Orkney's Community Wind Farm Project - Faray

Marine Licence Dredging Application

Best Practicable Environmental Option (BPEO) Assessment

1 Introduction

1.1 Overview

1.1.1 'Orkney's Community Wind Farm Project' includes three potential Council-owned wind farm sites - one on Faray, another in Hoy in the area around Wee Fea, and one at Quanterness in St Ola. All three projects are currently in the planning process. Each site has the potential capacity for six turbines at up to 149.9 m to tip height and a generating capacity of circa 28.8 MW per site.

1.1.2 This Best Practicable Environmental Option (BPEO) assessment accompanies the dredging marine licence application submitted to the Marine Scotland Licensing Operations Team (MS-LOT) for the marine infrastructure associated with Orkney's Community Wind Farm Project - Faray (the Proposed Development). Specifically, under the Marine (Scotland) Act 2010, a marine licence is required for dredging works associated with the installation of the following infrastructure:

- The development of a new extended slipway (to replace the existing facility which is badly damaged); and
- A new landing jetty designed to accommodate vessels carrying abnormal loads, such as the wind turbine components necessary for the Proposed Development.

1.1.3 A separate marine licence application has been submitted for the construction works below Mean High Water Springs (MHWS) for the new infrastructure.

1.1.4 In addition to the marine licences, a planning application will be submitted for the onshore aspects of the Proposed Development, namely the onshore wind turbines and associated onshore infrastructure. One Environmental Impact Assessment (EIA) Report has been prepared to accompany the planning application and marine licence applications to ensure the impacts of the Proposed Development are assessed as a whole.

1.2 Purpose of this Report

1.2.1 This report presents the BPEO assessment for disposal of dredging materials associated with the new extended slipway and landing jetty associated with the Proposed Development.

1.2.2 BPEO is defined by The European Commission (2008) as follows:

"a rigorous and systematic methodology for identifying and evaluating different options (technical, environmental, organisational, economic, etc.) for achieving the strategic objectives. In this context, the BPEO may be defined as "the option (or combination of options) which, in meeting the strategy objectives, minimises the overall adverse impacts on the environment at an acceptable cost""

1.3 Proposed Development

1.3.1 The Proposed Development is seeking to improve access to the island of Faray in Orkney's North Isles by replacing the existing slipway with a new extended slipway and installing a separate landing jetty. Access to Faray is currently taken from a small slipway located to the south of the island. This slipway is in a dilapidated condition and currently only suitable for small landing craft style vessels. The installation of a new extended slip and new landing jetty will ensure general continued access to Faray and would facilitate future development, such as the Proposed Development.

1.3.2 Localised dredging will be required to construct both structures, there may also be some localised channel dredging to allow vessel access to the landing jetty.

1.3.3 The exact vessel requirements are not known at the time of writing as construction contractors would not be appointed until post consent. Thus, the infrastructure dimensions and associated dredging volumes provided are the maximum requirements based on the largest vessel sizes the structures could support.

1.3.4 The location of the new extended slipway and landing jetty is provided in Figure 1 which accompanies this marine licence application, with dredging details shown in Figure 2.

New Extended Slipway

1.3.5 The new slipway would provide general access to the island, including access for construction equipment and vehicles, allowing preliminary site works for the Proposed Development to be undertaken.

1.3.6 The new slipway will be constructed first, the existing slipway will be used for deliveries of construction materials via landing craft. The extended slipway will be a maximum of 36m long and 8m wide. It will be built in the same location as the existing slipway. The design will enable easier access by larger vessels than the current slipway can accommodate and would be built to a standard design for Orkney, to allow access for local vessels.

1.3.7 The slipway has been designed to accommodate local vessels up to the size of the OIC reserve ferry, the MV Thorsvoe (35 m by 10 m, 385 gross tonnage, Marine Traffic, 2021).

Landing Jetty

1.3.8 The landing jetty would facilitate the delivery of abnormal loads which cannot be accommodated by the slipway to the island, such as large wind turbine components for the Proposed Development.

1.3.9 The landing jetty will comprise a causeway of up to 55m long and 10m wide, terminating in a structure for docking, measuring up to 20m by 20m. The square docking structure would likely be infilled and capped off with concrete batched on-site.

1.3.10 The landing jetty has been designed to accommodate vessels up to the size of the MV Meri (105.4 m by 18.8 m, 3,360 gross tonnage – Marine Traffic, 2021).

2 Dredging Requirements

2.1 Summary

2.1.1 Capital dredging will occur in two areas, details provided below, and areas illustrated in Figure 2:

- **Dredge Area A:** Up to 600 m^3 (774 tonnes based on an average specific gravity of 1.290 g/cm^3) will be dredged (maximum of 1 m depth) to allow for construction of the new extended slipway.
- **Dredge Area B:** Up to 2,400m^3 (3,096 tonnes based on an average specific gravity of 1.290 g/cm^3) will be dredged (maximum of 1 m depth) to allow for construction of the new landing jetty. This includes channel dredging to allow for abnormal load vessel access.

2.1.2 Please see the method statement which accompanies the marine licence application for further details on the dredging operations.

2.2 Sediment Composition and Quality

2.2.1 A diver sediment collection survey and geotechnical site investigation survey was completed by Leask Marine Limited on 24 March 2021 to obtain surface sediment samples. Using handheld cores, sediment cores within the footprint of the dredge area were collected (Figure 2).

2.2.2 A sediment sampling plan was shared with MS-LOT and was approved as being suitable and sufficient for the Proposed Development. A copy of the sample plan and MS-LOT approval has been provided as part of this marine licence application.

2.2.3 Sediment samples were then sent to a certified laboratory (James Hutton Limited) for chemical and physical analysis. Four seabed sediment samples were obtained, the sediment sample analytical report is provided as part of this marine licence application with a summary provided below. Further details are also provided in Chapter 17 of the EIA Report.

Particle Size Analysis (PSA)

2.2.4 Details of the sediment samples are provided in Table 2.1. The Particle Size Analysis (PSA) shows that the sediment present are almost entirely made up of sands, which range from very fine sand up to very coarse sand, but in general mostly fine-medium sand. There are very low amounts of fine material (silts and clays) within the sediment samples. Sample 1 recorded <1% of materials over 2mm, which is classed as pebbles, cobbles and boulders, however, the maximum size is <3mm.

Table 2.1 – Sediment samples

Sample name	Location (see Figure 2)	Specific gravity (g/cm³)	Particle Size Analysis (See Appendix 1 of Sediment Sample Analytical Report)		
			Clay and Silt (< 0.063 mm)	Sand (0.063 ≤ Sand < 2.0 mm)	Pebbles, Cobbles & Boulders (≤ 2.0 mm)
1	Landing jetty (353394.4733, 1035899.3635)	1.418	0%	99%	<1%
2	Landing jetty (353415.6010, 1035873.4006)	1.203	<1%	99%	0%
3	Landing jetty (353428.2314, 1035867.8760)	1.180	<1%	99%	0%
4	Slipway (353357.7594, 1035798.0301)	1.360	<1%	99%	0%
Average		1.290	<1%	99%	<1%

Heavy Metals and Organotins

2.2.5 Concentrations of heavy metals were found to be low at all four sample locations. The average concentration of each metal and organotin (averaged from the four samples taken) is shown in Table 2.2 and an assessment made against each Marine Scotland Action Level (AL) ((Marine Scotland, 2017) or Canadian Sediment Quality Guidelines (CSQG) (CCME, 2001) criteria. In the case of CSQG criteria, the temporary effect level (TEL) is used as levels are very low and would not require assessment against the permanent effect level (PEL).

2.2.6 Levels of heavy metals and organotins contaminants were very low, or below the levels of detection (for mercury and tributyltin) and are therefore not of concern.

Table 2.2 - Average Metals and Organotin Concentrations and Assessment Against ALs and CSQG

Contaminant	Average sediment concentration (mg/kg)	Assessment against criteria (AL and CSQG given in brackets in mg/kg)
Arsenic (As)	1.63	Below AL1 (20) and below TEL (7.24)
Cadmium (Cd)	0.045	Below AL1 (0.4) and below TEL (0.7)
Chromium (Cr)	5.45	Below AL1 (50) and below TEL (52.3)
Copper (Cu)	0.833	Below AL1 (30) and below TEL (18.7)
Mercury (Hg)	<LOD	Below AL1 (0.25) and below TEL (0.13)
Nickel (Ni)	2.82	Below AL1 (30). There is no TEL for Nickel
Lead (Pb)	0.92	Below AL1 (50) and below TEL (30.2)
Zinc (Zn)	3.98	Below AL1 (130) and below TEL (124)
Tributyltin	<LOD	Below AL1 (0.1)

Polyaromatic Hydrocarbons

2.2.7 Levels of polyaromatic hydrocarbons (PAH) were generally found to be below the level of detection (LOD) for all analysed PAHs, except for naphthalene (average of two samples of 6.5 µg/kg) and phenanthrene (one sample of 5 µg/kg), which were present just over the LOD.

2.2.8 The AL1 for PAHs is 100 µg/kg. As such the levels detected for the two chemicals identified above are an order of magnitude lower than the AL1. The corresponding CSQG TEL is 34.6 µg/kg (naphthalene) and 86.7 (phenanthrene), for the two chemicals that were detected above the LOD.

2.2.9 Levels of PAH contaminants were very low, or below the levels of detection and are therefore not of concern.

Polychlorinated Biphenyls

2.2.10 Levels of polychlorinated biphenyls (PCB) were all found to be below the level of detection, and are therefore not of concern.

Organochlorine/Organophosphorus Pesticide

2.2.11 Overall, samples were not found to contain detectable pesticides. One sample (Location 1) did contain detectable levels of tributylamine. This compound is reported to be used as an insecticide besides having other uses. Overall, the levels of pesticides are therefore not of concern.

3 Disposal Options Assessment

3.1.1 The Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (Scottish Government, 2016) (hereinafter referred to as "the Plan") states that *"dredging within the Pentland Firth and Orkney Waters area will be supported by the Plan where: dredged material is recycled or disposed of in appropriate locations"*.

3.1.2 The following disposal options have been identified and assessed for the dredged materials:

- Option 1: Re-use On-site
- Option 2: Re-use Off-site
- Option 3: Disposal at Sea
- Option 4: Disposal to Landfill

3.2 Option 1: Re-use On-site

3.2.1 The construction of the onshore turbines and associated infrastructure will require materials to be shipped to site. Coarser dredged material (e.g. rock, gravel and sand) may be suitable for land reclamation on site. Finer sediments (fine sand, silt and clay) are, generally, not suitable for construction use.

3.2.2 In general, the re-use of dredged material for reclamation is a sustainable and efficient method of disposing of the material arising from the capital dredging. There would be no need for transport of the material off-site, resulting in less vessel movements (and associated emissions and vessel costs). In addition, re-use on-site is in line with the recycling requirements of the Plan.

3.2.3 As discussed in Chapter 12 of the EIA Report, materials for the majority of the works associated with the construction of the access track and crane hardstands for the Proposed Development will be won from on-site borrow pits. Material for the initial works, will, however need to be imported from quarries on the Mainland of Orkney.

3.2.4 Some initial works will be required at site to allow for the installation of the new extended slipway and landing jetty. As such material import would be undertaken prior to construction of the marine infrastructure. In addition, volumes of dredged material are relatively low (up to 3,870 tonnes) so would require to be supplemented with borrow pits and material import.

3.2.5 The PSA shows that the sediment present are almost entirely made up of sands, which range from very fine sand up to very coarse sand, but in general mostly fine-medium sand. Fine sand is, usually, not suitable for re-use in construction, therefore, it's unclear how much of the dredged material would actually be viable for use on the site. Finer dredged sediment that cannot be used on site would require disposal off-site, either at a sea disposal site or landfill.

3.2.6 Re-use on-site is, therefore, not considered to be the BPEO in this instance.

3.3 Option 2: Re-use Off-site

3.3.1 Similar to Option 1, coarser dredged may be suitable for land reclamation off-site, however, finer sediment is not usually suitable.

3.3.2 The use of the dredged material in construction for projects within Orkney is technically feasible, however, it is likely to require considerable handling and reworking on site. There are transport implications associated with both vessels and subsequent road use to the identified site of use, resulting in atmospheric emissions. Furthermore, it is not known how much of the dredged material would be suitable for re-use, as discussed in Section 3.2.

3.3.3 Given the small volume of fine to medium sand that will be dredged, handling work required and the additional vessel and road traffic emissions, re-use off-site is not considered to be the BPEO in this instance.

3.4 Option 3: Disposal at Sea

3.4.1 Disposal would be at a designated sea disposal site. As shown on Marine Scotland's National Marine Plan interactive (NMPi) map (Marine Scotland, 2021), there are four operational at sea dredge disposal sites in Orkney, with Stromness A the closest to, and preference for, the Proposed Development. Designated sea disposal sites are selected based on a number of criteria including their location in relation to amenities and other uses of the sea in the area, economic and

operational feasibility and physical, chemical and biological characteristics (Scottish Government, 2011).

3.4.2 The disposal of material at sea can generate sediment plumes that can adversely affect fish, shellfish and other marine species. However, as discussed in Section 2, sediment analysis shows that levels of contaminants within the dredged materials are likely to be very low. In addition, volumes are relatively small (up to 3,870 tonnes) so are unlikely to result in significant impacts to the surrounding marine environment. Residual currents within the area are relatively strong, according to BEIS (2016) tidal streams, which vary from 0.25 to 0.5m/s over much of the northern North Sea, are in excess of 1.0m/s on the Orkney-Shetland Platform. This will assist with plume dispersion. In addition, as noted above, the disposal site has been selected based on its physical chemical and biological characteristics to accommodate disposal.

3.4.3 Given the relatively small volume of dredged material disposed, the localised and temporary plume will be a sufficient distance from the nearest nature conservation site to not cause impacts, the Hoy Special Protection Area (SPA) located approximately 2.2km to the southeast (Marine Scotland, 2021).

3.4.4 In terms of disposal contributions, according to Marine Scotland (2019) statistics, 4.2 million tonnes of dredge material was disposed of at sea in 2018. The maximum 3,780 tonnes associated with the Proposed Development represents a very small proportion of this, at ~0.1%.

3.4.5 Therefore, sea disposal at Stromness A is not considered to present significant impacts to the marine environment.

3.4.6 As discussed above, it is not clear how much of the dredged materials are actually suitable for re-use due to the presence of fine sand. As such, disposal at sea or to landfill would likely be required, regardless. Disposal to landfill is not deemed BPEO as discussed in Section 3.5.

3.4.7 Disposal at sea would still require vessel movements from the Proposed Development to the disposal site, however, would not require onward road transport, as required for Option 2. Furthermore, as discussed in Section 3.2, Option 1 is not viable for the Proposed Development with disposal still likely for finer materials along with material import and borrow pits still being required. As such, Option 3 is deemed the BPEO in this instance.

3.5 Option 4: disposal to landfill

3.5.1 Disposal to landfill would require more handling and transport (via additional road traffic) of the dredged material than disposal at sea, resulting in increased safety risks and atmospheric emissions. As such it is not deemed the BPEO in this instance.

4 Conclusions

4.1.1 Sediment sampling and analysis has been undertaken to inform this BPEO. This showed that the sediment present within the Proposed Development area is almost entirely made up of sands, which range from very fine sand up to very coarse sand, but in general mostly fine-medium sand. The analysis also showed that levels of contaminants within the dredged materials are likely to be very low.

4.1.2 Four options for dredged material disposal were assessed to identify the BPEO for the Proposed Development; Option 1: Re-Use on site, Option 2: Re-Use Off-site, Option 3: Disposal at Sea and Option 4: Disposal at Landfill.

4.1.3 As there is fine sediment present, it is not clear how much of the dredged material would be suitable for re-use on-site or off-site at a different development. Furthermore, due to the relatively small volumes dredged (up to 3,870 tonnes), material import and borrow pits would still be required on site. As such re-use on site is not deemed the BPEO for the Proposed Development.

4.1.4 Re-use off-site would require additional handling works and road traffic movements once transported off-site. Due to the relatively small volumes and fine nature of the sediment, along with

the additional road traffic emissions, re-use off-site is not deemed the BPEO for the Proposed Development.

4.1.5 Disposal to landfill would result in more handling and transport (via additional road traffic) of the dredged material than disposal at sea, resulting in increased safety risks and atmospheric emissions. As such it is not deemed the BPEO in this instance.

4.1.6 Disposal at sea can generate sediment plumes that can adversely affect fish, shellfish and other marine species. However, the sediment sample analysis shows that contaminant levels within the dredged materials are likely to be very low. In addition, dredged volumes are relatively low and dredged material would be disposed of at a designated site where the plume would rapidly disperse and of sufficient distance to any protected areas. Disposal is highly likely even if re-use on-site were to be implemented as finer sand is not suitable for construction. Thus, Option 3: Disposal at Sea is deemed the BPEO in this instance.

5 References

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