Port of Dundee: EPS Risk Assessment

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1 Introduction

WildLife Consulting Ltd were commissioned by Fairhurst to complete a marine European Protected Species (EPS) Licence application on behalf of their Client Port of Dundee Limited as part of a project to redevelop the Port of Dundee.

Consultation with Marine Scotland Science (MSS) and NautreScot (formally Scottish Natural Heritage) has confirmed the need for the procurement of an EPS licence in addition to the Marine Licence for the project (Ref: 00008483) in order to ensure legal compliance with disturbance to marine EPS and to set out measures to mitigate disturbance and safeguard these species. This EPS Risk Assessment considers the risks associated with piling works associated with Port of Dundee.

1.1 Development Context

The application site is located along the northern banks of the River Tay, within the Port of Dundee, which is operated by the Port of Dundee Limited who are also the statutory Harbour Authority. The Port of Dundee comprises of 1,600m of quayside and currently has 6 working berths. It provides services for the North Sea oil and gas industry, construction industry, paper pulp and forest products along with a wide range of general and bulk cargoes. £40 million is being invested into various redevelopments within the port, including a new quayside to support the decommissioning of offshore oil and gas equipment and the assembly of offshore wind farm infrastructure, which the Port of Dundee has a strong presence in, due to its strategic location.

1.2 Licensable Activity

The proposed new quay will generally be a suspended open quay front with revetment below, which will act to dissipate wave action and facilitate marine operations. The quay piles will be driven in position by vibro hammer and finally by impact piling, although impact driving will be limited to no more than 4 hours in any 24 hour period.

2 Species

Based on consultation with SNH and Marine Scotland and a review of the existing literature surrounding marine EPS[i], there are four marine EPS with the potential to be present in the vicinity of the Port of Dundee: bottlenose dolphin *Tursiops truncatus*, white-beaked dolphin *Lagenorhynchus albirostris*, harbour porpoise *Phocoena phocoena*, and minke whale *Balaenoptera acutorostrata*. Below are brief descriptions of their distribution populations in relation to the development site and works.

2.1 Bottlenose dolphin

Bottlenose dolphin are relatively cosmopolitan in their distribution and are found in a variety of suitable habitats globally. In Europe, the Moray Firth Special Area of Conservation (SAC) hosts the only known resident population in the North Sea. This population is highly mobile and are found as south as the Firth of Forth, highlighting that individuals from the Moray Firth SAC population may be in transit and/or foraging within the vicinity of Dundee. The Moray Firth population is estimated at 200 animals[ii].

2.2 White-beaked dolphin

White-beaked dolphin are endemic to the North Atlantic and are typically found in waters between 50-100m deep. While usually encountered offshore, white-beaked dolphins have been encountered inshore on the east coast of Scotland. The site lies within Region C of the Small Cetaceans in the European Atlantic and North Sea (SCANS) study area [iii] and the white-beaked dolphin population estimate for this region is 2,351 animals.

2.3 Harbour porpoise

The distribution of harbour porpoise is restricted to temperature and sub-arctic seas of the Northern Hemisphere, and in the context of the UK, are most abundant around the Scottish coast and the northeast of England. The site lies within Region C of the Small Cetaceans in the European Atlantic and North Sea (SCANS) study area [iv] and the harbour porpoise population estimate for this region is 16,939 animals.

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[i] Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters - https://data.marine.gov.scot/dataset/regional-baselines-marine-mammal-knowledge-across-north-sea-and-atlantic-areas-scottish

[ii] Quick, N. Arso, M. Cheney, B. Islas, V. Janik, V. Thompson, P and Hammond, P (2014). The east coast of Scotland bottlenose dolphin population: Improving understanding of ecology outside the Moray Firth SAC. Sea Mammal Research Unit and Aberdeen University.

[iii] Small Cetaceans in the European Atlantic and North Sea (SCANS-III)https://synergy.st-andrews.ac.uk/scans3

[iv] Small Cetaceans in the European Atlantic and North Sea (SCANS-III)https://synergy.st-andrews.ac.uk/scans3

2.4 Minke whale

In the UK, minke whales are distributed mainly around Scotland and in the northern and central North Sea. Inshore sightings of this species generally peak in July and August. The site lies within Region C of the Small Cetaceans in the European Atlantic and North Sea (SCANS) study area [v] and the minke whale population estimate for this region is 1,073 animals.

[v] Small Cetaceans in the European Atlantic and North Sea (SCANS-III)https://synergy.st-andrews.ac.uk/scans3

3 Legislative Context

Whales, dolphins, and porpoises are protected under The Habitats Regulations 1994, which implement certain requirements of the European Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna) in Great Britain. Animals listed in Annex IV(a) of the Habitats Directive, whose natural range includes any area in Great Britain, are also listed in Schedule 2 of the Habitats Regulations as European protected species (EPS) of animals. They are species of European Community interest in need of strict protection (Marine Scotland, 2014).

Marine Scotland (2014) state: "*Considerations to exempt from the requirement of these species protection provisions are available in certain specified circumstances, provided that:*

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

These are often referred to as 'The Three Tests' and each test is considered below in relation to the Port of Dundee project.

3.1 Test 1 – Licensable Purpose

Without an EPS licence there is the risk of a legislative breach of the Habitats Directive via piling works associated with the development resulting in disturbance to EPS. Hence the reason that during the consultation process NatureScot and Marine Scotland Science requested the applicant apply for a marine EPS licence.

3.2 Test 2 – Satisfactory Alternatives

The Climate Change Bill places a legislative requirement on the Scottish Government to be net-zero by 2050. To meet this target there will need to be the extensive provision of green energy with a primary source of this being offshore wind of significant scale. The Port of Dundee is strategically located on the east coast of Scotland between Aberdeen and the Central Belt and is, therefore, very well positioned to provide a service to facilitate the construction of offshore wind turbines. Due to the size and scale of the proposed offshore wind turbines, Scottish Ports, including the Port of Dundee, need to adapt and provide facilities to cater for demand which will ultimately facilitate the construction of offshore wind turbines and contribute to the requirement to be net-zero by 2050.

The first project of many to benefit from the proposed development at the Port of Dundee will be the assembly of all 54 turbines for the approved Neart Na Gaoithe (NnG) offshore wind farm. This has triggered a proposed £40m investment by the Port of Dundee itself which includes the proposals subject to this EPS Licence. Therefore, the proposal to not undertake the works would mean that the substantial social and economic investment in Dundee would not be realised.

Consideration was given to a closed structure for the existing Caledon East Wharf, but this would result in the loss of a large area of intertidal foreshore, which was considered unacceptable. The closed face would also require the driving of close spaced large diameter steel piles. The optimal solution was considered to reduce the number of piles and utilise an open deck, similar to the

existing quay, although with an adjusted alignment to facilitate the new vessel alignments. Utilising alternatives to driven piles was considered but were discounted on various grounds. The use of caissons was determined to be unsuitable due to the environmental and wave climate on the berth making use of the new facilities by vessels unsafe. Bored piles were considered to remove the need for pile driving but the installation of bored piles through the open tidal section of the quay would require steel pile casings to be driven which would result in marginal reductions in environmental disturbance from pile driving but would also introduce additional and longer duration construction activities which may result in an overall increase in environmental impact from the works.

The eventual solution of driven steel piles was reviewed to ensure that the optimum pile size and number were utilised to reduce the diameter and driving energy, compared against the number of piles to be installed.

Overall the design of the facility has been undertaken to remove any works that are not essential, to reduce the extent of the essential works and to utilise only works that have a minimal impact.

3.3 Test 3 – Maintenance of Favourable Conservation Status of Marine EPS in their Natural Range

Each of the four marine species considered in this Risk Assessment travel large distances and the development site and associated 500m marine mammal mitigation zone covers a fraction of their range. The implementation of the mitigation measures set out in Section 5 as outlined in the HRA and committed to within the Marine licence (conditions 19-25), which are designed to safeguard these species from harm, will help ensure that Favourable Conservation Status is maintained for all four marine EPS considered in this assessment.

4 Impacts

4.1 Noise

Noise generated by the piling works has potential to result in both direct and indirect impacts to marine EPS. These impacts have been considered below.

Cetacean responses to acoustic effects are known to show species-specific and individual variation based on a wide range of acoustic properties including sound pressure, frequency and duration of exposure[vi]. Additionally, cetaceans may suffer auditory injury from sounds that fall out with their hearing range. Quantifying definite impacts on a particular species is therefore hard to achieve however some of the impacts, which can be caused by exposure of Marine EPS to underwater noise include (Marine Scotland, 2014):

- Direct injury (e.g., collision, entanglement, hearing damage- including temporary or permanent threshold shifts);
- Disturbance and displacement;
- Exclusion from foraging areas;
- Barrier effect;
- Habitat loss or degradation;
- Indirect effects on prey;
- Changes in distribution;
- Disruption of communication, migration, breathing, breeding, nursing, feeding or resting;
- Excessive use of energy leading to loss of condition (caused by continual or repeated
- avoidance or flight); and
- Increased vulnerability of an individual or population to predators or physical stress.

Cetaceans can be classified into three functional hearing groups based on auditory sensitivity (Marine Scotland, 2014):

- Low Frequency (7 Hz – 22 kHz), all baleen whales e.g. humpback whales, minke whales;
- Medium Frequency (150 Hz – 160 kHz), e.g. dolphins; and
- High Frequency (200 Hz – 180 kHz), e.g. harbour porpoises.

The threshold injury and behavioural response criteria proposed by Southall et al (2007) are listed in Appendix A (Threshold Criteria) however the figures stated must be used conservatively, as they are derived from responses of individual cetaceans to specific sources of underwater sound.

4.2 Duration and frequency

The licenced works and associated sounds are expected to occur between October 2020 and June 2022, with impact piling limited to a maximum of four hours within a 24 hour period.

[vi] Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene, Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. (2007) Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic Mammals 33:411-521

Although the exact piling hammers are yet to be confirmed the output has been described by the piling contractor as 115dB at 5m from the source. Based on this, the noise level during piling is not expected to reach levels where any significant marine EPS avoidance (i.e. beyond the 500m mitigation zone) would be expected.

5 Mitigation

The licenced works are located where marine EPS exposure to anthropogenic noise will be limited due to low source levels of sound and low occurrence of marine EPS in close proximity to the works. However, mitigation will still be implemented to further reduce the risk to a residual level that is safe to proceed with the works.

These measures are as follows:

The JNCC 2010 protocol for minimising risk of injury to marine mammals from piling noise ("JNCC Piling Protocol") is to be followed at all times in connection with the undertaking of the works as far as it is practical to do so.

When undertaking impact piling, Marine Mammal Observers (MMO) are to be used.

A mitigation zone with a radius of 500 metres is to be utilised by the MMO in accordance with the JNCC Piling Protocol.

Impact piling will not be carried out in poor or adverse weather or light conditions such that the MMO is unable to observe marine mammals within the 500m mitigation zone.

Soft start procedures will be employed as per section 2.4 of the JNCC Piling Protocol.

Impact piling is restricted to 4 hours in any 24 hour period."

Full details of 'soft start' measures are compliant with the JNCC piling protocol[vii] (notably sections 2.4 – and 2.5 for breaks in piling) are contained in the Piling Protocol Method Statement for the project (Appendix B).

[vii] JNCC (2010). Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise.

6 Summary

In summary, provided the mitigation measures set out above are followed and piling works are undertaken under a Marine EPS licence, then the three licensable tests can be satisfied and there will be legal compliance with the Habitats Directive in relation to marine EPS. Under these circumstances, the conclusion of this risk assessment is that appropriate measures have been take to safeguard marine EPS.

7 Appendices

7.1 Appendix A – Threshold Criteria

Proposed injury criteria for individual marine mammals exposed to 'discrete' noise events (either single or multiple exposures within a 24-hr period) (Southall et al., 2007)

Table 3. Proposed injury criteria for individual marine mammals exposed to "discrete" noise events (either single or multiple exposures within a 24-h period; see Chapter 2)

Marine mammal group	Sound type		
	Single pulses	Multiple pulses	Nonpulses
Low-frequency cetaceans	Cell 1	Cell 2	Cell 3
Sound pressure level	230 dB re: 1 μPa (peak) (flat)	230 dB re: 1 μPa (peak) (flat)	230 dB re: 1 μPa (peak) (flat)
Sound exposure level	198 dB re: 1 μPa^2-s (M_{lf})	198 dB re: 1 μPa^2-s (M_{lf})	215 dB re: 1 μPa^2-s (M_{lf})
Mid-frequency cetaceans	Cell 4	Cell 5	Cell 6
Sound pressure level	230 dB re: 1 μPa (peak) (flat)	230 dB re: 1 μPa (peak) (flat)	230 dB re: 1 μPa (peak) (flat)
Sound exposure level	198 dB re: 1 μPa^2-s (M_{mf})	198 dB re: 1 μPa^2-s (M_{mf})	215 dB re: 1 μPa^2-s (M_{mf})
High-frequency cetaceans	Cell 7	Cell 8	Cell 9
Sound pressure level	230 dB re: 1 μPa (peak) (flat)	230 dB re: 1 μPa (peak) (flat)	230 dB re: 1 μPa (peak) (flat)
Sound exposure level	198 dB re: 1 μPa^2-s (M_{hf})	198 dB re: 1 μPa^2-s (M_{hf})	215 dB re: 1 μPa^2-s (M_{hf})
Pinnipeds (in water)	Cell 10	Cell 11	Cell 12
Sound pressure level	218 dB re: 1 μPa (peak) (flat)	218 dB re: 1 μPa (peak) (flat)	218 dB re: 1 μPa (peak) (flat)
Sound exposure level	186 dB re: 1 μPa^2-s (M_{pw})	186 dB re: 1 μPa^2-s (M_{pw})	203 dB re: 1 μPa^2-s (M_{pw})
Pinnipeds (in air)	Cell 13	Cell 14	Cell 15
Sound pressure level	149 dB re: 20 μPa (peak) (flat)	149 dB re: 20 μPa (peak) (flat)	149 dB re: 20 μPa (peak) (flat)
Sound exposure level	144 dB re: (20 $\mu Pa)^2$-s (M_{pw})	144 dB re: (20 $\mu Pa)^2$-s (M_{pw})	144.5 dB re: (20 $\mu Pa)^2$-s (M_{pw})

Note: All criteria in the "Sound pressure level" lines are based on the peak pressure known or assumed to elicit TTS-onset, plus 6 dB. Criteria in the "Sound exposure level" lines are based on the SEL eliciting TTS-onset plus (1) 15 dB for any type of marine mammal exposed to single or multiple pulses, (2) 20 dB for cetaceans or pinnipeds in water exposed to nonpulses, or (3) 13.5 dB for pinnipeds in air exposed to nonpulses. See text for details and derivation.

Proposed behavioural response criteria for individual marine mammals exposed to various sound types; specific threshold levels are proposed for single pulses (Southall et al., 2007)

Table 5. Proposed behavioral response criteria for individual marine mammals exposed to various sound types; specific threshold levels are proposed for single pulses. See the referenced text sections and tables for severity scale analyses of behavioral responses to multiple pulses and nonpulses.

Marine mammal group	Sound type		
	Single pulses	Multiple pulses	Nonpulses
Low-frequency cetaceans	Cell 1	Cell 2[1]	Cell 3[6]
Sound pressure level	224 dB re: 1 μPa (peak) (flat)	Tables 6 & 7	Tables 14 & 15
Sound exposure level	183 dB re: 1 μPa^2-s (M_{lf})	Not applicable	Not applicable
Mid-frequency cetaceans	Cell 4	Cell 5[2]	Cell 6[7]
Sound pressure level	224 dB re: 1 μPa (peak) (flat)	Tables 8 & 9	Tables 16 & 17
Sound exposure level	183 dB re: 1 μPa^2-s (M_{mf})	Not applicable	Not applicable
High-frequency cetaceans	Cell 7	Cell 8[3]	Cell 9[8]
Sound pressure level	224 dB re: 1 μPa (peak) (flat)	[Tables 18 & 19]	Tables 18 & 19
Sound exposure level	183 dB re: 1 μPa^2-s (M_{hf})	Not applicable	Not applicable
Pinnipeds (in water)	Cell 10	Cell 11[4]	Cell 12[9]
Sound pressure level	212 dB re: 1 μPa (peak) (flat)	Tables 10 & 11	Tables 20 & 21
Sound exposure level	171 dB re: 1 μPa^2-s (M_{pw})	Not applicable	Not applicable
Pinnipeds (in air)	Cell 13	Cell 14[5]	Cell 15[10]
Sound pressure level	109 dB re: 20 μPa (peak) (flat)	Tables 12 & 13	Tables 22 & 23
Sound exposure level	100 dB re: (20 $\mu Pa)^2$-s (M_{pw})	Not applicable	Not applicable

[1] "Low-Frequency Cetaceans/Multiple Pulses (Cell 2)" section
[2] "Mid-Frequency Cetaceans/Multiple Pulses (Cell 5)" section
[3] "High-Frequency Cetaceans/Multiple Pulses (Cell 8)" section
[4] "Pinnipeds in Water/Multiple Pulses (Cell 11)" section
[5] "Pinnipeds in Air/Multiple Pulses (Cell 14)" section
[6] "Low-Frequency Cetaceans/Nonpulses (Cell 3)" section
[7] "Mid-Frequency Cetaceans/Nonpulses (Cell 6)" section
[8] "High-Frequency Cetaceans/Nonpulses (Cell 9)" section
[9] "Pinnipeds in Water/Nonpulses (Cell 12)" section
[10] "Pinnipeds in Air/Nonpulses (Cell 15)" section