment/soils correctly.

5.2 On-Site Pollution Equipment

Appropriate spill plans aligned to the pollution control hierarchy and spill kits will be in place, construction operatives will be trained in the plans and in the use of spill kits.

A comprehensive spill kit will be in the main site compound(s) adjacent to the plant storage area, and appropriate grab-bag/ wheelie-bin mobile spill kits will be present wherever plant is operating on site. These mobile spill kits will be pollutant (oil) specific and appropriately sized to contain the largest quantity of fuel present at that location. Multipurpose spill kits will be situated close to sites where water miscible chemicals are in use.

Staff to be briefed on spill kit use and locations regularly in toolbox talks, and practise test pollution incident scenarios using spill kits to ensure competence will be completed at least once every 6 months.

5.3 Disposal of Used Spill Kit Equipment

If emergency response equipment is used it will be disposed of correctly. If contaminated with oil, fuel, or other hazardous materials it will be segregated from other waste in sealed, labelled bags. Spill kits will be replenished on site promptly, to facilitate this stock of spare equipment will be kept onsite.

6 Pollution Prevention Management

Responsibilities for environmental management including pollution prevention is detailed within Section 3 of the CEMD, the relevant details from which are summarised below.

Figure 6.1.1 provides an overview of the interactions between the various parties involved in the construction of the Stornoway Deep Water Port. The Environmental Clerk of Works (ECoW) will be employed by the Contractor and will work closely with the Contractor's Site Manager and site team, supervising works, inputting into RAMS, and ensuring that all the elements of the CEMD and relevant consent conditions are being appropriately implemented. Stornoway Port Authority will employ an Independent Ecological Clerk of Works (IECoW) who will carry out audits to ensure the works are compliant with the relevant consents and licences. As the ECoW and IECoW will perform important but different roles during this construction project, these are itemised in more detail below.

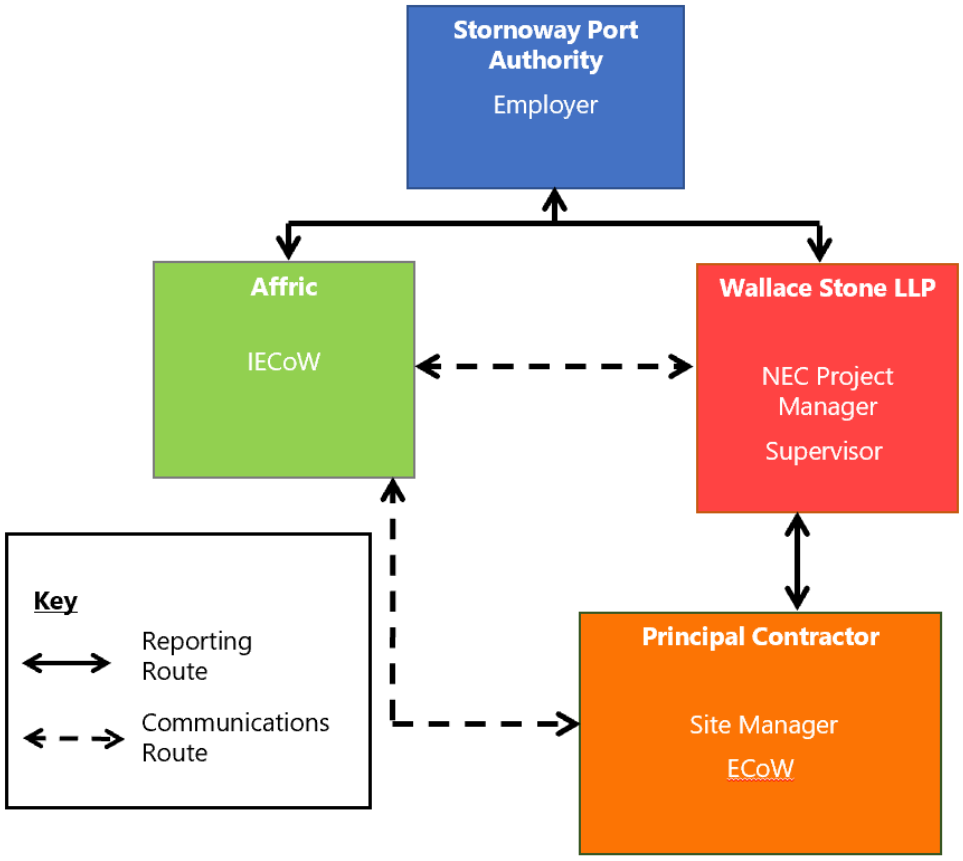

Figure 6.1.1: Organogram to show Key Environmental Roles

6.1 ECoW Responsibilities

The ECoW is responsible for ensuring appropriate steps are taken to minimise environmental impacts and risks and will act as the main point of contact about environmental issues on behalf of the Principal Contractor. The ECoW will advise the Site Manager if there are environmental issues or non-compliance, and if they are of scale that they would advise that works should be stopped, pending the issue or non-compliance being resolved.

Duties will include:

- Ensuring the IECoW and NEC Project Manager are notified of all incidents:
  - where there has been a breach of agreed environmental management procedures;
  - where there has been a spillage of a potentially environmentally harmful substance;
  - where there has been an unauthorised discharge to ground, water, or air and where there has been damage to a protected habitat, etc.;
- Be ready to assist in implementing an Emergency Response Plan when required;
- Be responsible for notifying SEPA of environmental incidents;(NB: Pollution Incident hotline 0800 807060 (24 hrs a day, 7 days a week)
- Carrying out an investigation and producing a report regarding environmental incidents and non-conformances. The report of the incident and details of

remedial/corrective action actions taken should be made available to the Client Environmental and Project Managers.

6.2 IECoW Responsibilities

The IECoW is responsible for auditing compliance with the relevant consents, licences, and relevant legislation. To provide advice in event of an incident or unexpected condition arising. The IECoW will advise Stornoway Port Authority and the NEC Project Manager and Supervisor if there are issues of non-compliance, and if they are of a scale that they would advise that works should be stopped, pending the issue or non-compliance being resolved.

Duties will include:

- Ensuring Stornoway Port Authority interests are looked after regarding environmental performance and commitments.
- Ensuring the CEMD is up to date and carrying out updates.
- Ensuring the requirements of the CEMD are implemented appropriately through auditing.
- Reviewing RAMS prior to implementation for compliance with the CEMD
- Stopping work in event of a non-compliance, incident or unexpected condition arising which poses an imminent risk to the environment.

6.3 Maintenance Programme

Maintenance programmes will be identified by principal contractor that will be undertaken (and on what frequency) in relation to vehicles, and plant.

Any permanent or temporary infrastructure used to avoid, intercept or trap/treat pollutants will be maintained by the construction contractor, the effectiveness of which will be reviewed during ECoW and IECoW audits.

6.4 Points of Contact

The points of contact for the project will be detailed and kept up to date within the Construction Environmental Management Documents, the main roles, companies, and contact details where known are detailed in Table 6.4.1.

Table 6.4.1 Points of Contact

Role	Company	Phone	Email
Client Organisation	Stornoway Port Authority (SPA)	01851 702688	info@stornowayport.com
NEC Project Manager	Wallace Stone	01851 600220	Hebrides@wallacestone.co.uk
NEC Supervisor	Wallace Stone	01851 600220	Hebrides@wallacestone.co.uk
IECoW	Affric Limited	01808 521498	info@affriclimited.co.uk
Principal Contractor Site Manager	TBC		

7 Conclusion

Several potential pollutants may be present on site during the construction phase of the Stornoway Deep Water Port development. These have been identified, along with potential pathways for the transfer of pollutant, and the receptors for the surface water containing potential pollutants. Mitigation measures have been identified for managing any potential pollutants at source, in pathways and at receptors where appropriate, to minimise the risk of a pollution events occurring.

An emergency response plan is in place to reduce the impact of pollution events should they occur, and this explains the actions required prior to and during the construction work commencing, and the site personnel responsible for managing this plan. It also identifies any unforeseen circumstances, and the spill kits and equipment needed to manage the day-to-day risks as well as any unforeseen events.

A robust maintenance programme will be implemented on site to ensure the plant and equipment on site will be in good condition, therefore reducing the chances of a pollution event occurring. The site staff will be trained and competent to manage a pollution event and will know and understand the importance of following the emergency response plan requirements.

8 References

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NIEA, SEPA, & Natural Resources Wales, 2018b. GPP 22: Dealing with Spills.

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9 Glossary

Acronym	Definition
CAR	Water Environment (Controlled Activities) (Scotland) Regulations 2011 as amended
CD	Chart Datum
CIRIA	Construction Industry Research Information Association
COSHH	Control of Substances Hazardous to Health
DMRB	Design Manual for Roads and Bridges
DWP	Deep Water Port
ECoW	Environmental Clerk of Works
EIAR	Environmental Impact Assessment Report
GBRs	General Binding Rules
GWDTE	Ground Water Dependent Terrestrial Ecosystem
Ha	Hectare
HRO	Harbour Revision Order
IECoW	Independent Environmental Clerk of Works
M	Metres
MHWS	Mean High Water Spring
NIEA	Northern Ireland Environment Agency
PMP	Peat Management Plan
PPIP	Planning Permission In Principle
SEPA	Scottish Environment Protection Agency
SPA	Stornoway Port Authority

Acronym	Definition
SPMT	Self-Propelled Modular Transporters
SuDS	Sustainable urban Drainage System

Appendix 1 : Drainage Calculations

Construction Environmental Management Document	
Section Number	14
Section Title	Noise and Vibration
Issue	1B
Issue Date	20/01/22
Author	Kirsty Macdonald
Approved	Fiona Henderson

Document History		
Issue	Date	Reason for Change
1A	20/04/21	Document Issue to Tenderers for Comment
1B	20/01/21	Document for Issue to Regulators - No Change

Contents

14 Noise and Vibration

14.1 Introduction

A detailed assessment of in-air noise effects was completed, as detailed in Chapter 12 of the EIAR. Noise and vibration impacts are primarily associated with dredging and blasting activities. The majority of construction activities are at a sufficient distance away from noise sensitive receptors and do not give rise to any detrimental effects. General construction noise impacts should be minimised by implementing best practice techniques. Some specific mitigation is detailed for blasting and dredging.

14.2 Mitigation

Works will be carried out primarily during daytime hours (with the exception of dredging) as defined by BS5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites and detailed in Table 14.1. In line with the aforementioned guidance, the noise levels during daytime will be ≤70dB $L_{Aeq,t}$ at noise sensitive properties (Table14.1). Any works outwith daytime hours will only be completed if the appropriate noise limits detailed in Table 14.1 are not exceeded at any noise sensitive locations.

Table 14.1: Noise Limits at Nearest Receptors at Various Times of Day

Works	Times (Hrs)	Noise Limits dB $L_{Aeq,t}$
Daytime	07:00 – 19:00 Weekdays 07:00 – 13:00 Saturdays Excluding Bank Holidays	70
Evenings and Weekends	19:00 – 23:00 Weekdays 13:00 – 23:00 Saturdays 07:00 – 23:00 Sundays Bank Holidays	60
Night-time	23:00 – 07:00	50

Work creating noise levels exceeding these limits shall only be carried out where absolutely necessary (for example, in emergency situations, or where there is an absolute need to work at a particular expected tide). The Principal Contractor may take the decision to apply to the Comhairle nan Eilean Siar (CnES) for consent to conduct potentially noisy construction activities, under Section 61 of the Control of Pollution Act 1974 (as amended).

To minimise noise levels generated, good working practices, in line with Section 8 of BS5228, will be employed to keep noise levels down throughout the construction process, this includes:

- Ensuring regular maintenance of all equipment used on site, including maintenance related to noise emissions;
- Ensuring that vehicles and vessels are loaded carefully to ensure minimal drop heights so as to minimise noise during operation; and
- Ensuring that machines are shut down between working periods or throttled down to a minimum.

Implementation of best practice measures will also aid in the minimisation of disturbance to ecological receptors considered in Section 16: Habitat and Species Protection.

With specific regard to dredging, the following measures will be implemented:

- Dredging of areas in the north of the dredge area will be carried out during the day whenever practicable;
- Prior to night-time dredging in the north of the dredge area (if required), the noise sensitive receptors likely to be affected, e.g. Residents of Builnacraig Street will be informed; and
- Noise monitoring during dredge activities will be carried out to understand the actual noise levels arising at receptors.

With specific regard to blasting, the following good practice guidance will be followed:

- Restriction of blasting as far as practicable to regular daytime periods, not on Sundays and away from public holidays;
- Blasting should be carried out between 9am and 7pm Monday to Saturday with blasts normally being planned prior to 5pm;
- Good community relations; informing nearby noise/vibration sensitive receptors ahead of periods of blasting;
- The choice of appropriate drilling rigs; and,
- Designing blasts to maximise efficiency and reduce the transmission of noise/vibration.

14.3 Monitoring

All noise monitoring will be taken in accordance with BS7445 Description and Measurement of Environmental Noise. Noise should be recorded over a minimum of 20 minutes at each receptor. The following measurements will be recorded:

- $L_{Aeq,5\ min}$ – equivalent continuous A – weighted sound pressure level in decibels measured over each 5-minute interval.
- $L_{Aeq,t}$ - equivalent continuous A – weighted sound pressure level in decibels measured over the full measurement period.
- L_{A10} - A-weighted sound pressure level that is exceeded for 10% of the measurement period.
- L_{A90} - A-weighted sound pressure level that is exceeded for 90% of the measurement time.
- L_{Amax} – A weighted highest sound pressure level measured.
- Critical listening noise observations should be recorded, including noting which 5-minute period of the measurement events occurred within.

If a noise complaint is received (see Section 14.4), then the Principal Contractor will carry out noise checks. Initial checks will be qualitative, with the ECoW visiting noise sensitive receptors to identify if noise related to the ongoing construction activities is audible at the location. If construction noise is clearly audible, then noise monitoring will be undertaken.

In event of noise levels exceeding the criteria defined in Table 14.1, the Principal Contractor will carry out an investigation to ascertain whether the noise source is associated with the construction operations, and if so the reason behind the breach. This will allow additional targeted mitigation to be identified and implemented.

14.4 Noise Complaints

Contact details for the Principal Contractor will be provided in any notices to the public, such that if there is a noise issue, they are able to raise a complaint. Complainants will be asked to provide:

- A description of the issue, including any particular concerns they may have;
- The location of the issue;
- The date and time the issue arose; and
- If willing contact details to allow feedback to be given once an investigation has been completed. Note any contact details provided should be held securely not distributed and only utilised for the purposes of providing feedback to the complainant.

The complainer should be informed that their complaint will be investigated, and feedback provided, where possible timescales for a response provided. If the complaint relates to a known activity, then information with regard to the remaining duration of the activity should be provided.

The time and date will be used to identify what activities were being carried out on site at that time, to help identify the potential noise source giving rise to the complaint. If no activities were being carried out, then this will be fed back to the complainant as the site may not have been the source of the issue.

If the complaint is significant and founded, then the potential for an issue should be raised to the IECoW at the earliest opportunity.

Assuming that there were activities being undertaken that could have given rise to the issues, then the Principal Contractor will carry out noise monitoring as detailed in Section 14.3 when similar activities are being undertaken. The monitoring should be carried out close to the location of the complaint and also at the closest noise sensitive receptor if they differ. In addition, a review of the activity to ensure that it is being carried out as planned should be completed and if not, steps taken to rectify the issue (this will be recorded).

If the noise monitoring identifies noise levels above those identified in Table 14.1 or the noise source is clearly identifiable at the receptor, then the potential to apply additional mitigation should be investigated and where applicable implemented.

The results of the complaint investigation should be discussed with the IECoW and then fed back to the complainant where contact details have been provided.

Construction Environmental Management Document	
Section Number	15
Section Title	Construction Traffic Management Plan
Issue	1B
Issue Date	20/01/22
Author	Kirsty Macdonald
Approved	Fiona Henderson

Document History		
Issue	Date	Reason for Change
1A	20/04/21	Outline Document Issue to Tenderers for Comment
1B	20/01/22	Document for Issue to Regulator – No Change

Section to be updated once contractor is appointed. Section will be submitted to Comhairle nan Eilean Siar, once completed for agreement.

Contents

15 Construction Traffic Management Plan

15.1 Introduction

A Traffic Impact Assessment (TIA) has been completed for the project as discussed in Chapter 15 of Volume 2 of the Environmental Impact Assessment Report (EIAR) and detailed in Appendix O.1 of Volume 3 of the EIAR.

During construction, equipment and materials not won on site will need to be delivered. It was assumed that materials delivered by sea would come to the main ferry terminal in Stornoway and then be brought by road. If this is the case, then there will be an increase in traffic. Matheson Road in Stornoway would be expected to experience the greatest increase in Heavy Goods Vehicles (HGV) movements. The A857 Willowglen Road and the A857 Macauley Road (south) will also experience increases in HGV movements.

In addition to equipment and material movements, construction staff will travel to and from the site daily, all of whom will utilise the A857, be that north or south of the site.

Vehicle movements give rise to a range of effects including driver and pedestrian delay, loss of pedestrian amenity, increased accident risk, track out and dust, etc. This plan details how vehicle movements will be minimised, and effects mitigated. Track out and dust is addressed by mitigation identified within Section 12: Dust Management Plan and Section 6: Construction Environmental Management Plan.

It should be noted that the location of the construction compound on the other side of the Arnish Access Road was not known when the TIA was produced, however it is recognised that this crossing could cause delays to drivers accessing the Arnish site and give rise to increased risk of accidents, therefore, mitigation to address these issues has been included within this document.

15.2 Regulations and Guidance

Relevant regulation and guidance includes, but is not limited to:

- Road Traffic Act 1988 as amended; and
- The Highway Code.

15.3 Mitigation

15.3.1 General Requirement

The following general mitigation will be employed:

- The Road Traffic Act 1988 as amended, and the Highway Code will be adhered to when travelling on public and site roads;
- Road journeys will be minimised wherever practicable;
- During inductions, all staff will be made aware of the need to comply with the Road Traffic Act 1998 as amended, and the Highway Code, when travelling to and from work;
- Emergency Vehicle access to the Arnish Industrial Estate shall be maintained at all times; and

- Delivery drivers will be made aware of routes to be utilised to access the site, any particular hazards or sensitivities on their route and any restrictions on travel time .

15.3.2 Traffic Routes

CONTRACTOR TO IDENTIFY SOURCES OF EQUIPMENT & MATERIALS AND ASSOCIATED VEHICLE MOVEMENTS, AND DETAIL THE PROPOSED ROUTING OF VEHICLES. ROUTES SHOULD UTILISE SUITABLE ROADS FOR THE GIVEN VEHICLES AND TAKE ACCOUNT OF SENSITIVE RECEPTORS OR PARTICULAR HAZARDS. IF NECESSARY, MITIGATION SUCH AS RESTRICTIONS ON TIMINGS SHOULD BE CONSIDERED.

IF ABNORMAL LOADS ARE TO BE UTILISED THE ROUTING AND ARRANGEMENTS OF WHICH SHOULD BE IDENTIFIED.

POINTS FOR APPROPRIATE INCLUSION:

Movements from any of the piers in Stornoway shall utilise James St and Matheson Road (not the seafront route along the A857) to reach the Manor Roundabout. The A857 will then be followed to gain access to Willowglen Road and the A858.

Movements to and from the Stornoway Port will aim to avoid times of high pedestrian activity in the region of the Nicolson Institute, ie start time (8.50am), finish time (15.35 Monday to Thursday and 13.15 on a Friday and lunch time (13.15 to 13.55 Monday to Thursday).

15.3.3 Traffic Delay Mitigation

CONTRACTOR TO IDENTIFY MEASURES TO MINIMISE IMPACT ON THE ROAD NETWORK OF STORNOWAY AT PEAK HOURS.

15.3.4 Arnish Point Industrial Estate Access

CONTRACTOR TO DETAIL HOW ACCESS TO ARNISH POINT INDUSTRIAL ESTATE WILL BE MAINTAINED THROUGHOUT WORKS INCLUDING:

- *PHASING OF THE ACCESS ROAD JUNCTION CONSTRUCTION.*
- *MANAGEMENT OF CROSSING BETWEEN THE CONSTRUCTION COMPOUND AND THE CONSTRUCTION SITE E.G. SIGNAGE, PRIORITISATON, TIMINGS*

TO INCLUDE:

A road condition survey will be carried out jointly by SPA and the Principal Contractor prior to construction.

15.3.5 Travel to Work

CONTRACTOR TO DETAIL HOW VEHICLE MOVEMENTS ASSOCIATED WITH TRAVEL TO WORK WILL BE MINIMISED INCLUDING, ACTIVE TRAVEL ARRANGEMENTS AND CAR SHARING (COVID COMPLIANCE PERMITTING).

15.4 Complaints and Issues

The Principal Contractor Site Manager will be the point of contact for any complaints or issues arising. They will carry out appropriate investigations in the event of any complaints or issues being identified, to understand the route cause and resolution where practicable.

Construction Environmental Management Document	
Section Number	16
Section Title	Habitat and Species Protection Plans
Issue	1B
Issue Date	12/01/2022
Author	Kirsty Macdonald
Approved	Fiona Henderson

Document History		
Issue	Date	Reason for Change
1A	20/04/21	Document Issue to Tenderers for Comment
1B	12/01/22	Document updated to include compliance with Condition 3.2.5 of the awarded Marine Construction Licence (MS-00008749) and Condition 3.2.5 of the awarded Marine Dredge and Disposal Licence (MS-00008748) and to align with the EPS licence application. INNS and Otter section updated with current status.

Contents

16 Habitat and Species Protection Plans

16.1 Introduction

There are a number of ecologically designated areas in and around the Deep Water Port development as detailed in Table 16.1.

Table 16.1: List of Relevant Designated Sites

Designation	Name	Location Relative to Tarbert	Relevant Qualifying Features
Marine Protected Area (MPA)	North East Lewis	1.5km SE	Risso's dolphin, Raitt's sandeel
Special Area of Conservation	Inner Hebrides and the Minches	1.8km SE	Harbour porpoise
Marine Protected Area (MPA)	Sea of the Hebrides	120km S	Minke whale, Basking shark

Habitat and Species Protection Plans have been developed to ensure that all concerned are aware of the specific issues associated with the species of concern. All mitigation is included within Section 16: Schedule of Mitigation, to aid implementation within the Construction Environmental Management Plans (CEMPs) detailed in Section 6.

In addition to the protection of specific species, the management of Non-Native Invasive Species and Marine Non-Native Species has been included in Sections 16.9 and 16.10, respectively.

16.2 Marine Mammal and Basking Shark Species Protection Plan

16.2.1 *Introduction*

Evidence suggests that there is the potential for various marine mammal species within the area of the development and within the impact range of the marine construction, dredge, and dredge disposal areas. Species which have been frequently recorded in the area include harbour porpoise, white beaked dolphins, Risso's dolphins, killer whales, minke whales and common and grey seals. Other species include bottlenose dolphins, short beaked common dolphins, and Atlantic white sided dolphins.

Marine mammals and basking sharks can be affected by changes in water quality, disturbance and injury from underwater noise and vessel interactions, and physical injury though interactions with spoil disposal operations. Water quality will be managed as described in Section 13 and as such is not considered further in this section.

16.2.2 *Protection*

Whales and dolphins are classed as European Protected Species (EPS) and are fully protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).

The main legislation with regard the protection of seals is The Marine (Scotland) Act 2010, which provides for Scottish Ministers to designate 'seal conservation areas.'

Basking sharks are provided full legal protection under Schedule 5 of the Wildlife and Countryside Act 1981, as amended in Scotland by the Nature Conservation (Scotland) Act 2004.

16.2.3 *Offences*

All cetaceans are listed under Schedule 2 of the Habitats Regulations, meaning it is an offence to:

- Deliberately capture or kill a wild animal of a European protected species;
- Deliberately disturb any such animal;
- Deliberately take or destroy the eggs of such an animal; or
- To damage or destroy a breeding site or resting place of such an animal.

The Wildlife and Countryside Act 1981, and Nature Conservation (Scotland) Act 2004 provide further protection to marine mammals. Cetaceans are listed in Schedule 5 of the Wildlife and Countryside Act 1981, which prohibits their deliberate killing, injuring or disturbance. The Nature Conservation (Scotland) Act 2004 makes amendments to the Wildlife and Countryside Act in Scottish waters, including the addition of 'reckless' acts, to offences against species protection. This makes it an offence to disturb a cetacean intentionally, or recklessly.

The Marine (Scotland) Act 2010 makes it an offence to disturb seals at any designated haul out location and to kill, injure or take seals anywhere, regardless of whether there is a designation or not, except under licence or for welfare reasons.

The Wildlife and Countryside Act 1981, together with the Nature Conservation (Scotland) Act 2004 makes it an offence to intentionally or recklessly kill, injure, harass, or disturb basking sharks.

16.2.4 *Mitigation*

During construction, a number of noisy activities will be undertaken, the most notable of which is piling, which has the potential to cause injury and disturbance to marine mammals. Basking sharks and otter are less sensitive to underwater noise than marine mammals and the predicted noise emissions do not have the potential to cause injury in this species. However, the underwater noise emissions may still result in disturbance. As such, a Piling Marine Mammal & Basking Shark Protocol has been developed to reduce the risk of causing injury to marine mammals and disturbance of basking sharks and otter (Section 16.2.4.1). In addition to this, the use of vibro hammers will be used to drive piles to refusal prior to using impact piling techniques.

Disturbance can be caused by interaction with vessels as such, all vessels are to comply with the Scottish Marine Wildlife Watching Code at all times (see Appendix 16A).

There is also the potential for marine mammals and basking sharks to be injured through interactions with falling debris during dredged spoil disposal operations. In order to mitigate this, a Spoil Disposal Marine Mammal & Basking Shark Protocol has been developed to reduce the risk of a marine mammal or basking shark being underneath the disposal plant when the spoil is released (Section 16.2.4.2).

Note as discussed in Section 16.4.4 the protocols detailed in Sections 16.2.4.1 and 16.2.4.2 should be applied to otters in the water who can also be disturbed by noise and injured by spoil disposals.

16.2.4.1 Piling Marine Mammal & Basking Shark Protocol

General Provisions

Two months prior to commencement of all construction activities, inclusion of details of the on-site location and experience levels of the marine mammal observers (MMOs) employed and the inclusion of the details of the Passive Acoustic Monitoring (PAM) system to be utilised, with details of its location, when it is to be deployed and the experience of the levels of the operators, will be required. These details will be provided by the principal contractor upon appointment of MMOs and obtainment of a PAM system for use during the works. This section of the CEMD will be updated with these details.

All MMOs and PAM technicians will be trained to Joint Nature Conservation Committee (JNCC) standards. Both MMOs and PAM technicians shall have the power to delay piling operations should marine mammals be present in the mitigation zone. The mitigation zone for piling operations shall extend 500m from the piling barge/rig for cetaceans and basking shark, and will extend 100m for seals and otter.

A formal log shall be maintained by the MMOs and PAM technicians whether marine mammals basking sharks or otter are present or not. The forms used will be the standard JNCC MMO forms, modified to suit pile driving operations (Appendix 16B). Paper forms should be collated on a regular basis and transferred to an electronic format. All data will be stored electronically and provided to Marine Scotland at the end of the piling campaign. The details recorded will include but are not limited to:

- Time and location of the disposal operations;
- Mobilisation and demobilisation times of MMO/PAM team;
- Start time of piling;
- Duration of piling;
- Breaks in operations, or times spent at reduced hammer energy;
- Conditions affecting observations including sea state and visibility, throughout surveillance;
- Records of any sightings/acoustic detections and actions taken; and
- Records will also be kept of sightings of other marine species including otters.

Visual observations are preferred over acoustic when possible. PAM will be required during hours of darkness, reduced visibility (fog) and when the sea state is >3. Beaufort Scale is often used as an indicator of sea state hence, visual observation when Beaufort is ≥4 may not be possible. However, it should be noted however that a Beaufort level of ≥4 does not necessarily correspond to sea states in which visual observations cannot be undertaken, especially in coastal locations . As such, in this instance when a Beaufort level of ≥4 is recorded the MMO will consider sea state and actually visibility to decided whether MMO or PAM should be utilised.

A noise generator will be utilised to provide a 'soft start' for large pile installation. This is to provide sufficient time for mammals especially those with Very High Frequency (VHF) hearing,

to leave the vicinity. The noise generator can also be utilised during breaks in piling of up to 30 minutes to avoid the need for a full restart protocol. The noise generator should not be utilised for periods of greater than 30 minutes to prevent it becoming a nuisance in its own right.

Marine Mammal Mitigation Piling Protocol

The impact piling marine mammal mitigation will provide the following measures:

1. A 500m mitigation zone will be established around the piling rig.
2. During periods where the visible conditions and sea state are not conducive for visual mitigation practices (MMO) (i.e. darkness, fog reducing visibility to <500m, or graded sea states of >3); PAM will be utilised by a trained PAM operator to monitor the mitigation zone.
3. The MMO/PAM operator should be informed by the site manager or piling foreman of proposed piling start times as soon as possible (at least 90 minutes notice, or the night before for a morning start).
4. If visual observations are being undertaken, an MMO will commence the watch using binoculars (minimum characteristics of 8x42). If PAM is being undertaken, the PAM operator will be required to use the specified PAM equipment. At least a 20-minute watch is required to be conducted prior to the anticipated start time. The MMO/PAM operator should focus their effort on the mitigation zone and advise the site piling foreman if marine mammals, otter or basking sharks are present.
5. Prior to piling, if the 500m mitigation zone remains clear of cetaceans and basking shark during the 20 minute watch, and the 100m mitigation zone remains clear of all seal species and otter, the MMO/PAM operator will give permission to commence the soft-start, but:
    - If a mammal/shark is sighted in the zone, the MMO/PAM operator will track the animals visually, and the soft-start will be delayed until the mitigation zone has been clear for 10min. The MMO/PAM operator will keep the site team up to date with progress.
    - A 30-minute soft start-up for 123cm diameter king piles and 80cm diameter bearing piles is required to protect HF hearing receptor groups (a noise generator may be used for this).
    - A soft start-up is not required for the piling of the heavy load area 30cm diameter piles.
6. Once the soft-start has commenced the MMO/PAM operator should be notified. If the mitigation zones during the soft-start procedure have been clear of marine mammals, otter and/or basking shark for 30 mins, then the MMO/PAM operator will give permission to commence piling at full power.
    - If a marine mammal/otter/shark is sighted in the mitigation zones during the soft-start, the MMO/PAM operator will track the animals visually, and the power will not be increased until the mitigation zones has been clear for 10min. The MMO/PAM operator will keep the site team up to date with progress.
7. Once piling has commenced at full-power, the MMO/PAM operator should be notified. The MMO/PAM operator does not need to continue watching during piling at full-power. If marine mammals, otters, or basking sharks are observed during piling

operations within their designated mitigation zones, details should be noted on a recording form.

- There is no requirement to stop works for mammals or basking sharks entering the mitigation zone once piling has commenced, provided piling is continuous.
- Continuous is defined as without a break in operations exceeding 10min in duration.

8. If a break in piling operations exceeds 10min the following conditions will apply:
   - A noise generator will be utilised to produce sound at lower pressures to deter marine mammals away from the construction area and maintain a soft-start procedure. There is no requirement for the use of an MMO or PAM operator in combination with the noise generator.
   - If the noise generator is not available, then a normal 20min MMO/PAM watch with soft start (if applicable) shall be deployed.
9. If a break in piling operations has been planned to last for a period of up to <30min, but exceeds this timeframe, irrespective of whether the noise generator has been running or not, a 20min pre-watch will be required before piling can recommence as detailed above.
10. All MMO/PAM operations will be recorded using the JNCC marine mammal reporting forms template and submitted to Marine Scotland once the works are complete.

A simple flow chart summarising the observation protocols is provided in Figure 16.1.

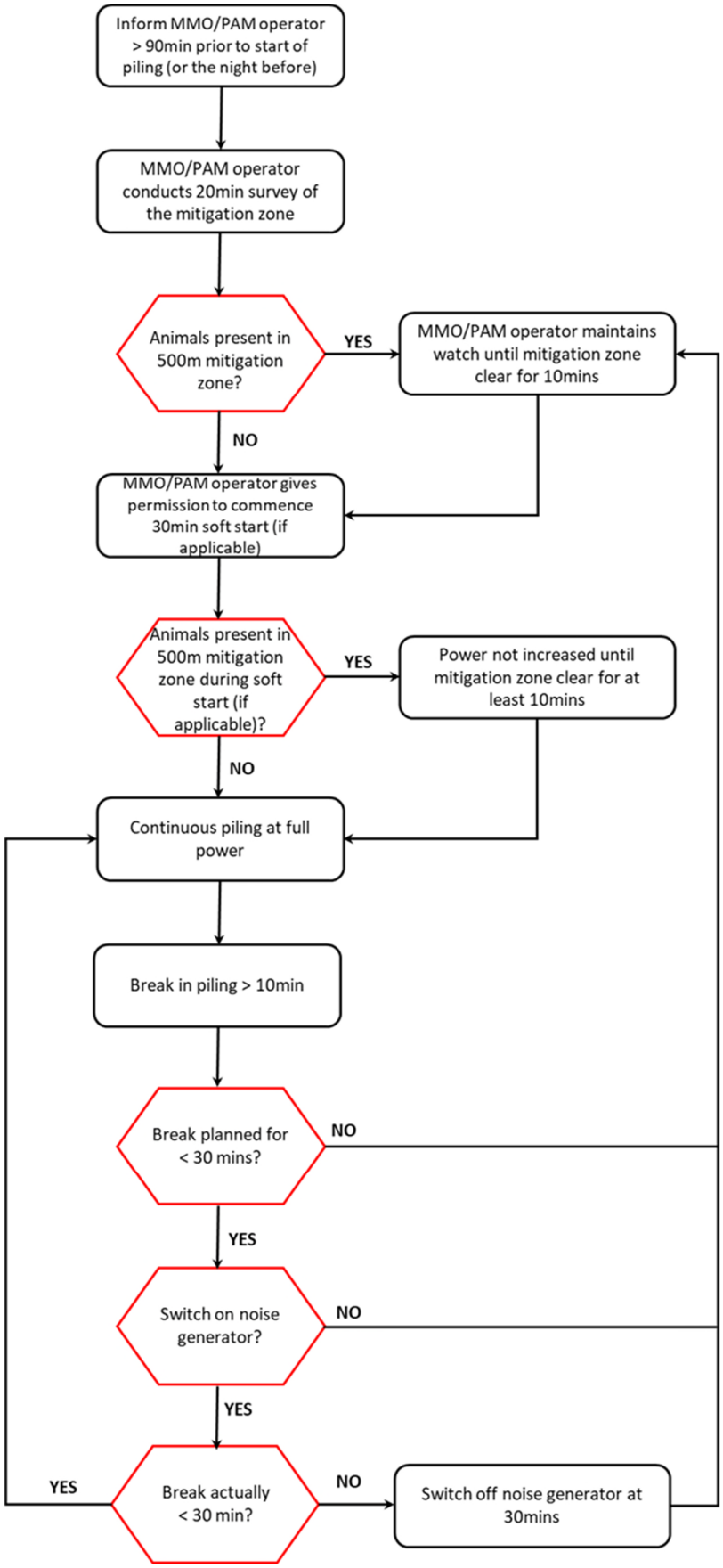


Figure 16.1: Flowchart of Visual Pilling Observation Protocols

16.2.4.2 Spoil Disposal Marine Mammal & Basking Shark Protocol

General Provisions

Two months prior to commencement of all construction activities, inclusion of details of the on-site location and experience levels of the MMOs employed and the inclusion of the details of the PAM system to be utilised, including details of its location, when it is to be deployed and the experience of the levels of the operators, will be required. These details will be provided by the principal contractor upon appointment of MMOs and obtainment of a PAM system for use during the works. This section of the CEMD will be updated with these details.

All MMO and PAM technicians will be trained to JNCC standards. Both MMOs and PAM technicians shall have the power to delay disposals should marine mammals or basking sharks be present in the mitigation zone. The mitigation zone for spoil disposals shall extend 200m from the disposal vessel.

A formal log shall be maintained by the MMOs and PAM technicians whether marine mammals or basking sharks are present or not. The forms used will be the standard JNCC MMO forms, modified to suit spoil disposal operations (Appendix 16C). Paper forms should be collated on a regular basis and transferred to an electronic format. All data will be stored electronically and provided to Marine Scotland at the end of the dredging campaign. The details recorded will include but are not limited to:

- Time and location of the disposal operations;
- Mobilisation and demobilisation times of MMO/PAM team;
- Start time of disposal;
- Duration of disposal;
- Conditions affecting observations including sea state and visibility, throughout surveillance;
- Records of any sightings/ acoustic detections and actions taken; and
- Records will also be kept of sightings of other marine species including otters.

Visual MMO watches will be conducted during daylight hours, when sea state is ≤3, and when visibility permits (clear visibility past the spoil ground for land-based observations, and ≥500m for vessel based). Unless PAM is available, spoil disposal operations will not take place during hours of darkness, or if conditions are unsuitable for visual observations.

If available, PAM will be used during hours of darkness, when sea state is ≥4, or if visibility prohibits visual observation. Summaries of both visual and acoustic observation protocols are provided below.

It is vital that sufficient advance notice is provided for MMO call out, to allow for early check on sea state and visibility at the Spoil Ground, so that PAM operators may be called out in time to conduct 20-minute PAM survey prior to vessel arrival at the Spoil Ground if conditions require.

Visual Observation Protocols

Visual marine mammal and basking shark observations will be conducted by an MMO at a suitable observation location, either shore based, or vessel based on the disposal vessel or separate observation vessel. A 200m mitigation zone around the disposal vessel will be

established for marine mammals and basking sharks. The following protocol will be followed regardless of the MMO location:

1. The MMO should be informed by the dredge spoil disposal plant via VHF radio or phone once dredging is complete and that the ship is on route to the spoil ground. The vessel must give suitable warning to the MMO observer to allow them to get into position and start a watch at least 20 minutes before the anticipated arrival time.
2. The MMO will commence the watch using binoculars (minimum characteristics of 8x42) so that at least a 20-minute watch has been conducted by the time the ship reaches the spoil ground. The MMO should focus their effort on the spoil ground and advise the ship if marine mammals, otters, or basking sharks are present in order to avoid them if possible.
3. Once in the spoil ground the ships officers will ask the MMO if they are clear to commence the disposal. If the 200m mitigation zone for marine mammals and basking shark is clear, then MMO will give permission to proceed. If marine mammals or basking sharks are present within the mitigation zone, disposal will be delayed until the animals have left the mitigation zone and 5 minutes have passed since an animal was last sighted within the zone.
4. Visibility Limits:
    - Shore based – Must have clear visibility to 700m, sufficient light (i.e., daylight hours), and sea state must be ≤3.
    - Vessel based – Must have clear visibility to 300m from the disposal vessel, sufficient light (i.e., daylight hours) and sea state must be ≤3.

A simple flow chart summarising the visual observation protocols is provided in Figure 11.3.

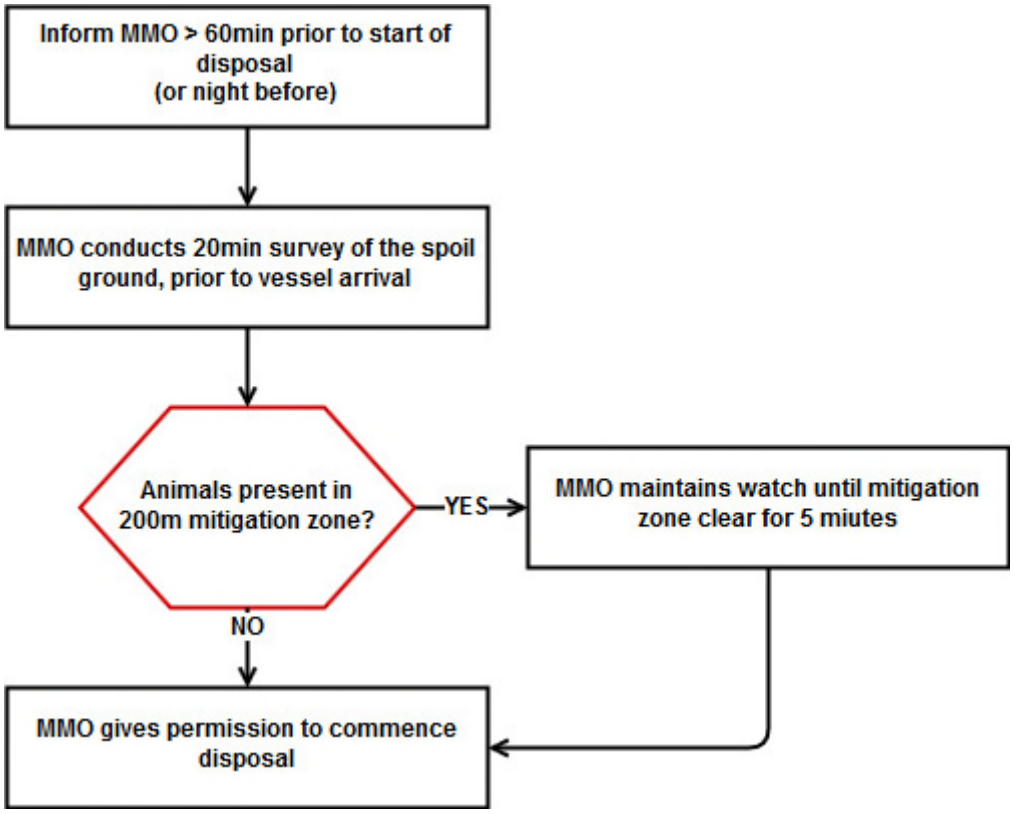


Figure 16.3: Flowchart of Spoil Disposal Visual Observation Protocols

Acoustic Monitoring Protocols

During hours of darkness, sea states ≥4, or if visibility falls to below 300m for vessel-based observation or visibility is not clear past the spoil ground for shore-based observation, marine mammal detection will be conducted acoustically using Passive Acoustic Monitoring (PAM). The PAM system will be either be deployed from the disposal vessel, or buoy mounted in a location where the system provides sufficient coverage of the spoil ground to allow detection of vocalising cetaceans in the area. It should be noted that PAM does not provide mitigation for seals, minke whales, or basking sharks, since these species do not vocalise. The following protocol will be used for PAM:

1. The PAM technician shall be given a minimum warning of 60 minutes ahead of the intended disposal time, in order to prepare for the watch. The operator will work from the PAM base station where the laptop will receive data from the PAM hydrophones. The base station will be located on the disposal vessel for vessel deployed systems, or on land if the hydrophones are buoy mounted.
2. The PAM technician should perform a minimum of a 20-minute watch before the vessel reaches the Spoil Ground.
3. Once the PAM technician is satisfied no marine mammals are present within the 200m mitigation zone, they may advise the crew to commence the disposal. If mammals are detected within the zone, the disposal will be delayed until 10 minutes have passed since last detection within the zone.

A simple flow chart summarising the acoustic monitoring protocols is provided in Figure 16.4.

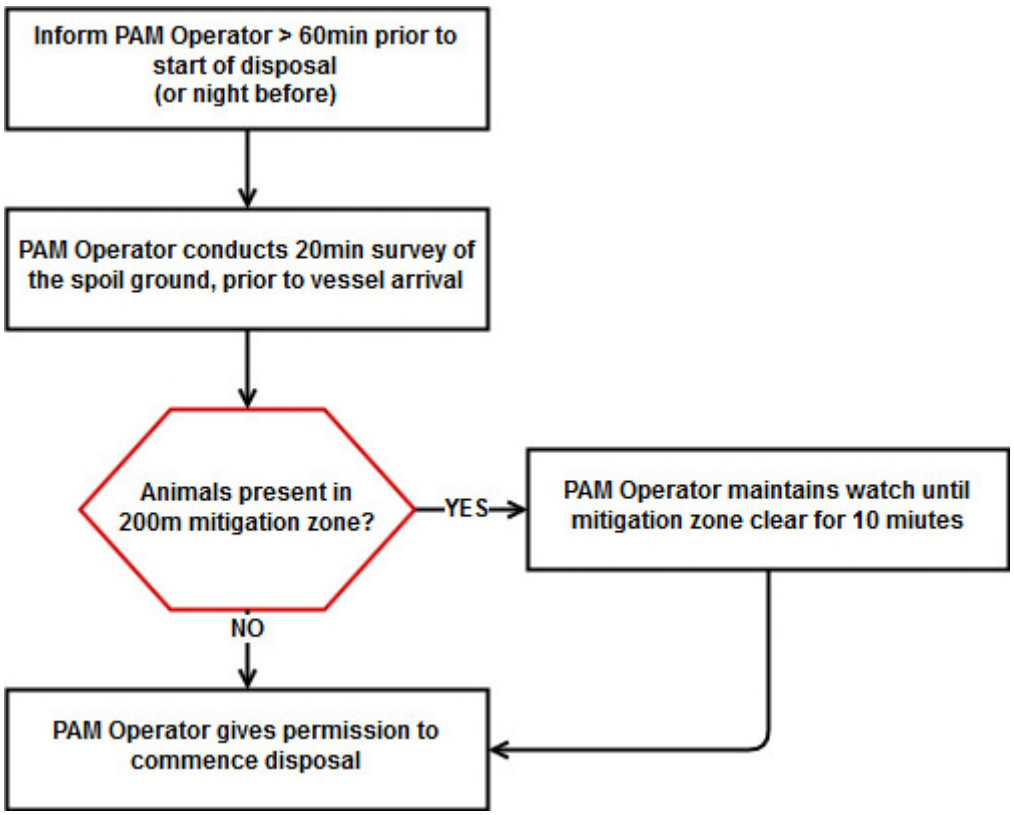


Figure 16.4: Flowchart of Spoil Disposal Acoustic Observation Protocols

16.3 Benthic Ecology Protection Plan

16.3.1 *Introduction*

The Priority Marine Feature (PMF) 'Kelp and Seaweed communities has been identified within the easter region of the dredge area, near the Seid Rocks channel marker. During the dredge, some of this habitat will be removed.

A review of photographs taken during a dive inspection of the wreck of the Alabama identified plumose anemones, dead man's fingers, hydroids, sea squirts, common sea star and red algae. A section of the Alabama wreck will be removed for navigational purposes and it is likely some individual benthic organisms will be lost.

16.3.2 *Protection*

Inclusion in the PMF does not provide legal protection in itself, however, due consideration must be provided in Impact Assessments, and as such, mitigation measures and best practice should be implemented.

16.3.3 *Mitigation*

The dredging will be carried out utilising positioning technology to ensure that only the required dredge area is dredged and further impacts on benthic organisms in adjacent habitat are minimised.

Prior to the removal of the section of the Alabama wreck, divers will be briefed to attempt to relocate individual organisms likely to be affected. A similar approach shall be employed if other wrecks are to be moved.

16.4 Otter Protection Plan

16.4.1 *Introduction*

Otters are widespread across the Western Isles and initial surveys have indicated that otters pass through the site on a regular basis. The coastline is likely to offer sheltered foraging and resting sites and potential for breeding and non-breeding holts. The two small burns in the area of the site may be utilised by otter when requiring freshwater to clean their fur.

16.4.2 *Protection*

Otters are classed as European Protected Species (EPS) and are fully protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).

16.4.3 *Offences*

It is an offence to deliberately or recklessly:

- capture, injure or kill an otter;
- harass an otter or group of otters;
- disturb an otter in a holt or any other structure or place it uses for shelter or protection;
- disturb an otter while it is rearing or otherwise caring for its young;
- obstruct access to a holt or other structure or place otters use for shelter or protection, or otherwise deny the animal use of that place;

- disturb an otter in a manner or in circumstances likely to significantly affect the local distribution or abundance of the species; and,
- disturb an otter in a manner or in circumstances likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young.

It is also an offence to:

- damage or destroy a breeding site or resting place of such an animal (whether or not deliberately or recklessly); and
- keep, transport, sell or exchange, or offer for sale or exchange any wild otter (or any part or derivative of one) obtained after 10 June 1994.

Otter shelters are legally protected whether or not an otter is present.

16.4.4 *Mitigation*

Pre-construction surveys for otter will be carried out prior to construction. An EPS licence will be sought if required (i.e. should a resting place be identified within or close to an area of works) and this species protection plan will be updated accordingly.

As it is likely otter will utilise the site, measures to protect otter should be implemented regardless of a place of shelter being identified. Works should be carried out in daylight, where practicable and the use of artificial lighting should be minimised where possible and directed towards the works area away from watercourses. Measures to prevent entrapment such as capping pipes/tubes or storing upright, ensuring open excavations are suitably fenced off or ramp exits provided. All machinery, stockpiles, and equipment should be checked thoroughly, with a torch if required, for otter prior to use. Any temporary buildings and waste control areas should be secured to prevent access by mammals and other wildlife. Speed limits of 10mph should be implemented and adhered to, to minimise the chance of collision. Noise and vibration sources should be minimised where possible, for example, vehicles and plant should be switched off or throttled down when not in use and all ancillary plant should be situated away from potential receptors, see Section 14: Noise and Vibration. Measures also noted in Section 13: Water Quality, will provide protection for otter using the watercourses within and around the site for commuting, foraging, and feeding and cleaning their fur. Rock armour revetments will be installed replaced coastal habitat which is likely utilised by otters.

In the event that a potential otter holt is identified within 200m of the construction site during works, works should cease within 200m of the location. The ECoW should be made aware and will provide advice.

The Marine Mammal and Basking Shark piling and disposal protocols will also be applied to otter should an otter be sighted during the MMO watch.

16.5 Bats Protection Plan

16.5.1 *Introduction*

Roosts for common pipistrelle have been identified in the Stornoway area however there are no buildings on site and woodland and scattered trees in the area provide low suitability for

roosting bats. However, there is the potential for bats to use the site for foraging, commuting and for connectivity with the wider landscape.

16.5.2 *Protection*

Bats are classed as European Protected Species (EPS) and are fully protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).

16.5.3 *Offences*

For any wild bat species, it is an offence to deliberately or recklessly:

- capture, injure or kill a bat;
- harass a bat or group of bats;
- disturb a bat in a roost (any structure or place it uses for shelter or protection);
- disturb a bat while it is rearing or otherwise caring for its young;
- obstruct access to a bat roost or otherwise deny an animal use of a roost;
- disturb a bat in a manner or in circumstances likely to significantly affect the local; distribution or abundance of the species;
- disturb a bat in a manner or in circumstances likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young; and,
- disturb a bat while it is migrating or hibernating.

It is also an offence to:

- damage or destroy a breeding site or resting place of such an animal (whether or not deliberately or recklessly); and
- keep, transport, sell or exchange, or offer for sale or exchange any wild bat (or any part or derivative of one) obtained after 10 June 1994.

16.5.4 *Mitigation*

Pre-construction surveys for bats will be carried out prior to construction. An EPS licence will be sought if required (i.e. in the unlikely event a roost is identified within or close to an area of works) and this species protection plan will be updated accordingly.

Mitigation measures to protect bats using the site for foraging and commuting should be implemented as best practice. These include ensuring artificial lighting is only used where required to light works and for safety reasons. Lighting should be directional towards the works.

16.6 Amphibians and Reptiles Protection Plan

16.6.1 *Introduction*

There is the potential for slow worms to be present within the development area within grassland, heath and bracken habitat along the coastline. There is also the potential for common lizard to be present in area of heath and bog across the site.

16.6.2 *Protection*

Common lizard and slow worm are given limited protection under the Wildlife and Countryside Act 1981 (as amended).

16.6.3 *Offences*

It is an offence to:

- intentionally or recklessly kill or injure these species; and to,
- trade – i.e., sale, barter, exchange, transport for sale, or advertise for sale or to buy.

It is not an offence to possess these species.

16.6.4 *Mitigation*

Pre-construction surveys for amphibians and reptiles will be carried out prior to construction to identify potential reptile hibernacula, and this species protection plan will be updated accordingly.

Clearance of potential hibernacula, i.e., tree roots, rocky areas with deep crevices, log piles, if identified, should be avoided where practicable during the hibernating period (October – March, weather dependent). Where this is not practical, watching briefs should be carried out and reptiles translocated to suitable receptor sites.16.7 Breeding Birds Protection Plan

16.7 Breeding Birds Protection Plan

16.7.1 *Introduction*

Various records of bird species have been recorded in and around the site. The waterbodies and some habitats identified such as moorland and scrub offer some suitability for local breeding birds including ground nesting species.

16.7.2 *Protection*

All wild birds are protected under the Wildlife and Countryside Act 1981 (as amended). Additional protection is afforded to some rarer species and to species vulnerable to disturbance and/or persecution through various schedules attached to the Act.

16.7.3 *Offences*

For any wild bird species, it is an offence to intentionally or recklessly:

- kill, injure or take a bird
- take, damage, destroy or interfere with a nest of any bird while it is in use or being built
- obstruct or prevent any bird from using its nest
- take or destroy an egg of any bird

For any wild bird species listed on Schedule 1, it is an offence to disturb:

- any bird while it is building a nest
- any bird while is in, on, or near a nest containing eggs or young
- any bird while lekking
- the dependent young of any bird

For any wild bird species listed on Schedule 1A, it is an offence to harass any bird intentionally or recklessly.

For any wild bird species listed on Schedule A1, it is an offence to intentionally or recklessly take, damage, destroy or interfere at any time with a nest habitually used by any bird.

16.7.4 *Mitigation*

Pre-construction surveys for breeding birds will be carried out prior to the start of construction works in the breeding season.

During the bird breeding season, the ECoW should carry out regular checks of the construction area and adjacent land to identify nests. If found, then an exclusion zone appropriate to the species will be implemented, a toolbox talk will be given to make sure that all onsite workers are aware to avoid the nest and exclusion area. If, additional mitigation is required, this species protection plan will be updated.

As with other species, artificial lighting within the site should only be used where required to light works sites and for safety reasons and should be directional towards the required works area.

16.8 Ground Water Dependent Terrestrial Ecosystem (GWDTE) Protection Plan

16.8.1 *Introduction*

A number of habitats were identified to support Ground Water Dependent Terrestrial Ecosystems (GWDTE). Highly dependent habitats include flush and springs which was identified on site. The most significant areas in relation to GWDTE are the large areas of wet heath habitat present, which have been recorded as widespread across the site and of moderate dependence on groundwater.

16.8.2 *Protection*

Habitats identified as potential Ground Water Dependent Terrestrial Ecosystems (GWDTE), are protected under the Water Framework Directive (Directive 2000/60/EC) (European Commission, 2000) and transposed into Scottish law through the Water Environment and Water Services (Scotland) (WEWS) Act 2003 (Scottish Parliament, 2003).

16.8.3 *Offences*

Disturbance to the groundwater resource on which a particular GWDTE relies, would be a breach of legislation.

16.8.4 *Mitigation*

Where a section of flush habitat will be removed, an impermeable membrane to protect the remaining habitat will be installed to encourage formation of new habitat, see Drawings SDWP–WS 2139–XX–03–DR–C 4051 and 4052.

Drainage along the sides of the access road where it passes through a number of moderate GWDTE will be in line with Sustainable urban Drainage Systems, see Drawing SDWP-WS2139-XX-01-DR-C-0051.

16.9 Invasive Non-Native Species (INNS) Plan

16.9.1 *Introduction*

Rhododendron, an Invasive Non-Native Species (INNS), has been identified across the site. No other INNS have been identified on the site during surveys. The rhododendron within 50m of the construction site have been injected with herbicide by a specialist contractor in spring/summer 2021. Check have been carried out to ensure that the herbicide has been effective and where required additional treatment completed. The scale and topography of the site is such that there is a small chance that some young Rhododendron plants have not been treated.

16.9.2 Mitigation

Rhododendron injected with herbicides will have died off prior to construction works commencing allowing them to be removed with other vegetation as required.

Prior to any vegetation clearance the ECoW should check to ensure that there are no INNS present if found appropriate treatment and disposal relevant to the species present will be required.

All plant and equipment brought to site should be free of material, to prevent import of INNS from other sites.

16.10 Marine Non-Native Species (MNNS) Plan

16.10.1 *Introduction*

The consequences of introducing non-native species into the local marine ecosystem includes;

- Damage or displacement of indigenous species;
- Disruption of sensitive ecosystem balance;
- The spread of foreign diseases which severely affect native species;
- Damage to buildings and marine infrastructure; and
- Significant economic costs associated with the control and management of invasive species.

16.10.2 *Mitigation*

All works will be carried out in accordance with The Code of Practice on Non-Native Species (approved by Scottish Parliament 28 June 2012), adopting a precautionary approach to minimise the risk of releasing Marine Non-Native Species (MNNS), using risk assessments relevant to planned activities and seeking advice on best practice whenever necessary, including reporting the presence of non-native species. This guidance will be adopted during the Deep Water Port development works, to minimise the risks of introducing MNNS into Stornoway Harbour during any marine works.

Appropriate measures will be implemented to reduce the risk of MNNS introduction. These will include:

- **Marine Plant (Not Road Transportable):**

  - Vessel employed to support the project will be sourced from within relevant biogeographic boundaries wherever possible i.e., within the North Sea ecosystem; and
  - All vessels working on the project will be compliant with the relevant requirements of the International Maritime Organisation, including adherence to the Ballast Water Management Convention.
- **Road Transportable Equipment (Plant, Vehicles and Small Boats):**
  - All equipment is to be received in an 'as new' standard;
  - Salt water will be drained from every part of the plant, boat or any other item which could transport water from the marine environment, prior to being mobilised to site or demobilised from it;
  - All parts of plant, equipment or boats that come into contact with the water will be thoroughly cleaned before being mobilised to or demobilised from the site, removing any visible algae, fish, shellfish, and soils;
  - Any algae, fish, shellfish or soils removed from plant or equipment during routine cleaning will be disposed of inf a designated bin or skip;
  - Small boat hulls will be cleaned regularly to avoid the risk of transporting MNNS, and anti-fouling applied where appropriate;
  - Operators will avoid travelling through marine plants and weed where possible, to prevent organic matter becoming entangled in tracks, propellers etc. and transport around the site; and
  - All equipment will be inspected prior to mobilisation on site; any equipment carrying excessive sediment deposits will be returned to the supplier.

- **Materials:**
  - All materials used during the construction of the Deep Water Port will be free from marine organic matter and sourced from areas free from known MNNS.

In event that invasive species are suspected the relevant authorities will be contacted by the ECoW or Project Manager.

- SEARS (Scottish Environment & Rural Services): 08452 302050
- SNH: non_native_species@snh.gov.uk
- Marine Scotland: marinescotland@scotland.gsi.gov.uk - 01224 876544
- SEPA: http://www.sepa.org.uk/about_us/contacting_sepa.aspx

Appendix 16A – Scottish Marine Wildlife Watching Code

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

The Scottish Marine Wildlife Watching Code

The Scottish Marine Wildlife Watching Code

Preface

This Code has been produced in fulfilment of the requirement under Section 51 of the Nature Conservation (Scotland) Act 2004 for Scottish Natural Heritage (SNH) to:

"Prepare and issue a code, to be known as the Scottish Marine Wildlife Watching Code, setting out recommendations, advice and information relating to commercial and leisure activities involving the watching of marine wildlife".

The Act states that the Code may contain information on:

- Activities which are likely to disturb marine wildlife.
- Circumstances in which marine wildlife may be approached.
- The manner in which marine wildlife may best be viewed with minimum disturbance.

The Act also requires SNH to consult others in the development of the Code, to publish and promote the Code and, periodically, to review the Code. The Code was first published in 2006. A revision was undertaken in 2016 to reflect changes in relevant legislation since 2006.

This Code is an opportunity to draw together information relating to best practice on watching all species of marine wildlife in and around Scotland. It is expected that the Code will form the basis for more targeted codes and guidance material.

This Code was developed through extensive review and synthesis of existing guidance, and consultation with scientists, providers of tourism and wildlife watching opportunities, other marine and coastal user groups and the general public.

A Code of Conduct for Watching Marine Wildlife

Contents

Introduction

Scotland has a long and varied coastline and a wealth of marine wildlife. This is arguably the best place in Europe to watch whales, dolphins and porpoises. The basking shark – the second largest fish in the world – can often be seen feeding off the west coast in summer. Seals are found all around our coasts; they can be curious and easy to observe. Otters are more elusive, but are nonetheless relatively common, and if you watch carefully and are patient you may see them. Spectacular populations of seabirds nest on our sea cliffs and islands, and hundreds of thousands of waders and waterfowl frequent our beaches and estuaries. Sea eagles can be seen soaring and hunting on our coasts. Occasionally loggerhead and leatherback turtles are seen in our waters.

Watching marine wildlife is exciting and memorable. It makes us more aware and increases our understanding and enjoyment of the marine environment. It is also increasingly important for tourism and the economy.

Some people now make their living taking visitors to sea, or on coastal walks, to watch wildlife. For others, watching wildlife is purely a hobby or part of a family outing. This Code is principally designed for those who actively watch marine wildlife around Scotland, but it is also relevant to other marine users who encounter marine wildlife during other activities. With this in mind, we all need to know how to act responsibly around wildlife.

The Code is not a law or regulation – its over-riding purpose is to raise awareness and offer practical guidance. It aims to:

- Help you to enjoy watching marine wildlife.
- Improve your chance of seeing wildlife.
- Help minimise disturbance to marine wildlife.
- Provide a standard for the wildlife watching industry.
- Help you to stay within the law.

For these reasons it is important that everyone follows the Code, as far as is safe, practical and feasible. Many species are protected by law and harming or disturbing them may be an offence, as explained in the section on the law in this document.

There are other excellent codes for watching marine wildlife, mostly targeted at particular users, species groups or locations. The Scottish Marine Wildlife Watching Code has been designed to complement these codes, and to help in

the development of new or improved targeted codes and guidance materials.

This document is intended to be a concise code of conduct. This comprises a set of broad Principles, followed by three user codes: **On the coast**, **On the sea**, and **In the sea**.

There is no separate code for those carrying out research: this guidance applies equally to everyone. If in doubt, you should contact **SNH** to discuss whether you need to apply for a licence to undertake an activity that would otherwise constitute an offence. Further information on marine wildlife and the law is provided in the final section.

This Code is complemented by the more detailed Guide to Best Practice for Watching Marine Wildlife ("the Guide"), arranged by major species groups: cetaceans (whales, dolphins and porpoises), basking sharks, seals, otters, birds and turtles. For each of these we provide basic information on the animals found at the coast and in the waters around Scotland, on their vulnerability to different forms of disturbance, on sensitive times and places, and more detailed guidance as to what constitutes responsible watching behaviour. We provide a guide to the law as it applies to each group. Users are reminded that the law protects wild plants as well as animals.

This Code deals mainly with minimising disturbance from individual encounters. There will inevitably be times and places where the number of encounters with wildlife increases to the point where the longer term well-being and survival of animals is compromised. The Guide therefore also includes a section which provides information on Dealing with cumulative impacts through the development of local wildlife management initiatives and improved marine planning.

A set of annexes to the Guide provides additional advice on what to do if you encounter injured or stranded animals, reporting and recording your sightings of marine wildlife, and a list of more specialist codes of conduct and guidance targeted at particular users or species groups.

The recommendations within the Code and Guide should be followed as far as possible, but remember that human safety is paramount and do not put yourself, or others, at risk.

Objectives of the Code

- To minimise the risk of harm to marine wildlife from encounters with people.
- To provide information about marine wildlife in Scotland, human activities most likely to affect animals and how to recognise the signs of disturbance.
- To offer specific guidance about watching marine wildlife with minimum disturbance.
- To provide an over-arching framework against which more detailed user codes or management measures may be developed to address specific local issues.

Principles

Be aware. Before you go wildlife watching, learn about the animals you might encounter. Understand how your actions could affect them. Be alert to the signs that animals make when they feel threatened. Be observant, patient and sensitive to the interests of the wildlife you are watching.

Take responsibility for your own actions. Constantly assess the wildlife's reaction to your presence and, if you see signs of disturbance, move away quietly. Consider how much time you spend watching animals. The presence of people over long periods can be disturbing, however careful you may be.

Have respect for other people, wildlife and the environment. Use your right of responsible access wisely. Respect the privacy and livelihoods of those who live by the sea. Leave the environment as you find it.

On the coast

Scotland's coast is a wonderful place to start exploring our enormously varied marine wildlife: from colonies of cliff-nesting seabirds, to seals that come ashore to rest and pup, to the miniature underwater worlds found in rockpools. You can get great views from the coast of whales, dolphins, porpoises and basking sharks, as well as of birds foraging or rafting on the water. Using binoculars from the coast means that you get better views, without having to be close to the animals.

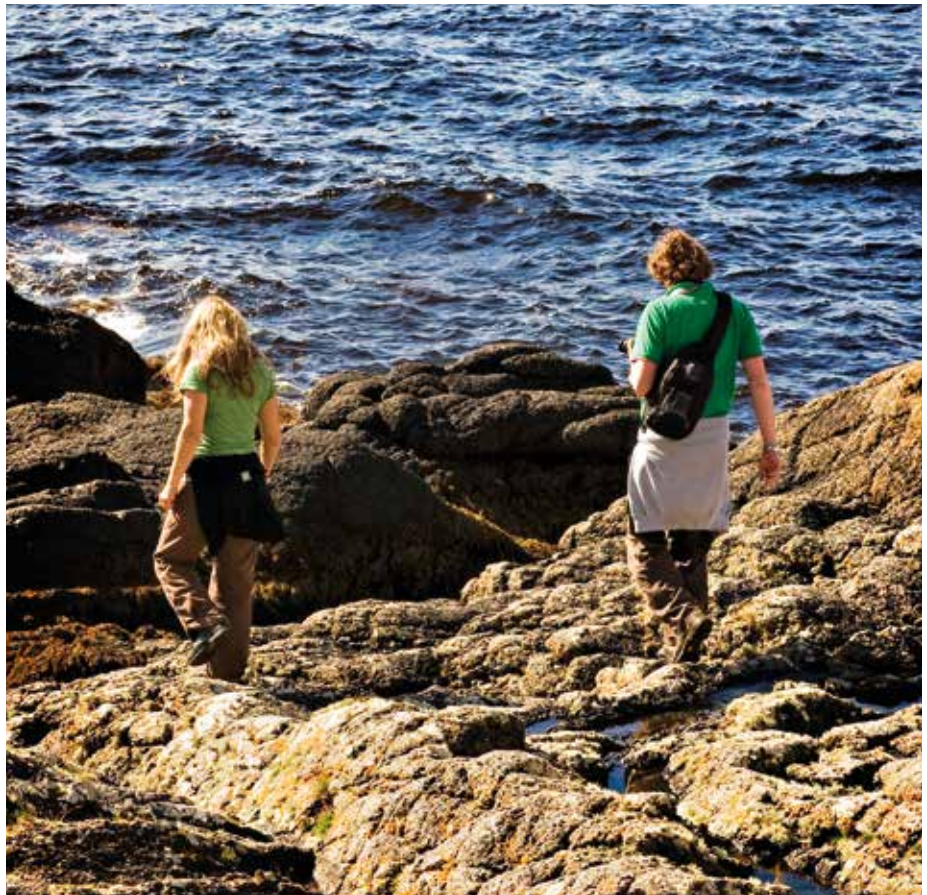
You may also come across wildlife while taking part in other coastal activities, such as rock climbing, coasteering and land yachting. You should follow this code regardless of whether you deliberately set out to see wildlife or are lucky enough to have an unexpected encounter.

- Follow any locally available advice about avoiding disturbance to wildlife. If you're visiting a wildlife viewing site then you may be asked to follow specific routes to minimise disturbance.
- Use wildlife watching hides wherever possible.
- Keep a good lookout and don't get too close. Use binoculars or a telescope to get better views.
- As soon as you see wildlife, assess the situation. What are the animals doing? Where are they going? How can I avoid disturbing them?

- Let the animals decide how close they want you to be. If you see signs of disturbance (such as “heads up” responses, alarm calls, sudden movements or aggressive behaviour) then you should move away and if possible take an alternative route or wait for the animals to move on.
- If you are passing close to wildlife, do so slowly and cautiously. Make sure that your movements are steady and predictable, and do not approach directly.
- Avoid surrounding or corralling the animals. If other people are watching the same animals, or you are in a group, try to ensure that you all stay together and to one side. Remember that with more people the likelihood of disturbance will be greater.
- Do not chase animals. Let them go if they move away.
- Do not feed or touch birds or other large wild animals.
- Avoid using flash photography – check the default setting on your camera.
- Move away from wildlife as quietly and carefully as you can – your exit should be as careful as your approach.
- Take extra care during sensitive times of year in places where animals may be feeding, resting, breeding or with their young:
    - Be careful not to scare birds off nests or trample burrows/nests.
    - Do not intentionally divide or put up flocks of birds or flush seals into the sea.
    - Do not approach otter holts (dens) closely, and avoid blocking routes to and from the sea.
    - Be careful not to split up groups or mothers and young, and never approach apparently lone young animals.

- Do not trample through rockpools. If you lift rocks, do so carefully and put them back the same way up and in the same place.
- If you touch or pick up small animals from rockpools, handle them with care and put them back where you found them.
- Avoid physical damage to the environment. Carry rather than drag canoes and dinghies where possible, and avoid trampling and erosion, particularly of sand dunes, saltmarsh and coastal grasslands.
- Keep your dog under close control at all times as they can cause great disturbance.
- Do not leave litter.
- If camping on the coast, follow the **Scottish Outdoor Access Code's** advice on camping responsibly. Avoid pitching your tent close to seal colonies, otter holts or sites used by birds for nesting or roosting.

See **A Guide to Best Practice for Watching Marine Wildlife** for more detailed advice on different species groups.



On the sea

Seeing wildlife is a great bonus to any boat trip, and increasing numbers of people are taking advantage of dedicated wildlife watching boat tours. There is a great deal of wildlife around, and it is often easy to see, even from a distance – especially if binoculars are used.

This guidance applies to anyone out in a boat of any kind who encounters wildlife, intentionally or otherwise. Although the Code should be followed at all times where practical, remember that the first responsibility of the skipper of a vessel is the safety of passengers and crew. Do not put yourself, crew or passengers in danger.

- Follow any locally available advice about avoiding disturbance to wildlife. This may include local marine codes, byelaws and wildlife management schemes.
- Keep a good lookout and don't get too close. Use binoculars to get a better view. Tour operators often provide their passengers with binoculars to assist with this.
- As soon as you see wildlife, assess the situation. What are the animals doing? Where are they going? How can I avoid disturbing them?
- If you are passing close to wildlife, reduce your speed to the safest minimum. Make sure that your movements are steady and predictable and approach at an oblique angle – direct or head-on approaches are more threatening. Depart with equal caution.

- Do not cut off an animal or group of animals by moving across their path, and do not approach them from behind.
- Let the animals decide how close they want you to be. If you see signs of disturbance (such as sudden movements or flight, aggressive behaviour, “heads up”, bunching together, tail slaps) then you should move away and if possible take an alternative route or wait for the animals to move on.
- If animals are moving in a consistent direction, maintain a steady parallel course and where possible keep above the recommended minimum distances discussed in the Guide.
- If marine mammals decide to approach you (for example to bow ride), try to maintain a steady speed and course. Try not to present your propellers to approaching animals.
- Make sure the animals are not surrounded. If other people are watching, try to stay on the same side. Avoid corralling or boxing animals in against the shoreline or in sea lochs or bays.
- If you can see one animal at the surface, others may well be nearby, just below the surface out of sight. Keep a careful lookout at all times.
- Remember that with more boats and people about, the likelihood of disturbance will be greater.
- Take extra care during sensitive times of year in places where animals may be feeding, resting, breeding or with their young:
  - Do not intentionally break up or put up rafts of birds or flush seals into the sea.
  - Avoid landing or entering the sea adjacent to designated seal haul-out sites.
  - Be careful not to split up groups, or mothers and young, and never approach apparently lone young animals.
  - Watch out for basking sharks at tidal fronts where different water bodies meet (often marked on the surface of the water by lines of debris or foam) as they may be feeding and not be aware of your presence.
- If watching whales, dolphins or porpoises, switch off your echo sounder if it is safe to do so. These animals are particularly sensitive to underwater noise and it may interfere with their communication, navigation and foraging.
- Avoid using flash photography – check the default setting on your camera.
- Do not throw litter into the sea.

If you are using an engine:

- Avoid sudden unpredictable changes in speed, direction and engine noise.
- Keep your engine and propeller well maintained to minimise noise.

If you are under sail, paddling or rowing:

- Do not take advantage of your ability to approach quietly – it may result in wildlife being suddenly startled by your proximity.
- Be aware of any wildlife around your vessel so that you can act as quickly as possible to minimise disturbance.
- Remember that small craft are vulnerable. Getting too close to marine animals may put you at risk.
- If you are under sail, avoid tacking, gybing and flapping sails close to marine wildlife, if possible.
- When seals are hauled out on the shore, they are particularly prone to disturbance from passing kayaks. If paddling, give haul-out sites a wide berth.

Personal water craft (sometimes known as “jet skis”) are not recommended for viewing marine wildlife. They are fast, noisy, and low in the water. Their speed and limited range of visibility means that collisions may occur and can be serious for both parties.

- Keep a good lookout at all times, and keep away from marine wildlife where possible.
- If you have an unexpected encounter with marine wildlife, slow down and move away steadily to 100 metres or more.

See **A Guide to Best Practice for Watching Marine Wildlife** for more detailed advice on different species groups.

In the sea

Diving, snorkelling and swimming in the waters around Scotland offer opportunities to see a stunning array of wildlife. High energy, wave-exposed coastlines with reefs and sea caves are a focus for many divers, with their varied communities of encrusting animals including sponges, anemones, sea mats and sea firs. A fascinating array of marine life can also be seen when snorkelling or swimming in more sheltered waters.

Divers can explore otherwise inaccessible places underwater. This offers great opportunities to see wildlife, but brings a particular responsibility to avoid disturbance. Most divers start out in a boat, and should therefore also observe the **On the sea** code at this stage of their trip.

- Follow any locally available advice about avoiding disturbance to wildlife. This may include local marine codes, byelaws and wildlife management schemes.
- Diving, snorkelling or swimming with marine mammals or basking sharks is not recommended. It can cause disturbance and stress to the animals as well as putting yourself at risk. However, if you do encounter animals while in the water, follow the guidance below where relevant, and take extreme care not to disturb the animals or put yourself in danger.
- Keep a good lookout on the surface and underwater.
- If you are passing close to marine wildlife, do so slowly and cautiously. Make sure that your movements are steady and predictable.

- Let the animals decide how close they want you to be. If you see signs of disturbance (such as sudden movements) then you should stop your approach or move away gently.
- Remember that the likelihood of disturbance will be greater with higher numbers of people (and boats) in the vicinity.
- If you touch or pick up small animals on the sea bed, handle them with care and put them back where you found them.
- Take care not to cause damage to the environment with your feet or fins. Be aware that some species are particularly sensitive to physical damage.
- Make sure that your buoyancy control is good and secure gauges, regulators, torches and other equipment to avoid damaging animals and plants attached to the sea bed or smothering them in clouds of sand or mud.
- Take pictures underwater only when you have become a competent diver and are able to control your buoyancy and your movements precisely. As you would normally use flash, limit the number of photographs of individual animals.
- Be aware that your trapped exhaust air can kill marine life in caves, caverns and wrecks. Minimise your time in such places.
- When night diving, be careful not to dazzle and disturb fish. Use the edge of the beam rather than pointing the torch directly at animals.

See **A Guide to Best Practice for Watching Marine Wildlife** for more detailed advice on different species groups.

The law

Protection of wildlife

Many forms of marine wildlife are protected by law. This Code does not attempt to explain it all but highlights the most relevant measures. You can find further information on wildlife and the law on the **SNH website**.

For birds it is an offence to intentionally or recklessly kill, injure or take any wild bird, or take, damage, destroy, obstruct or interfere with any wild bird's nest whilst being built or in use, or their eggs It is also illegal to possess any wild bird alive or dead, or part of one, or any egg.

Certain wild birds (those on Schedule 1 of the Wildlife and Countryside Act 1981(as amended)) are also protected from disturbance during breeding (whilst they are building or using their nest) or disturbance to their dependent young.

Nests habitually used by white-tailed eagle and golden eagle are protected at all times from intentional or reckless taking, damage, interference, etc. It is also an offence to intentionally or recklessly harass these birds.

For other animals it is an offence:

- To deliberately or recklessly disturb or harass any whale, dolphin, porpoise, marine turtle or otter, or intentionally or recklessly do so to a basking shark.
- To deliberately or recklessly capture, kill or injure any marine turtle, whale, dolphin, porpoise, or otter, or intentionally or recklessly kill, injure or take a basking shark.
- To damage or destroy a breeding site or resting place of any marine turtle, whale, dolphin, porpoise or otter.
- To deliberately or recklessly obstruct access to any structure or place used by an otter for shelter or protection.
- To possess, sell or offer for sale any marine turtle, whale, dolphin, porpoise, basking shark or otter or any part of these animals.
- To knowingly cause or permit any of the above offences.
- To intentionally or recklessly kill, injure or take any live seal at any time.
- To intentionally or recklessly harass seals at designated **haul-out sites**.

Marine European Protected Species Guidance gives comprehensive advice for marine users who are planning to carry out an activity in the marine environment which has the potential to kill, injure or disturb a European protected species (EPS).

It is also an **offence** to uproot any wild plant unless this is accidental or permission has been given by the owner or occupier of the land. Further, it is illegal to intentionally or recklessly pick, uproot or destroy certain plants even with such permission.

The Partnership for Action Against Wildlife Crime Scotland (**PAW Scotland**) represents a wide range of bodies concerned with the prevention of crimes against wildlife.

Access to beaches and the foreshore

Rights of responsible access came into effect in 2005 under Part 1 of the Land Reform (Scotland) Act 2003 (as amended). **The Scottish Outdoor Access Code** sets out how these rights can be exercised and managed responsibly. Exercising access rights responsibly is about making informed decisions about what is reasonable to do in everyday situations. You need to be aware that, whilst you may only visit a place occasionally and feel that you cause no harm, the land manager and the environment may have to cope with the cumulative effects of many people. Acting with awareness and common sense underpins responsible behaviour.

Access rights to Scotland's beaches and coastline are very important as many people enjoy these places. For the public, access rights extend to beaches and the foreshore. Follow any local guidance, for example aimed at reducing dune or machair erosion or at avoiding disturbance of nesting birds. Public rights on the foreshore include fishing for sea fish, lighting fires, beachcombing, swimming, playing and picnicking.

Land managers can work with their local authority and other bodies to help facilitate and manage access. Local information, including signs indicating recommended routes and temporary (timed) restrictions on access, should always be agreed between land managers, representative bodies, conservation authorities and/or local access authorities. Under Section 29 of the 2003 Act, SNH may put up signs asking you to avoid a specific area or route in order to protect the natural heritage.

For further information about your access rights visit
www.outdooraccess-scotland.com

What to do if you think an offence has been committed

If you witness or become aware of a wildlife crime being committed then you should do one of the following:

- If the incident is ongoing and there is a threat to health or property – contact Police Scotland on 999 or 112. Give details to the Service Centre Adviser. The nearest unit will attend the scene.
- If the incident is historical or is ongoing but does not pose a threat to health or property – contact Police Scotland on 101. Ask to speak to a Wildlife Crime Liaison Officer (WCLO). If a WCLO is not available, give details to the Service Centre Adviser. Record the incident number.
- If the incident involves an injured animal that is suffering – contact the Scottish SPCA on 03000 999 999.

The Partnership for Action Against Wildlife Crime (**PAW**) website provides more information on what to do if you think an offence has been committed, what to look for, and who to report to.

Scottish Natural Heritage

Scottish Natural Heritage (SNH) is a government body responsible to the Scottish Government and, through them, to the Scottish Parliament.

Our mission

All of nature for all of Scotland

Our aim

Scotland's natural heritage is a local, national and global asset. We promote its care and improvement, its responsible enjoyment, its greater understanding and appreciation and its sustainable use now and for future generations.

Our operating principles

We work in partnership, by co-operation, negotiation and consensus, where possible, with all relevant interests in Scotland: public, private and voluntary organisations, and individuals.

We operate in a devolved manner, delegating decision-making to the local level within the organisation to encourage and assist SNH to be accessible, sensitive and responsive to local needs and circumstances.

We operate in an open and accountable manner in all our activities.

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https://twitter.com/SNH_Tweets
https://scotlandsnature.wordpress.com

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Scottish Natural Heritage
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Nàdar air fad airson Alba air fad

Appendix 16B – Piling Marine Mammal Observation Forms

PILING OPERATIONS

MARINE MAMMAL RECORDING FORM - OPERATIONS

Regulatory reference number: **Ship/ platform name:**

Complete this form every time piling (vibro and impact) operations commences or ends.
Times should be in UTC, using the 24-hour clock.

Date	**Activity Type** **pv** = vibro piling **pi** = impact piling	**Time soft start/ ramp-up began**	**Start Time of full power**	**Time of reduced output** (if relevant)	**Time Activity Stopped**	**Time pre-activity search began**	**Time search ended**	**Time PAM observation began**	**Time PAM observation ended**	**Was any mitigating action required?** (yes/ no)

PILING OPERATIONS

MARINE MAMMAL RECORDING FORM - EFFORT

Regulatory reference number: **Ship/ platform name**:

Record the following for all watches, even if no marine mammals are seen.

START A NEW LINE IF SOURCE ACTIVITY OR WEATHER CHANGES. ENTER DATA AT LEAST EVERY HOUR.

Date	**Visual watch or PAM** (v/ p)	**Observer's/ operator's name(s)**	**Time of start of section of watch** (UTC, 24hr clock)	**Time of end of section of watch** (UTC, 24hr clock)	**Activity Type** (pv /pi)	**Activity level** (f/ s/ r/ n/ v)	**Position** (latitude and longitude)	**Depth** (m)	**Wind dir'n**	**Wind force** (B'fort scale)	**Sea state** (g/ s/ c/ r)	**Swell** (o/ m/ l)	**Vis.** (visual watch only) (p/ m/ g)	**Sun glare** (visual watch only) (n/ wf/ sf/ vf/ wb/ sb/ vb)	**Precip.** (n/ l/ m/ h/ s)

Visual watch or PAM: v = visual watch; p = PAM
Activity type: pi = impact piling, pv = vibro piling
Activity level: f = full power; s = soft start; r = reduced power (not soft start); n = not active; v = variable (e.g. tests)
Sea state: g = glassy (like mirror); s = slight (no/ few white caps); c = choppy (many white caps); r = rough (big waves, foam, spray)
Swell: o = low (< 2 m); m = medium (2-4 m); l = large (> 4 m)
Visibility: p = poor (< 1 km); m = moderate (1-5 km); g = good (> 5 km)
Sun glare: n = none; wf = weak forward; sf = strong forward; vf = variable forward; wb = weak behind; sb = strong behind; vb = variable behind
Precipitation: n = none; l = light rain; m = moderate rain; h = heavy rain; s = snow

PILING OPERATIONS

MARINE MAMMAL RECORDING FORM - SIGHTINGS

Regulatory reference number	**Ship/ platform name**	**Sighting number** (start at 1 for first sighting of survey)	**Acoustic detection number** (start at 500 for first detection of survey)
Date:		**Time at start of encounter** (UTC, 24hr clock)	**Time at end of encounter** (UTC, 24hr clock)

Were animals detected visually and/ or acoustically?	**How were the animals first detected?**
□ visual □ acoustic □ both	□ visually detected by observer keeping a continuous watch □ visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ both visually and acoustically before operators/ observers informed each other

Observer's/ operator's name	**Position** (latitude and longitude)	**Water depth** (metres)

Species/ species group	**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow; characteristics of whistles/ clicks)
Bearing to animal (when first seen or heard) (bearing from true north)	**Range to animal** (when first seen or heard) (metres)

Total number	**Number of adults** (visual sightings only)	**Number of juveniles** (visual sightings only)	**Number of calves** (visual sightings only)	**Photograph taken**
				ϒ yes ϒ no

Behaviour (visual sightings only)

Direction of travel (relative to site)		**Direction of travel** (compass points)	
ϒ towards source	ϒ variable	ϒ N	ϒ W
ϒ away from source	ϒ milling	ϒ NE	ϒ NW
ϒ crossing perpendicular (in channel swimming E↔W)	ϒ stationary	ϒ E	ϒ variable
	ϒ other	ϒ SE	ϒ stationary
ϒ unknown		ϒ S	ϒ unknown
		ϒ SW	
Activity Type (pi, pv):			

Activity level when animals first detected	**Activity level when animals last detected**	**Time animals entered 500m mitigation zone** (UTC, 24hr clock)	**Time animals left 500m mitigation zone** (UTC, 24hr clock)
□ full power □ not active □ soft start □ reduced power (other than soft start)	□ full power □ not active □ soft start □ reduced power (other than soft start)	**Closest distance of animals from source activity** (metres)	**Time of closest approach** (UTC, 24hr clock)

If seen during soft start give:	**What action was taken?** (according to requirements of guidelines/ regulations in country concerned)	**Length of power-down and/ or shut-down** (if relevant) (length of time until subsequent soft start, in minutes)
First distance **Closest distance** **Last distance** during soft start (metres)	□ none required □ delay start □ shut-down of active source □ power-down of active source □ power-down then shut-down of active source	

Appendix 16C – Spoil Disposal Marine Mammal Observation Forms

SPOIL DISPOSAL OPERATIONS

MARINE MAMMAL RECORDING FORM - OPERATIONS

Regulatory reference number **Ship/ platform name**

Complete this form every time dredging, piling (vibro and impact), revetment removal or revetment construction commences/ends.
Times should be in UTC, using the 24-hour clock.

Date	**Activity Type**	**Time Disposal Start**	**Time Disposal End**	**Time pre-disposal search began**	**Time search ended**	**Was any mitigating action required?** (yes/ no)
	Dredge Disposal					
	Dredge Disposal					
	Dredge Disposal					
	Dredge Disposal					
	Dredge Disposal					
	Dredge Disposal					
	Dredge Disposal					
	Dredge Disposal					
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	Dredge Disposal					
	Dredge Disposal					
	Dredge Disposal					
	Dredge Disposal					
	Dredge Disposal					
	Dredge Disposal					
	Dredge Disposal					

SPOIL DISPOSAL OPERATIONS

Regulatory reference number **Ship/ platform name**

Record the following for all watches, even if no marine mammals are seen.

START A NEW LINE IF DISPOSAL ACTIVITY OR WEATHER CHANGES. ENTER DATA AT LEAST EVERY HOUR.

Date	**Observer's name(s)**	**Time of start of section of watch** (UTC, 24hr clock)	**Time of end of section of watch** (UTC, 24hr clock)	**Activity Type**	**Disposal in Progress** (Y/N)	**Start Position** (latitude and longitude)	**Start Depth** (m)	**End Position** (latitude and longitude)	**End Depth** (m)	**Vessel Speed** (knots)	**Wind dir'n**	**Wind force** (B'fort scale)	**Sea state** (g/ s/ c/ r)	**Swell** (o/ m/ l)	**Vis.** (visual watch only) (p/ m/ g)	**Sun glare** (visual watch only) (n/ wf/ sf/ vf/ wb/ sb/ vb)	**Precip.** (n/ l/ m/ h/ s)
				Dredge disposal													
				Dredge disposal													
				Dredge disposal													
				Dredge disposal													
				Dredge disposal													
				Dredge disposal													
				Dredge disposal													
				Dredge disposal													
				Dredge disposal													
				Dredge disposal													
				Dredge disposal													
				Dredge disposal													
				Dredge disposal													
				Dredge disposal													

Sea state: g = glassy (like mirror); s = slight (no/ few white caps); c = choppy (many white caps); r = rough (big waves, foam, spray)
Swell: o = low (< 2 m); m = medium (2-4 m); l = large (> 4 m)
Visibility: p = poor (< 1 km); m = moderate (1-5 km); g = good (> 5 km)
Sun glare: n = none; wf = weak forward; sf = strong forward; vf = variable forward; wb = weak behind; sb = strong behind; vb = variable behind
Precipitation: n = none; l = light rain; m = moderate rain; h = heavy rain; s = snow

SPOIL DISPOSAL OPERATIONS

MARINE MAMMAL RECORDING FORM - SIGHTINGS

Regulatory reference number	**Ship/ platform name**	**Sighting number** (start at 1 for first sighting of survey)

Date:	**Time at start of encounter** (UTC, 24hr clock)	**Time at end of encounter** (UTC, 24hr clock)

How were animals detected?	**How were the animals first detected?**
□ Visually □ Acoustically □ Both	□ visually detected by observer keeping a continuous watch □ visually spotted incidentally by observer or someone else □ acoustically detected by PAM □ detected both visually and acoustically before MMO/PAM warned each other.

Observer's name	**Position** (latitude and longitude)	**Water depth** (metres)

Species/ species group	**Description** (include features such as overall size; shape of head; colour and pattern; size, shape and position of dorsal fin; height, direction and shape of blow)
Bearing to animal (when first seen bearing from true north)	**Range to animal** (when first seen metres)

Total number	**Number of adults**	**Number of juveniles**	**Number of calves**	**Photograph taken**
				ϒ yes ϒ no

Behaviour

Direction of travel (relative to vessel)

- ϒ towards ship
- ϒ away from ship
- ϒ parallel to ship in same direction as ship
- ϒ parallel to opposite direction to ship
- ϒ crossing perpendicular ahead of ship
- ϒ variable
- ϒ milling
- ϒ stationary
- ϒ other
- ϒ unknown

Direction of travel (ANIMAL) (compass points)

- ϒ N
- ϒ NE
- ϒ E
- ϒ SE
- ϒ S
- ϒ SW
- ϒ W
- ϒ NW
- ϒ variable
- ϒ stationary
- ϒ unknown

Activity Type: *Dredging Disposal*

Was the barge disposing when animals first seen?	**Was the barge disposing when animals last seen?**	**Time animals entered 200m mitigation zone** (UTC, 24hr clock)	**Time animals left 200m mitigation zone** (UTC, 24hr clock)
□ Y □ N	□ Y □ N	**Closest distance of animals from vessel** (metres)	**Time of closest approach** (UTC, 24hr clock)

What action was taken? (according to requirements of guidelines/ regulations in country concerned)	**Length of delay in disposal?** (if relevant) (length of time until subsequent disposal)
□ None required □ Delay disposal	

Construction Environmental Management Document	
Section Number	17
Section Title	Programming
Issue	1B
Issue Date	20/01/22
Author	Kirsty Macdonald
Approved	Fiona Henderson

Document History		
Issue	Date	Reason for Change
1A	20/04/21	Document Issue to Tenderers for Comment
1B	20/01/22	Document for Issue to Regulators – End of year dredge and piling reports added. Timescale for incident reports added.

Contents

17 Programming

17.1 Introduction

This section lays out both the construction programme and the reporting programme for the Deep Water Port development.

17.2 Construction Programme

The construction programme should consider the need to minimise disturbance to both human and ecological receptors. The construction programme is provided in Appendix 17A.

17.3 Reporting Programme

Table 17.1 details the environmental reports expected to be produced throughout the project, their timing, who is responsible and the regular distribution. The Project Team includes Stornoway Port Authority, NEC Project Manager and Supervisor, IECoW and the Principal Contractor's Site Manager, Contracts Manager and ECoW. It is acknowledged that the licencing bodies can request copies of any report during the project, however they would not routinely be sent all reports.

Table 17.1: Environmental Reporting Programme

Report	Timing/Frequency	Responsibility	Distribution
Incident / Non-conformance Reports	In event of an incident or near miss.	Principal Contractor	Project Team and potentially relevant regulators.
Independent Investigation Reports	After an environmental event or incident requiring independent investigation. Within 10 days of Incident.	IECoW	Project Team and potentially relevant regulators.
Investigation Reports	After an environmental event or incident requiring further investigation. Within 10 days of Incident.	Principal Contractor's ECoW	Project Team and potentially relevant regulators.
Environmental Audits	Daily/Weekly/ Monthly as per Section 5.	IECoW/ Principal Contractor's ECoW	Project Team
Dredging Report	January each year and within 28 days of completing dredging.	Principal Contractor Site Supervisor	Project Team then Marine Scotland
Waste and Material Management Reports	Monthly	Principal Contractor	Project Team
In-air Noise Monitoring Reports	As completed see Section 12.	ECoW	Project Team

Report	Timing/Frequency	Responsibility	Distribution
Marine Mammal Observation and Piling Reports to support Marine Noise Registry Submission	January each year and End of Works	Principal Contractor's ECoW	IECoW then JNCC & Marine Scotland Science
Marine Construction Close Out Report including Quantities of materials utilised.	End of Works	Principal Contractor's ECoW	Project Team then Marine Scotland

Appendix 17A – Programme

PROGRAMME TO BE PROVIDED BY PRINCIPAL CONTRACTOR

Construction Environmental Management Document	
Section Number	18
Section Title	Schedule of Mitigation
Issue	1B
Issue Date	20/10/21
Author	Kirsty Macdonald
Approved	Fiona Henderson

Document History		
Issue	Date	Reason for Change
1A	20/04/21	Document Issue to Tenderers for Comment
1B	20/10/21	Updated to include reduced seal mitigation zone to align with marine construction licences (MS-00008749 & MS-00008748). Minor format changes.

Contents

18 Schedule of Mitigation

The Schedule of Mitigation for the Stornoway Deep Water Port, as identified through the EIAR process is provided in Table 18.1. This will be implemented along with relevant best practice as discussed in Section 2 of this document.

Table 18.1: Schedule of Mitigation – Construction Mitigation

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
C.01	Landscape and Visual	Visual impacts	Detailed design, and construction planning will ensure that the design mitigation of minimising the rock extraction to that required for the construction only.		EIAR Chapter 5 Section 5.7.1 PPiP 19/00273	n/a
C.02	Landscape and Visual	Visual impacts	In siting buildings on the levelled/reclaimed platform, ensure their exact location benefits from the best possible screening provided by surrounding landform.		EIAR Chapter 5 Section 5.7.2	n/a
C.03	Landscape and Visual	Visual impacts	The buildings should be simple in appearance with façades coloured to reflect the backdrop of rock and moorland.		EIAR Chapter 5 Section 5.7.2	n/a
C.04	Landscape and Visual	Visual impacts	Where logistically feasible, locate any built development, above ground infrastructure and storage away from the water's edge		EIAR Chapter 5 Section 5.7.2	n/a
C.05	Marine Mammals	Marine Mammals	Marine Mammal and Basking Shark Protection Plan to be implemented		EIAR Chapter 7 Section 7.6 EIAR Chapter 8 Section 8.6	16.2
C.06	Marine Mammals Fish Ecology (specifically Basking Shark)	Marine Mammals Fish Ecology (specifically Basking Shark) Piling	The impact piling marine mammal mitigation will provide the following measures: • A 500m mitigation zone will be established around the piling rig for cetaceans and basking shark, whilst a 100m mitigation zone will be applied to seals and otters; • Trained marine mammal observers (MMO) will conduct a 20min pre-watch prior to the commencement of piling operations;		EIAR Chapter 7 Section 7.6.1 EIAR Chapter 8 Section 8.6 Marine Construction	16.2.4

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
			○ If the 500m mitigation zone for cetaceans and basking shark and the 100m mitigation zone for seals and otters remains clear during the watch, permission will be given to commence piling; but ○ If a marine mammal is sighted within the mitigation zone(s), piling will be delayed until the zone has been clear of marine mammals for at least 10min. ○ A 30minute soft start-up for 123cm and 80cm diameter king piles is required to protect HF hearing receptor groups; and ○ A soft start-up is not required for the piling of the heavy load area 30cm diameter piles. • If conditions are unsuitable for visual observations (darkness, fog reducing visibility to <500m, or sea states >Beaufort 4); passive acoustic monitoring (PAM) will be utilised by a trained PAM operator to monitor the mitigation zone; ○ A PAM watch of the mitigation zone will have a minimum duration of 20min; • Once piling has commenced there will be no requirement to stop works if a marine mammal enters the mitigation zone, as long as piling has been continuous, with no breaks exceeding 10min; • If a break in piling operations exceeds 10min the following conditions will apply: ○ During a break in piling operations, the noise generator will be utilised to produce sound at lower pressures to deter marine mammals away from the construction area and maintain a soft start procedure. Should the noise generator fail to be utilised for whatever reason, an		Licence (MS-00008749)	

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
			MMO/PAM operator will be on watch during the break. The MMO/PAM operator will remain on watch during the break with or without the noise generator. ○ If an MMO/PAM operator has been on watch during the break, with or without the utilisation of the noise generator, if the mitigation zone remains clear of marine mammals, piling can recommence immediately; ○ If an MMO/PAM operator has been on watch during the break, with or without the noise generator running, and a marine mammal is observed within the mitigation, piling will not recommence until the zone has been clear of marine mammals for at least 10min; and ○ If no marine mammal observations have been conducted during a break exceeding 10min and without the noise generator running, a 20min pre-watch will be conducted before piling can recommence, as detailed above. • All MMO/PAM operations will be recorded using the JNCC marine mammal reporting forms template and submitted to Marine Scotland once the works are complete.			
C.07	Marine Mammals Fish Ecology (specifically Basking Shark)	Spoil Disposal Marine Mammals Fish Ecology (specifically Basking Shark)	The dredged spoil disposal marine mammal and basking shark mitigation will provide the following measures: • A 200m mitigation zone will be established around the disposal vessel during disposal for marine mammals and basking shark. • A mitigation zone is placed around the vessel as opposed to the disposal site as the vessel will be in transit during disposal;		EIAR Chapter 7 Section 7.6.2 EIAR Chapter 8 Section 8.6	16.2.4

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference

			• Trained marine mammal observers (MMO) will conduct a 20min pre-watch prior to the commencement of spoil disposal, either on board the disposal vessel or from land;
			  ○ If the 200m mitigation zone for marine mammals and basking shark is clear, then MMO will give permission to proceed.; and
			  ○ If a marine mammal or basking shark is sighted within the mitigation zone, disposal will be delayed until the zone has been clear of marine mammals for at least 5min.
			• If conditions are unsuitable for visual observations (darkness, fog reducing visibility to <300 on-board the vessel and <700m from the observation point on land, or sea states >Beaufort 4); passive acoustic monitoring (PAM) will be utilised by a trained PAM operator to monitor the mitigation zone;
			  ○ A PAM watch of the mitigation zone will have a minimum duration of 20min;
			  ○ If a marine mammal is detected within the mitigation zone during a PAM watch, disposal will be delayed until the zone has been clear of marine mammals for at least 10min.
			• All MMO/PAM operations will be recorded using the JNCC marine mammal reporting forms template and submitted to Marine Scotland once the works are complete.			

C.08	Marine Mammals	Marine Mammals	All vessels to comply with the Scottish Marine Wildlife Watching Code.	Scottish Marine Wildlife	EIAR Chapter 7 Section 7.6	16.2.4 16A

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
				Watching Code (SNH, 2017)		10.10
C.09	Benthic Ecology	Benthic Species on Sections of Wreck for Relocation	Divers will be briefed before the wreck removal to attempt to relocate individual organisms likely to be affected by the wreck section relocation works prior to them commencing.		EIAR Chapter 9 Section 9.6	16.3.1
C.10	Benthic Ecology	Benthic Species in Dredge Area	The dredging will be carried out utilising positioning technology to ensure only the required dredge area is dredged and further impacts on benthic species are minimised.		EIAR Chapter 9 Section 9.6	16.3.1
C.11	Terrestrial Ecology	Permanent Loss of Habitat	Minimise the area of the habitats to be removed. Rock armour revetments will be installed replacing coastal habitats used by otter. Replacement tree planting to minimise loss of woodland. (Replacement tree planting to be completed post construction, hence not included in CEMD).		EIAR Chapter 10 Section 10.6	S11A (section 5) 16.4.4
C.12	Terrestrial Ecology	Habitat Disturbance	Turves removed in soil stripping will be used to seal exposed peat where practicable to prevent heathland and/or shrub habitats from drying out. Mitigation is incorporated into the construction design to help retain water in the remaining flush and spring habitats.		EIAR Chapter 10 Section 10.6	S11A (section 7) S16.8.4

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
C.13	Terrestrial Ecology	Non-native Invasive Species	Pre-construction surveys will be undertaken to identify any non-native invasive species in the onshore construction area. Exclusion zones around rhododendron found in or adjacent to the construction site. Removal of rhododendron if required, following appropriate methodology. All equipment will arrive clean to site.		EIAR Chapter 10 Section 10.6	S11A (section 7) S16.9.2 16.10
C.14	Terrestrial Ecology	Otter	Pre-construction surveys. EPS licence sought if required. Development of Species Protection Plan (SPP). Minimise area and duration of disturbance. Artificial lighting within the site should only be used where required to light works sites and for safety reasons and should be directional towards the required works area. Measures to prevent entrapment.		EIAR Chapter 10 Section 10.6	16.4.4 17.2
C.15	Terrestrial Ecology	Bats	Pre-construction surveys. EPS licence sought if required. Development of Species Protection plans (SPP). Minimise area and duration of disturbance.		EIAR Chapter 10 Section 10.6	16.5.4 17.2

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
			Artificial lighting within the site should only be used where required to light works sites and for safety reasons and should be directional towards the required works area.			
C.16	Terrestrial Ecology	Amphibians and Reptiles	Pre-construction surveys. Development of Species Protection plans (SPP). Seasonal considerations when timing works where practical. Translocation of reptiles to suitable receptor site if required. Minimise area and duration of disturbance. Avoidance of hibernacula outwith active season where practicable. Watching briefs.		EIAR Chapter 10 Section 10.6	16.6.4
C.17	Terrestrial Ecology	Birds	Pre-construction surveys. Ongoing watching brief during breeding bird season. Development of Species Protection plans (SPP). Seasonal considerations when timing works where practical. Exclusion zones around any nests found. Minimise area and duration of disturbance. Artificial lighting within the site should only be used where required to light works sites and for safety reasons and should be directional towards the required works area.		EIAR Chapter 10 Section 10.6	16.7.4
C.18	Terrestrial Ecology	Habitat Disturbance or Loss of Ground	Installation of impermeable membrane to protect remaining habitat and encourage formation of new habitat.		EIAR Chapter 10 Section 10.6	16.8.4

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
		Water Dependent Terrestrial Ecosystems	Installation of SuDS.			
C.19	Underwater Noise	Piling	The use of vibro hammers to drive the piles to refusal prior to using impact piling techniques.		EIAR Chapter 11 Chapter 7 Section 7.5	16.2.4
C.20	Noise and Vibration (In-Air)	Control of In-Air Noise Impacts at all times of day	Applicable best practice techniques as identified in Section 8 of BS5228: • Ensure regular maintenance of all equipment used on site, including maintenance related to noise emissions; • Ensure that vehicles and vessels are loaded carefully to ensure minimal drop heights so as to minimise noise during this operation; and • Ensure that machines are shut down between work periods or throttled down to a minimum.		EIAR Chapter 12 Section 12.5.1	14.2
C.21	Noise and Vibration (In-Air)	Noise Impacts	A protocol for handling any noise related complaints will be contained within a Construction Environmental Management Document (CEMD), this will be applicable for all noise complaints but of particular use in addressing any concerns associated with dredging.		EIAR Chapter 12 Section 12.5.1	14.2
C.22	Noise and Vibration (In-Air)	Noise Impacts associated with Dredging	Dredging of areas to the north of the dredge area will be carried out during the day whenever practicable.		EIAR Chapter 12 Section 12.5.1	10.10 14.2
C.23	Noise and Vibration (In-Air)	Noise Impacts associated with Dredging	Prior to night-time dredging in the north of the dredge area (if required), the NSR likely to be affected will be informed.		EIAR Chapter 12 Section 12.5.1	14.2

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
C.24	Noise and Vibration (In-Air)	Noise Impacts associated with Dredging	Noise monitoring during dredge activities will be carried out to understand the actual noise levels arising at receptors.		EIAR Chapter 12 Section 12.5.1	14.2
C.25	Noise and Vibration (In-Air)	Noise Impacts associated with Blasting	Restriction of blasting as far as practicable to regular daytime periods, not on Sundays and away from public holidays.		EIAR Chapter 12 Section 12.5.1	14.2
C.26	Noise and Vibration (In-Air)	Noise Impacts associated with Blasting	Good community relations; informing nearby noise/vibration sensitive receptors ahead of periods of blasting		EIAR Chapter 12 Section 12.5.1	14.2
C.27	Noise and Vibration (In-Air)	Noise Impacts associated with Blasting	The choice of appropriate drilling rigs.		EIAR Chapter 12 Section 12.5.1	14.2
C.28	Noise and Vibration (In-Air)	Noise Impacts associated with Blasting	Designing blasts to maximize efficiency and reduce the transmission of noise/vibration.		EIAR Chapter 12 Section 12.5.1	14.2
C.29	Cultural Heritage and Archaeology	Archaeology – '*Alabama*' Wreck	A Method Statement detailing the proposed scope and methodology of the 'After' dismantling survey with regard to the archaeological elements of the wreck site will be developed. The survey and subsequent recording would be undertaken in accordance with the 36 Rules governing the management of underwater cultural heritage assets contained in the Manual for Activities directed at Underwater Cultural Heritage: Guidelines to the Annex of the UNESCO 2001 Convention (MAUCH) (UNESCO, 2013).	Policy GEN 6, paragraph 4.24 and 4.25 of the SNMP (Scottish Government, 2015). MAUCH (UNESCO, 2013)	EIAR Chapter 13 Section 13.6.1.1	9

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
			The results of the surveys and further research into the history of the '*Alabama*' will be presented in a report, in accordance with paragraph 4.24 of the Scottish National Marine Plan SNMP (Scottish Government, 2015), providing detailed information on the significance of the wreck, as well as recording and presenting evidence of that significance in a publicly accessible report.			
C.30	Cultural Heritage and Archaeology	Archaeology	In accordance with Conditions 14 and 15 of the Planning Permission in Principle (PPiP, 19/00273) an archaeological watching brief, preceded by a Method Statement to be approved by the CnES Archaeologist, shall be undertaken during ground-breaking construction works. The CnES Archaeologist shall also be granted access to inspect any construction works and to monitor the watching brief.		EIAR Chapter 13 Section 13.6.1.2 PPiP 19/00273	9
C.31	Water Environment, Soils and Coastal Processes	Increased sediment loading	The start of each activity that could give rise to increased sediment loading in the water column will be observed, to ensure that any plumes arising are localised and disperse quickly as they occur.		EIAR Chapter 14 Section 14.6.1	10.10 & 13A: Pollution Prevention Plan
C.32	Water Environment, Soils and Coastal Processes	Increased sediment loading.	Where increases in sediments are not as predicted, the construction technique will be reviewed to identify areas for improvement to prevent reoccurrence.		EIAR Chapter 14 Section 14.6.1.1	10.9.2 & 13A: Pollution Prevention Plan
C.33	Water Environment, Soils and	Increased sediment loading.	Implementation of Sustainable urban Drainage System (SuDS) as per the design.	The SuDS Manual (CIRIA, 2015)	EIAR Chapter 14 Section 14.6.1.1	13A: Pollution Prevention Plan

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
	Coastal Processes		Temporary surface water management requirements will be identified in the RAMS.		Simple CAR Licence (CAR/S/SEPA2021-883)	13.3.1 and 13A: Pollution Prevention Plan
C.34	Water Environment, Soils and Coastal Processes	Potential loss of containment: fuel on site.	Fuel bowsers on site will be under strict management controls, in compliance with the requirements of the relevant GBR's.	The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended).	EIAR Chapter 14 Section 14.6.1.2	10.3
C.35	Water Environment, Soils and Coastal Processes	Potential loss of containment: fuel on site.	Refuelling will be carried out in designated areas, by trained operatives following site refuelling procedures. The refuelling procedure will take into account best practice laid out in GPP2 and PPG6.	PPG6: Work at Construction and Demolition Sites (Environmental Agency, NIEA, & SEPA, 2012) GPP2: Above Ground Oil Storage Tanks (SEPA,	EIAR Chapter 14 Section 14.6.1.2	10.3

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
				NIEA, & Wales, 2017).		
C.36	Water Environment, Soils and Coastal Processes	Potential loss of containment: oils and chemicals on site.	Where practicable, bio-degradable hydraulic fluids will be utilised in machinery during construction.		EIAR Chapter 14 Section 14.6.1.2	7A & 10.3
C.37	Water Environment, Soils and Coastal Processes	Potential loss of containment: oils and chemicals on site.	All oils and chemicals will be subject to Control of Substances Hazardous to Health (COSHH) assessments under the COSHH Regulations 2002.		EIAR Chapter 14 Section 14.6.1.2	7A & 10.4
C.38	Water Environment, Soils and Coastal Processes	Potential loss of containment: oils and chemicals on site.	All COSHH assessments will include a section on the environment to highlight any precaution or mitigation requirements.		EIAR Chapter 14 Section 14.6.1.2	7A & 10.4
C.39	Water Environment, Soils and Coastal Processes	Potential loss of containment: oils and chemicals on site.	Appropriately bunded oil and chemical storage cabinets will be provided on site. These will be kept locked, with the key under management control to ensure appropriate use and accountability.	PPG6: Work at Construction and Demolition Sites (Environment	EIAR Chapter 14 Section 14.6.1.2	7A, 10.3 & 10.4

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
				al Agency et al., 2012)		
C.40	Water Environment, Soils and Coastal Processes	Potential loss of containment: oils and chemicals on site.	Appropriate spill plans aligned to the pollution control hierarchy and spill kits will be in place, construction operatives will be trained in the plans and in the use of spill kits.	GPP21: Pollution Incident Response Plans (NIEA, 2017)	EIAR Chapter 14 Section 14.6.1.2	7A
C.41	Water Environment, Soils and Coastal Processes	Cement washings.	Cement washings will be carried out in a dedicated area.	PPG6: Work at Construction and Demolition Sites (Environment al Agency et al., 2012)	EIAR Chapter 14 Section 14.6.1.2	8.3 & 13A: Pollution Prevention Plan
C.42	Water Environment, Soils and Coastal Processes	Cement washings.	Washing arisings will be collected for onsite treatment. This will include settlement and, if required, pH correction. If not suitable for reuse liquids will be tankered off site for appropriate disposal. The solids will be disposed of as solid waste.	PG6: Work at Construction and Demolition Sites (Environment al Agency et al., 2012)	EIAR Chapter 14 Section 14.6.1.2	8.3 & 13A: Pollution Prevention Plan

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
C.43	Water Environment, Soils and Coastal Processes	Introduction of non-native marine species.	Contractors will be required to ensure all plant and equipment brought to site is properly cleaned prior to arrival.		EIAR Chapter 14 Section 14.6.1.3	16.9.2
C.44	Water Environment, Soils and Coastal Processes	Introduction of non-native marine species.	All equipment will be inspected prior to mobilisation on site; any equipment carrying excessive sediment deposits will be returned to the supplier.		EIAR Chapter 14 Section 14.6.1.3	16.9.2
C.45	Water Environment, Soils and Coastal Processes	Litter	Prior to construction works on site commencing, a litter sweep will be conducted to prevent the escape of existing litter on site into the marine environment.		EIAR Chapter 14 Section 14.6.1.4	8.4
C.46	Water Environment, Soils and Coastal Processes	Litter	All personnel working on the project will undertake site induction; this will include a section on waste management and the use of the waste receptacles provided.		EIAR Chapter 14 Section 14.6.1.4	8.4
C.47	Water Environment, Soils and Coastal Processes	Litter	Waste receptacles will be covered, and littering will not be tolerated.		EIAR Chapter 14 Section 14.6.1.4	8.4 8.5

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
C.48	Water Environment, Soils and Coastal Processes	Litter	Construction staff will be encouraged to collect any litter they see in the construction areas and, if deemed necessary litter sweeps will be carried out.		EIAR Chapter 14 Section 14.6.1.4	8.4
C.49	Water Environment, Soils and Coastal Processes	Litter	The use of single use plastics will be discouraged, reusable water bottles supplied to all personnel and reusable crockery and cutlery will be provided in the welfare facilities.		EIAR Chapter 14 Section 14.6.1.4	8.2.1
C.50	Water Environment, Soils and Coastal Processes	Litter	All generated waste will be segregated to facilitate appropriate recycling.		EIAR Chapter 14 Section 14.6.1.4	8.2.3
C.51	Water Environment, Soils and Coastal Processes	Litter	Staff will be encouraged to collect any litter they see on site, and if deemed necessary litter sweeps will be carried out.		EIAR Chapter 14 Section 14.6.1.4	8.4
C.52	Water Environment, Soils and Coastal Processes	Peat Removal	A Peat Management Plan is to be developed, details of which are to be agreed with Comhairle nan Eilean Siar (CnES) in consultation with Scottish Environment Protection Agency (SEPA).		EIAR Chapter 14 Section 14.6.1.5 Chapter 10 Section 10.6	11 & 11A : Peat Management Plan

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
					19/00273, Condition 7(4)	
C.53	Traffic and Transport	Road Safety and Condition	Undertake a Road Condition Survey prior to any commencement of construction works no later than 2 weeks before the anticipated start date in line with Condition 9 of the PPiP from CnES.		EIAR Chapter 15 Section 15.4.1 PPiP 19/00273	15.2
C.54	Traffic and Transport	Road Safety and Navigation	Traffic management plan to monitor the traffic movements associated with the construction of the development in line with Condition 10 of the PPiP from CnES.		EIAR Chapter 15 Section 15.4.1 & 15.4.2 PPiP 19/00273	15.2
C.55	Air Quality	Air Quality - Dust	Dust mitigation plan to be implemented.	Guidance on the assessment of dust from demolition and construction (IAQM, 2014).	EIAR Chapter 16 Section 16.3	10.7 12
C.56	Air Quality	Air Quality - Dust	Appropriate planning to minimise the number of times dust emitting material is moved.		EIAR Chapter 16 Section 16.3	10.8
C.57	Socio-economics	Creation of construction jobs	Encourage local supply chain involvement in the project.		EIAR Chapter 16 Section 16.2	

No.	Topic	Aspect	Mitigation/Enhancement	Guidance	Source	CEMD Section Reference
C.58	Navigation	Increase in collision risk during construction due to construction/ dredge vessels.	Appropriate Notice to Mariners placed. Compliance with the Port Safety Management System. Good communications with the Harbour Master.		EIAR Chapter 16 Section 16.4	
C.59	Navigation	Additional vessel movements in the harbour area, leading to additional navigational safety issues.	Navigational aids agreed with the Northern Lighthouse Board prior to installation.		EIAR Chapter 16 Section 16.4	
C.60	Population & Human Health	Spread of communicable disease	All government guidance to be followed. Risk assessments to have particular regard for infection control. Working patterns for visiting workforce to take account of relevant guidance.		EIAR Chapter 16 Section 16.5	
C.61	Materials & Waste	Materials	Use of local materials where available.		EIAR Chapter 16 Section 16.6	10.8
C.62	Materials & Waste	Waste	Waste hierarchy to be implemented. All relevant waste legislation to be followed.		EIAR Chapter 16 Section 16.6	8.2

18.1 References

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18.2 Glossary

Acronym	Definition
CAR	Controlled Activities Regulations
CEMD	Construction Environmental Management Document
CnES	Comhairle nan Eilean Siar
DWP	Deep Water Port
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
GPP	Guidance on Pollution Prevention
IECoW	Independent Environmental Clerk of Works
MMO	Marine Mammal Observers
PAM	Passive Acoustic Monitoring
PPG	Pollution Prevention Guidance
PPiP	Planning Permission in Principle
RAMS	Risk Assessment Method Statement
SEPA	Scottish Environment Protection Agency
SPA	Stornoway Port Authority
SoM	Schedule of Mitigation