Uig Harbour Redevelopment

European Protected Species Licence Application Supporting Information

Marine Mammal Risk Assessment

The Highland Council

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1. Introduction

This report presents supporting information as part of a European Protected Species (EPS) licence application by The Highland Council (THC) for the Uig Harbour Redevelopment (hereafter referred to as 'the Proposed Development').

The Proposed Development consists of a series of upgrades to the existing infrastructure at Uig Harbour, in order to accommodate the new larger ferry vessel which CalMac Ferries Ltd. (CFL) is seeking to operate from the harbour.

Uig Harbour is located in Uig Bay on the west coast of the Trotternish Peninsula in the north east of the Isle of Skye. The Pier at Uig Harbour, named King Edward Pier, serves the CalMac ferry route to the isles of Harris and North Uist and is currently used by the existing ferry service, commercial fishermen, boat day trips, etc. The Pier is under the control of Highland Harbours which is run by THC, whilst the ferry service operations are controlled by CFL.

Increasing demand and ageing tonnage has led the ferry operator to commission new, larger ferry vessels for a number of its routes. The Skye Triangle has been identified as a priority and the procurement of a new vessel for this route has commenced. The new vessel which will operate from Uig will be one of a new generation dual-fuel vessels currently under construction for Caledonian Maritime Assets (CMAL), with the capacity to use either Marine Gas Oil (MGS) or Liquefied Natural Gas (LNG).

Construction works required for the Proposed Development include in-water piling at several different locations including the marshalling area, the approachway and around the ferry berth. Impact piling and vibro-piling has the potential to produce underwater sound and disturb cetacean in the area

The Proposed Development site is located close to two marine areas designated for marine mammals: Inner Hebrides and the Minches Special Area of Conservation (SAC), located at approximately 1.1 km; and Ascrib, Isay and Dunvegan SAC, located at approximately 8 km.

2. Additional Application Information

2.1 Question 4 - Consideration of Designated Sites

The location of the Proposed Development and the nearest designated and protected sites are shown in **Figure A1 (Appendix A)**.

The following marine designated areas are considered:

- Inner Hebrides and the Minches Special SAC; and
- Ascrib, Isay and Dunvegan SAC.

Correspondence has been received from Scottish National Heritage (SNH) in relation to designated areas. SNH have confirmed their opinion that the proposal will not adversely affect the integrity of the sites if undertaken in accordance with the proposed project description and mitigations.

A copy of the correspondence with SNH relating to the impact of the Uig Harbour Redevelopment on designated sites, received on the 26th of April (ref 06909/06910), is attached in **Appendix B**.

2.2 Question 7 – Satisfactory Alternatives

Alternatives considered for the Proposed Development, including a description of how the design of the project has evolved are described in the following sections.

2.2.1 Alternative 1: 'Do Nothing Scenario

It was considered that the 'do nothing' scenario would result in unacceptable reductions in the operability and vessel turnaround times of the new vessel, therefore, it would result in unacceptable reduction in reliability of this life line service. The following concerns relating to the ongoing feasibility of the current Uig Harbour layout were identified:

- Whilst the new vessel would geometrically fit the infrastructure and linkspan orientation, the berth would still require dredging works and strengthening works to maintain the structural integrity. Without the dredging works, the compromised water level would result in a tidally effected service;
- Passenger and vehicle marshalling and access facilities were not considered suitable or sufficient for the increased vehicle and passenger numbers expected as a result of the new vessel;
- The current infrastructure does not provide facilities for LNG fuel use;
- Environmental conditions (wave/wind) currently affecting the berth would also be expected to impact the reliable operation of the new vessel.

2.2.2 Alternative 2: 'Do Minimum' Scenario

In 2012 engineering designers were asked to review the current infrastructure and to give consideration to the identification of the 'do minimum' approach required to accommodate a new vessel at Uig harbour. At this stage the design of the new vessel was not known. The 'do minimum approach' identified included the provision of an increased marshalling area requiring land reclamation; a new ticket office; and a passenger walkway to and from the ferry.

2.2.3 Alternative 3: Uig Harbour Redevelopment Masterplan (2017)

The Highland Council (THC), Caledonian Maritime Assets (CMAL) and CalMac Ferries Ltd (CFL) recognise that the current ferry terminal is at its operational limit, particularly with respect to the current vessel turnaround time and vehicle throughput. A master-planning exercise was completed in 2017 which included the consideration of a series of design options for each element of infrastructure.

Of specific relevance to this application was the consideration given to the option of strengthening the existing berthing structure through the introduction of tension anchors, as an alternative to the proposed widening of the pier through the proposed piling activities. Whilst strengthen of the existing pier would ensure structural integrity to accommodate the increased horizontal fender reaction expected from the new vessel, it would not allow for existing identified passenger safety and access issues[1] to be addressed, nor would the existing pier footprint accommodate the required LNG bunker facilities.

2.2.4 Alternative 4: Detailed Design Development

2.2.4.1 Key Environmental Constraints Influencing Detailed Design Development

A series of key environmental constraints have influenced the detailed design of the Proposed Development. Constraints of relevance to this application include:

- Marine Physical Processes: Coastal modelling was used to inform the consideration, location and dimensions of the circular cell wall berthing structure, the configuration of the marshalling area and ticket office levels.
- Marine Sediment Quality: A Ground Investigation (GI) carried out from July to October 2017 around the existing pier infrastructure informed the design of the Proposed Development, including the number of piles and piling methods.
- Current Harbour Users: Feedback provided by current harbour users and community consultation was taken into account to define the project design, during the PAC events and three additional harbour user and community consultation events provided valuable information to assist with the design.
- Health and Safety: The proposed LNG storage facility location was identified through a risk analysis completed by DNV-GL, to comply with all applicable legislation therefore mitigating risk and concerns for local residents, users and ferry passengers.

2.2.4.2 Berth Widening Options

The proposed option for the solid circular cell sheet piled widening was identified following a masterplan optioneering study and coastal modelling exercise.

A series of alternative options for berth widening were considered through a masterplan optioneering study and informed by coastal modelling. These options comprised:

- Steel anchors drilled down existing raker piles with no widening;
- 8 m pier widening with vertical and raking steel tubular piles and timber wave screen;
- 8 m pier widening with solid pier structure to the existing round head;
- 8 m pier widening with solid pier structure to the extent of the outer dolphin.

Following consultation with the ferry operator CFL it was agreed that neither the steel anchor option nor the open piled structure with timber wave screen option would provide sufficient protection from the environment conditions at the berth and would have the potential to obstruct vessel berthing or provide sufficient laydown space to accommodate. Therefore, to provide the best protection from the environment conditions, berthing structure strengthening and widening for the new LNG compound, it was concluded that a solid structure to the extent of the outer dolphin would provide the best engineering solution.

2.2.4.3 Approachway Widening

The proposed option to widen the approachway by 6 m was identified following a masterplan optioneering study.

[1] Current operations require the movement of passengers within the bollard rope snap back zone. Without the proposed pier widening it would not be possible to introduce mechanically operated Passenger Access System (PAS) or a covered walkway to the waiting room and gangway, because of restricted space.

A series of alternative options were taken into consideration. These options comprised.

- ‘Do nothing’ approach;
- 3 m approachway widening with walkway shelter; and
- 6 m approachway widening with walkway shelter.

The proposed widening of the full length of the approachway from the marshalling area to the existing pier head allows tanker (LNG and MGO) vehicles to align and improve their manoeuvres onto the linkspan. The proposed widening mitigates the risk of tanker, HGV and bus vehicle conflicts with the boat steps and pedestrians that would result given the constraints of the approachway carriageway, adjacent narrow footway and constrained horizontal alignment of the approachway carriageway. The extension of the approachway width improves capacity, removes delays in vessel turnaround times during vehicle breakdowns that could impact on passenger safety and vessel loading/unloading and ensures the operability of the Ferry Terminal is not reduced with the introduction of the new vessel.

The widening of the approachway mitigates and reduces risks to foot passengers as a result of the current narrow footway, and improves access for mobility impaired and wheelchair users. It also provides the most suitable location for buried new and upgraded services with the least disruption. Without the widening, during the installation of the buried new and upgraded services, pedestrian access along the footway will be restricted resulting in increased risks to pedestrians.

The proposal to widen the approachway by 6 m was welcomed by the harbour users as this provides the safest operational area for passenger transit for both ferry and tour boats and provides a two lane approach allowing for emergency vehicle access during ferry embarking and disembarking which would not have been provided through the do nothing approach and 3 m widening. The widening improvements to the fishing berth were also welcomed by the harbour users along with replacement of existing marine equipment and an improved laydown area and reinstated boat steps.

3. Marine Mammal Risk Assessment

3.1 Baseline

A desk based study of available data sources has been carried out to characterise, where possible, the marine mammal populations which may be anticipated to be present within Uig Bay, Loch Snizort and the Minches. The primary data sources used in the assessment of impacts on marine mammals are as follows:

- Reports and academic papers;
- Marine Scotland National Marine Plan interactive (NMPi) maps;
- Data from the Small Cetaceans in the European Atlantic and North Sea (SCANS) projects ((Hammond, et al., 2017); (SCANS, 1995); (SCANS, 2008));
- EU Designated sites Standard Data Forms;
- Sea of The Hebrides MPA Proposal - Data Confidence Assessment.

The Inner Hebrides, including the Isle of Skye, are known to support a number of marine mammal species designated under Annex II of the EC Habitats Directive. These include the harbour porpoise in particular, as well as dolphins and whale species such as the minke whale.

3.1.1 Harbour Porpoise - *Phocoena phocoena*

The harbour porpoise *Phocoena phocoena* is the smallest cetacean in Scottish waters and the only species of porpoise found in the UK. The west coast of Scotland is a European stronghold for this species and it is therefore, the most important cetacean species around Uig and Loch Snizort.

The importance of this area of Scotland for harbour porpoise is recognised through the designation of the Inner Hebrides and Minches (IHM) SAC which encompasses the islands of Skye, Mull, Lismore, the group of small islands within the Firth of Lorn, and Colonsay. This designation is specifically for this species.

The SAC comprises an area of 13,539.77 km² and the site supports approximately 31.4% of the harbour porpoise population present within the UK's part of the West Scotland management unit (Clarke, Dolman, & Hoyt, 2010).

The density of harbour porpoises was found to be highest, at 1.071 animals per km², in the Inner Hebrides which includes the southern region of the Isle of Skye.

For the sea areas in the north of Skye, including Loch Snizort, the density of harbour porpoise was found to be lower, at 0.394 animals per km² (Clarke, Dolman, & Hoyt, 2010) Although the SAC has been identified in the area around the west of Skye (which includes Uig Bay and Loch Snizort) using summer modelled data, harbour porpoise are present throughout the year and thus the designation applies year round.

Harbour porpoise have an active lifestyle and a high energy demand. Being small mammals, they are not able to store a lot of energy in their bodies and so must feed frequently. Harbour porpoise have a varied diet, exploiting seasonally abundant prey from both pelagic and demersal habitats. Small schooling fish including herring and sprat (Clupeidae), sandeel (Ammodytidae) and members of the cod family (Gadidae) are important food sources in UK and Irish waters (Pierpoint, 2008)).

Concentrations of prey including sandeels and herring are found in the relatively shallow, cold, fast flowing waters above the diverse sea bed of the Inner Hebrides and the Minches SAC. Harbour porpoise can dive to depths of more than 200 metres and hold their breath for up to six minutes. It has been noted that higher densities of harbour porpoise were consistently associated with depths of between 50 m and 150 m across the various models constructed (Booth, 2010) and (Booth, Embling, Gordon, Calderan, & Hammond, 2013).

In coastal waters, they are often encountered close to islands and headlands with strong tidal currents (Evans, Anderwald, & Baines, 2003). Porpoise mating occurs around October with births (usually a single calf) from March to August with the highest number of births reported to occur in June and July.

3.1.2 Minke whale - *Balaenoptera acutorostrata*

The minke whale *Balaenoptera acutorostrata* is widely distributed along the Atlantic seaboard of Britain and Ireland and also throughout the northern and central North Sea. Sightings are most frequent on the west and east coasts of Scotland (Reid, Evans, & Northridge, 2003).

Minke whale are mostly observed between May and October with the most frequent sightings during July when they migrate into British waters to feed during the summer months, before moving south for the winter to breed (Reid, Evans, & Northridge, 2003).

Some sightings of minke have also been made in the Inner Hebrides and were reported to have been observed within and around the entrance of Uig Bay though specific sightings data could not be found for the waters of Loch Snizort and the north of Skye. However, such sightings are very occasional and the observed adjusted density of minke whale in the vicinity of Uig Bay, within Loch Snizort is reported to be between 0.00 and 0.01 individuals per km² and between 0.01 and 0.02 individuals per km² in the northern section of Loch Snizort (Paxton, Scott-Hayward, & Rexstad, 2014). Thus, density is very low but the occasional visit in the region of the project may occur.

3.1.3 Dolphins

Small numbers of bottlenose dolphin *Tursiops truncatus*, at an estimated density of 0.008 - 0.100 animals per km², have been observed during the SCANS surveys around the Isle of Skye including waters in the north of the island (SCANS, 2008) & (Hammond, et al., 2017).

Other dolphin species, such as short-beaked common dolphin *Delphinus delphis* have been recorded within and around the entrance to Uig Bay, as well as more widely in Loch Snizort (pers. comm. SNH). For example, a dead short-beaked common dolphin was found in Uig Bay in 2014. Around the Isle of Skye the density of short-beaked common dolphin is recorded as being between 0.00 and 0.381 individuals per km². No sightings records for Uig Bay or Loch Snizort were found.

3.1.4 Abundance Estimates

Approximate abundances for the five most commonly observed cetacean species within the area of Uig Harbour Redevelopment are provided in Table 1 below. The abundance estimates are based on SCANS II and SCANS III density data for marine mammals in the west of Scotland in the aerial observations blocks that include the Isle of Skye (Blocks N and I respectively).

Table 1 : Aerial Survey Estimates of Marine Mammal Abundance (Individuals per km^2) and 95% Confidence Value (CV) Around the Isle of Skye

Species	Scans II		Scans III	
	Abundance	CV	Abundance	CV
Harbour porpoise	0.394	0.43	0.397	-
Bottlenose dolphin	0.008	1.05	0.100	-
White beaked dolphin	0.105	0.77	0.000	-
Common dolphin	0.072	0.60	0.000	-
Minke whale	0.000	0.00	0.020	-

3.2 Activities to be Licenced

The Proposed Development consists of a series of upgrades to the existing infrastructure at Uig Harbour to accommodate the new larger ferry vessel which CFL is seeking to operate from the harbour. Construction works include in-water impact piling at several different locations including the marshalling area, the approachway and around the ferry berth. A summary of the activities requiring piling is listed in Table 2 and an indicative visualisation is presented in **Figure A2 (Appendix A).**

Table 2: Proposed development piling activities

Description	Type of Piles	Number of piles
Widening of the pier to accommodate the approachway	Tubular Steel Hollow piles (559 mm diameter and 25 mm thick)	82
Widening the existing berthing structure and new fendering	Straight web piles AS500-12.7 (20 m long, 10 m embedment into sea bed) 305x305x287 UKC H Pile. U section Pu32 Tubular pile 762 mm diameter and 25 mm thick	1096 63 25 9
Replacing and repositioning the linkspan and lifting dolphins	Tubular (vertical and raking): 762 mm diameter and 25 mm thick steel tubular (vertical and raking): 762 mm diameter and 25 mm thick or PU32 Arcelor Mittal Sheet Piles.	6 vertical and 4 raker 6 vertical and 4 raker or 50
Extending the marshalling area by land reclamation	Steel H pile dimensions: ranging from 204 mm x 207mm to 465 mm x 460 mm	30
Constructing of the fisherman's compound area	PU 32 Arcelor Mittal Sheet piles	120

The anticipated start date for the project is October 2019 with a total duration of 24 months. Piling could take place during this period however it would not be constant for this predicted timescale.

To determine the potential effect of underwater sound produced by piling during the construction phase it is necessary to understand the character of sound propagation underwater and the potential response of marine mammals to the sound. These are discussed below.

3.3 Sound Source Levels (SSLs)

Pile driving activities can generate very high sound pressure levels (SPLs) that are relatively broad-band in frequency (20 Hz to >20 kHz) (Nedwell & Howell, 2004), which can be detected by many groups of marine fauna, particularly marine mammals.

The piling during the construction period includes both vibratory and impact piling. Vibratory piling is a continuous sound source, of much lower intensity - generally between 20 and 30 dBs below the sound levels generated by impact piling. In contrast impact piling is an impulsive sound source. The threshold criteria for the different piling types are therefore different.

The determination of SSL is based on the technical details of the piling equipment expected to be used in the Proposed Development (including the shape and size of the pile, the type of piling and the power level of the piling hammer for impact piling) and associated measured real world project data (CDOT, 2007).

The following piles types were considered in the project scope:

Table 3: Pile Type Source Level

Pile Type and Dimensions	Impact Hammer Near-Source Level at 10 m, dB				Vibratory Driver/Extractor Near-Source Level at 10 m, dB			
	Peak	RMS	SEL	SELcum (15 min)	Peak	RMS	SEL	SELcum (15 min)
Sheet Piles = PU32 Acelor mittal (SP)	205	190	180	198	175	160	160	190
H piles = 204 mm x 207 mm (HP1)	190	175	160	178	165	150	150	180
H piles: 465 mm x 460 mm (HP2)	195	183	170	188	165	150	150	180
Tubular steel piles = 559 mm diameter with 25 mm steel casing (TP1)	200	184	174	192	171	155	155	185
Fender piles (tubular steel piles) = 762 mm diameter with 25 mm steel casing (TP2)	203	190	177	195	180	170	170	200
Straight web sheet piles AS500-12.7 (SWS)	205	190	180	198	175	160	160	190

The maximum SSL values (as SPL and sound exposure level (SEL)) produced across the whole Proposed Development for both impact and vibratory piling are shown in Table 4 below.

Table 4: SSLs for Piling Activities

Piling type	SPL dB re 1µPa	SEL dB re 1 µPa^{2}s
Impact piling	205	180
Vibratory piling	180	170

3.4 Underwater sound propagation calculations

The standard formula used for estimating the transmission loss from underwater sound sources is:

$$TL = A \log (r) + B\, r + C$$

Where:

TL is the transmission loss at a distance r from the source.

A is the wave mode coefficient. For spherical waves A = 20, and cylindrical waves A = 10.

B is an attenuation factor that is dependent on water depth and sea bottom conditions.

C is a fixed attenuation due to acoustic screening. In open water this will be 0.

For the purposes of this assessment and to provide a reasonable estimate of sound propagation, an empirical wave mode coefficient A = 20 has been used. Transmission losses due to absorption, scattering and diffraction have been excluded from these predictions. Additionally, the effect of the ambient underwater sound environment has not been considered in this assessment.

For receptor locations without a direct line of sight to the sound source (such as due to physical obstructions) the received level would be substantially lower in comparison to a receptor location with direct line of sight. The actual level of attenuation is dependent on a number of factors (e.g. separation distance between receptor and source, frequency content of the sound source, and angle of view from the diffracting edge of the obstruction). For the purposes of this project however, in order to account for physical screening of the sound propagation path by land massing between piling locations into open water, an estimated attenuation factor of 30 dB has been applied.

Although the use of spherical and cylindrical formulae for predicting the sound propagation loss is widely used as a simple way of evaluation, this methodology does not entirely take into account the influence of both environmental characteristics (bathymetry, seafloor geo-acoustic properties, water

salinity and temperature profiles etc.) and of signal frequency on the propagation of sound and hence the propagation loss may be under- or over-estimated. However for the purposes of undertaking a preliminary assessment of the effects of piling sound sources and the identification of noise impact zones, it is considered that the above calculation methodology is robust and provides a conservative yet reasonably realistic estimate of sound propagation.

3.4.1 Thresholds and sound propagation from Vibratory and Impact Piling

A number of thresholds for injury and disturbance in marine mammals, as a result of underwater sounds, are currently in use. Southall (2007) and the NOAA thresholds (NMFS, 2018) for impact piling have been considered in the impact assessment. For both sets of criteria, threshold values are expressed as dual criteria comprising a value for sound pressure level (SPL) and a value for sound exposure level (SEL). The greatest impact distance of the two has been taken as the potential impact range for consideration in the impact assessment and for determination of the proposed mitigation measures.

The thresholds criteria for permanent and temporary hearing shifts (PTS and TTS) and the corresponding distances at which the sound calculations estimate the threshold criteria to be met for the continuous sound of vibratory piling and impulsive sound of impact piling are shown in Table 5 and Table 6 below.

Table 5 : Distance (m) from Vibratory Piling Sound Source at which Threshold Criteria are Met (15 Minute Accumulation Time)

Sensitivity	Threshold	Pile Type (see Table 3 for Full Description)					
		SP	HP1	HP2	TP1	TP2	SWS
Southall Criteria PTS							
All cetaceans PTS	230 dB_{peak} SPL	10	10	10	10	10	10
	215 dB SEL	10	10	10	10	10	10
NOAA Criteria PTS							
LF Cetaceans PTS	199 dB SEL_{cum}	<10	<10	<10	<10	<10	<10
MF Cetaceans PTS	198 dB SEL_{cum}	<10	<10	<10	<10	<10	<10
HF Cetaceans PTS	173 dB SEL_{cum}	71	22	22	40	224	71
NOAA Criteria TTS							
LF Cetaceans TTS	179 dB SEL_{cum}	35	11	11	20	112	35
MF Cetaceans TTS	178 dB SELcum	40	13	13	22	126	40
HF Cetaceans TTS	153 dB SEL_{cum}	708	224	224	398	2239	708

Table 6 : Distance (m) from Impact Piling at which Sound Threshold is Met

		Pile Type					
Sensitivity	Threshold	SP	HP1	HP2	TP1	TP2	SWS
Southall Criteria							
All cetaceans PTS	230 dB_{peak} SPL	<10	<10	<10	<10	<10	<10
	198 dB SEL	<10	<10	<10	<10	<10	<10
All cetaceans TTS	224 dB_{peak} SPL	<10	<10	<10	<10	<10	<10
	183 dB SEL	<10	<10	<10	<10	<10	<10
NOAA Criteria							
LF	219 dB_{peak} SPL	<10	<10	<10	<10	<10	<10

		Pile Type					
Sensitivity	**Threshold**	**SP**	**HP1**	**HP2**	**TP1**	**TP2**	**SWS**
Cetaceans PTS	183 dB SEL_{cum}	560	<10	318	28	40	560
MF Cetaceans PTS	230 dB_{peak} SPL	<10	<10	<10	<10	<10	<10
	185 dB SEL_{cum}	45	<10	14	22	32	45
HF Cetaceans PTS	202 dB_{peak} SPL	140	<10	<10	<10	11	14
	155 dB SEL_{cum}	1413	141	447	708	1,000	1413
LF Cetaceans TTS	213 dB_{peak} SPL	<10	<10	<10	<10	<10	<10
	168 dB SEL_{cum}	316	32	100	158	224	316
MF Cetaceans TTS	224 dB_{peak} SPL	<10	<10	<10	<10	<10	<10
	170 dB SEL_{cum}	251	25	79	126	178	251
HF Cetaceans TTS	196 dB_{peak} SPL	28	<10	<10	16	22	28
	140 dB SEL_{cum}	793	794	2512	3891	5623	7943

The SEL accumulation time to estimate impact distances for impact piling that has been used is 15 minutes[2].

3.5 Impact Assessment

3.5.1 Extent of effect from Vibratory and Impact Pilling

There are no predicted permanent or temporary effects of **vibratory piling** on any marine mammal, unless an animal is within a few metres of the sound source. The thresholds for PTS and TTS indicates harbour porpoise will not be impacted any further than the standard 500 m mitigation zone around the sound source for all vibratory piling, with the exception of the largest pile type proposed. For these large pile types, the TTS threshold distance for harbour porpoise has been calculated to be met up to 708 m for the SP and SWS piles, and up to 2239 m for the TP2 piles (Table 5). There will be a maximum of 20 of the TP2 piles so the large predicted TTS distance applies for a very short period of time. Also, the calculations assume animals remain within this distance from impact piling for more than 15 minutes.

With the adoption of the standard JNCC mitigation protocol of MMOs including a 'soft-start' for piling, (see section 3.6) the risk of presence of any marine mammals remaining within an area of elevated sound for a full 15 minutes of vibratory piling of the larger piles is very low. In addition, the total duration of vibratory piling of these noisiest piles is very short (estimated to be less than an average of 10 minutes per day, therefore the likelihood of TTS occurring as a result of vibratory piling is considered to be low.

Thus, the effect of vibratory piling in all marine mammals, including harbour porpoise, is considered to be of negligible magnitude. For harbour porpoise, a receptor of high sensitivity, the impact of vibratory piling is considered to be of low significance.

[2] Whilst the duration of impact piling for some of the driven piles may be longer this accumulation time has been selected for a number of reasons: there will be breaks in impact piling as tolerances etc. need to be checked during piling operations; the calculated impact distances do not allow for the marine mammal observation zone meaning animals will already be a significant distance (at least 500 m) from the sound source when it starts, but importantly the short accumulation time accounts for the fact that marine mammals will be at least 500 m away before any soft-start begins and animals are thought highly likely to move away from any sound sources but the propagation calculations assume a receptor is stationary. However, converting impact distances for a higher accumulation time is a simple calculation. For example, for a doubling of the accumulation time the SEL impact distances will also double.

The estimated sound propagation from **impact piling** (Table 6) indicates distances for PTS in harbour porpoise (high frequency cetaceans) of up to 1413 m (for the largest sheet piles) from the sound source, resulting from cumulative SEL of a single impact piling rig. For these calculations the estimated effect distance is determined by the SEL threshold for accumulated sound energy from all piling impulses over a 15-minute period. For TTS in harbour porpoise, the predicted impact zones range from 794 m to 7943 m depending on pile types.

Note: The predicted impact distances are subject to a number of limitations and are considered to reflect the worst case. Predictions were based on the highest level of sound propagation into the Bay and beyond that could occur. There are a number of operational conditions that are expected to reduce sound propagation including: many piles are located in the intertidal zone, therefore some piling is likely to occur when the pile is not submerged; many piles are in very shallow water which would minimise sound propagation; and the large tubular (TP) impact piling on the pier approachway will take place on the shoreward side of the pier, and is therefore screened from the marine environment behind a solid wall or an existing wall of sheet piling. This is likely to significantly reduce the sound propagation from the approachway works (comprising an estimated total of 82 tubular piles). Additionally, there are limitations in the sound modelling calculations, using simple geometric spreading calculations, rather than full modelling, such that PTS and TTS effects are over-estimated[3].

The estimated duration of impact piling across the Proposed Development is a total of 270 hours split across a range of different stages of the construction programme, considerably less than the duration of the much less impactful vibratory piling. The average daily duration of impact piling, based on the proposed working hours, is less than an hour a day (between 0.2 and 0.9 hours). If the approachway piles are excluded from the estimated sound propagation from impact piling is only 30 minutes per day on average. Impact piling is anticipated therefore to be very short-term but frequent.

PTS in harbour porpoise is realistically considered possible only much closer to the impact piling, maybe in the order of 100s of metres and likely to be within the standard JNCC marine mammal mitigation zone of 500 m from the sound source. With the standard JNCC mitigation protocols in place and with the expected low density of animals within Uig Bay, PTS is considered very unlikely to occur.

The worst case predicted TTS as set out within Table 6 above, relates to the installation of Straight Web Sheet (SWS) piles and identifies a theoretical TTS distance of over 7000 m from source. In reality this is considered to be an overestimation resulting in part from the limitations of the propagation calculations used, as well as because of operational conditions (as discussed above). A review of other available acoustic models for similar activities, including those associated with development activities at the other harbours within the 'Skye Triangle' (Affric Ltd, 2019a) (Affric Ltd, 2019b)] has also been completed to allow this parameter to be tested and corroborated. As a result more likely TTS impact distances for high frequency cetaceans such as harbour porpoise are anticipated in the region of 2000 to 3000 m from the sound source.

3.5.2 Impact evaluation on Harbour Porpoise

Disturbance to harbour porpoise, even with the standard JNCC mitigation measures in place, is expected.

There is potential for behavioural disturbance to individual animals present within several kilometres of the noise source during impact piling activities. Work by Lucke et al. (2009) showed that aversive behavioural reactions of a captive harbour porpoise were initiated at a received SEL of >145 dB re 1

[3]
- The SEL threshold is based on the assumption of a stationary sound source and a stationary receptor. Harbour porpoise are highly mobile animals and able to easily move away from any uncomfortable sound levels. They can also easily move beyond the entrance to the Bay into Loch Snizort and out of the 'direct line of sight' of the propagating sound further limiting sound exposure;
- At the time of writing there are no factors that would provide particular motivation for harbour porpoise to remain within the Bay. There will be fish prey present within the Bay but the lack of fishing that takes place in the local area indicates there are better foraging grounds elsewhere;
- The SEL experienced by harbour porpoise will be limited by several other factors in addition to the simple ability to move away. In particular, porpoises are very unlikely to be within the standard JNCC observation zone of 500 m, where sound levels are highest, when impact piling commences and there will be a 20 minute soft-start before impact piling is operating at full power. Thus, the distance to which PTS and TTS could be experienced is likely to be further reduced.

µPa2 s which corresponded to a distance of >10 km (146–152 dB re 1 µPa2 s calculated SEL) and <25 km (139–145 dB re 1 µPa2 s calculated SEL) around the pile driving site. Whilst the duration of each impact piling event is short, it is likely to occur frequently and so animals may be displaced from the area in the short to medium term.

Aversive behavioural responses from harbour porpoise >10 km from the source would include the whole of Uig Bay and much of Loch Snizort. However, this area is not an open ocean environment, sound propagation without and outside of Uig Bay into Loch Snizort will be constrained by the shape of the Bay, such that the predominant sound propagation will form a wedge shape, as shown in **Figure A3 (Appendix A**).

The density of porpoise in this region of the SAC is reported to be 0.394 animals/km². This equates to a total of approximately 45 individuals in the area of Loch Snizort. However, the preferred habitat in coastal waters is in areas of fast flowing waters and they are often encountered close to islands and headlands with strong tidal currents. Thus, it is likely that the density of harbour porpoise in the Loch may be lower than the 0.394/m² reported further north. Numbers in the Bay are also expected to be much lower than the regional figure. Inside the Bay, where the impacts are likely to be greatest, the total area is approximately 2 km² and so anticipated abundance is very low and harbour porpoise are expected to be occasional visitors only.

The predicted effect of PTS or TTS as a result of impact piling affecting an individual harbour porpoise would be of medium to high magnitude particularly in the near vicinity of the construction, without further mitigation. However, the density of harbour porpoise in the Bay is expected to be low, the predicted PTS and TTS impact zone is not thought to represent key habitat for important life-cycle stages in harbour porpoise and thus animals can easily move away from the sound source. In addition, the shape of Uig Bay in relation to Loch Snizort will constrain the sound propagation such that outside the line of sight to the entrance to Uig Bay (as shown on Figure A3 in Appendix A) the intensity of sound is expected to be much lower than calculated. Thus, the risk of injury to hearing in harbour porpoise is considered to be low. Impact piling is intermittent, with gaps in between piles and pauses during piling operations. These intervals also allow for avoidance behaviour and for recovery if any impacts such as TTS were to occur.

The number of individual animals likely to be affected is expected to be low with most significant impacts occurring to individuals within the Bay, where harbour porpoises are thought to be only occasional visitors. Impacts are considered to be predominantly behavioural, which may result in temporary avoidance of the area but with recovery to baseline density after construction ceases. The area does not represent an area of particular importance for key life cycle stages and no population effects are considered likely.

3.5.3 Impact evaluation on other cetaceans

Whilst present in low density other species of cetacean, including dolphin and minke whale, may occasionally be present in Loch Snizort or Uig Bay.

The estimated distances for PTS in low and mid frequency cetaceans resulting from sound exposure are low, up to a maximum of 56 m. Since these distances are within the standard JNCC mitigation zone of 500 m PTS in any non-porpoise species of cetacean is not anticipated.

The TTS impact distances range from <10 m to 316 m, depending on the pile type. These distances are also within the standard JNCC mitigation zone of 500 m and therefore TTS in any non-porpoise species of cetacean is not anticipated. The standard mitigation measures mean highly mobile cetaceans can easily move away when the soft-start begins. Responses are expected to be largely behavioural, such as a change in swimming direction to move away from noisy construction. Impacts relate to individuals only and population effects are not anticipated.

3.6 Mitigation Measures

3.6.1 Avoidance Measures/Mitigation 'by design'

The project design has minimised the use of impact piling, using vibratory piling methods where possible, in order to minimise as far as is practicable, the intensity of underwater sound generated by construction activities. Thus, most of the estimated piling time, almost 80%, will comprise vibratory piling. However, ground conditions on site mean that impact piling will be required to drive the final sections of many of the piles.

The project will adopt, as a minimum, the 2010 JNCC standard protocol as the minimum level of good practice to mitigate the potential for causing injury or death to marine mammals in close proximity to piling operations (JNCC, 2010). Whilst the guidance was originally intended for offshore wind farm construction impacts in cetaceans the guidance is now industry best practice for other construction activities.

The protocol recommends the following mitigation measures which will be adopted as standard during the periods of impact piling:

- **Marine mammal observation:** piling activities will be monitored by suitable qualified and experience MMOs and PAM operatives whose primary role is to detect marine mammals and to potentially recommend a delay in the commencement of piling activity if any marine mammals are detected. A standard pre-watch period of 30 minutes will be implemented before the commencement of any piling activity. Piling will not commence if any marine mammals are detected within the mitigation zone or until 20 minutes4 after the last visual or acoustic detection;
- **Mitigation zone:** the extent of this zone represents the area in which a marine mammal could be exposed to sound that could cause injury and will be no less than 500 metres with the project specific extent of this zone defined and agreed with the regulatory authority; and
- **Soft-Start of pile driver:** a gradual ramping up of piling power, incrementally over a set time period, of not less than 20 minutes. It is believed that by initiating piling at a lower power this will allow for any marine mammals to move away from the noise source, and reduce the likelihood of exposing the animal to sounds which can cause injury. It is believed that by initiating piling at a lower power this will allow for any marine mammals to move away from the noise source, and reduce the likelihood of exposing any animals to injurious sound levels.

The mitigation measures that will be adopted will be provided in a Marine Mammal Management Plan (MMMP). The piling contractor/s will be required to comply with the MMMP.

The Proposed Development has made a commitment that no simultaneous impact piling, when the pile is in water, will take place at any time during construction. However, where at least one of two piling locations is exposed at low tide simultaneous impact piling of these sheet piles can be undertaken but only when one pile is not submerged. This is because underwater sound cannot propagate when piling is done out of the water. Whilst it is recognised that some sound propagation to water can take place through sediments this is considered to be minimal, particularly if in-water impact piling is taking place at the same time.

3.6.2 Additional mitigation measures and monitoring requirements

The following mitigation measures detailed below are in addition to the standard 2010 JNCC requirements of (JNCC, 2010) and are proposed in order to address the potential for possible effects associated with PTS and TTS and to minimise behavioural disturbance in marine mammals as far as possible, particularly with respect to Harbour Porpoise associated with the Inner Hebrides and the Minches cSAC.

The additional mitigation measures to be adopted by the Proposed Development are as follows:

- The mitigation zone will be monitored by Marine Mammal Observers (MMOs) positioned at suitable vantage points to observe and monitor Uig Bay. The number and location of MMOs required to enable the mitigation zone to be observed will be determined and agreed within the MMMP, before construction starts;
- The use of PAM equipment positioned at a location to be agreed, close to the entrance to the Bay, to monitor for harbour porpoise, will be required for any impact piling that commences during periods of darkness, poor weather conditions and reduced visibility of marine mammals. The exact location of the PAM operator will be determined before construction commences but may require deployment of monitoring equipment from a boat;
- A soft-start procedures is required for all impact piling, with initial power levels to be approximately 10% of the final level5, thereby ensuring a significantly lower sound source when piling activity starts giving animals the opportunity to move away before accumulated sound energy would be likely to result in hearing damage;
- Sound monitoring, including the collection of noise data from piling soft-starts, will be undertaken to monitor the effectiveness of the mitigation measures; and
- Any noise data collected during the construction of the Proposed Development will be considered for addition to the JNCC Marine Noise Registry.

3.7 Conclusion

The propagation of underwater sound from the vibrating and impact piling has been calculated. The risk of injury to harbour porpoise and other cetaceans is considered to be unlikely and responses will be limited to temporary avoidance of a relatively small number of animals.

Some behavioural disturbance may occur at the entrance to the Bay and into Loch Snizort, in areas outwith the 500m mitigation zone, but this will be temporary and short-term although as a result of a frequently recurring noise source, during construction. It is anticipated that harbour porpoise may avoid the area around Uig Bay and Loch Snizort during the construction period, but available evidence indicates animals will return to baseline once operations have stopped. No effects on the harbour porpoise population, other than temporary displacement from a non-key habitat, are anticipated.

The adoption of the standard JNCC Mitigation Protocols along with additional PAM observation (when required) and appropriate soft-start procedures, the construction programme at Uig will not be detrimental to the harbour porpoise population protected by the Inner Hebrides and Minches SAC. The ‘Favourable Conservation Status’ and long-term survival of harbour porpoise are not anticipated to be affected by the Proposed Development works.

[5] For example, in an offshore test piling project the soft-start increased the impact hammer power level from 80kJ to 800kJ over the standard 20 minute soft-start period (Robinson et al., 2007). The soft-start in this case resulted in a reduction of the Sound Pressure Level by 12dB.

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Appendix A Supporting Figures

Figure A1. Uig Harbour Redevelopment and Designated Sites

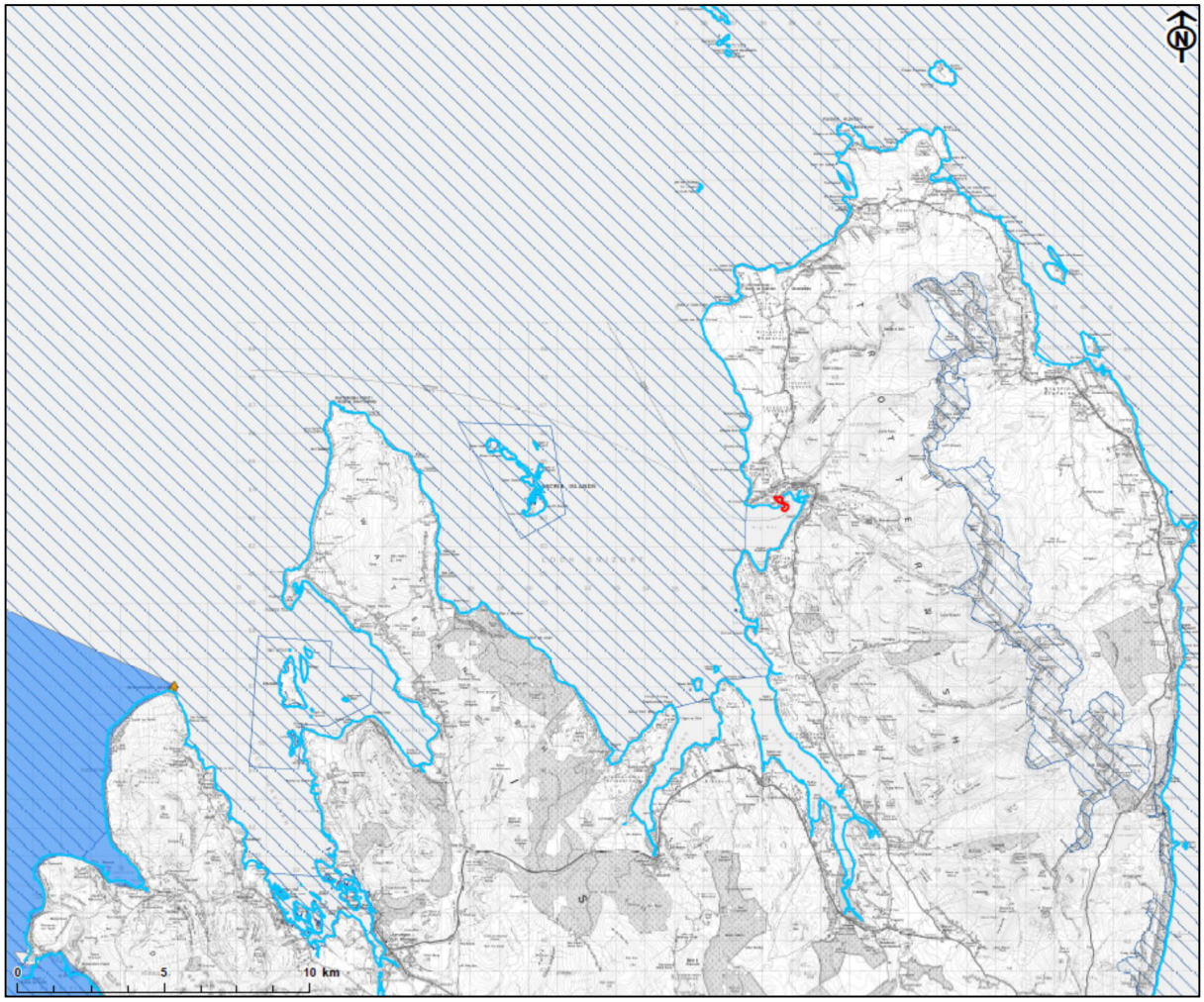


Figure A2. Indicative visualization of proposed layout/activities

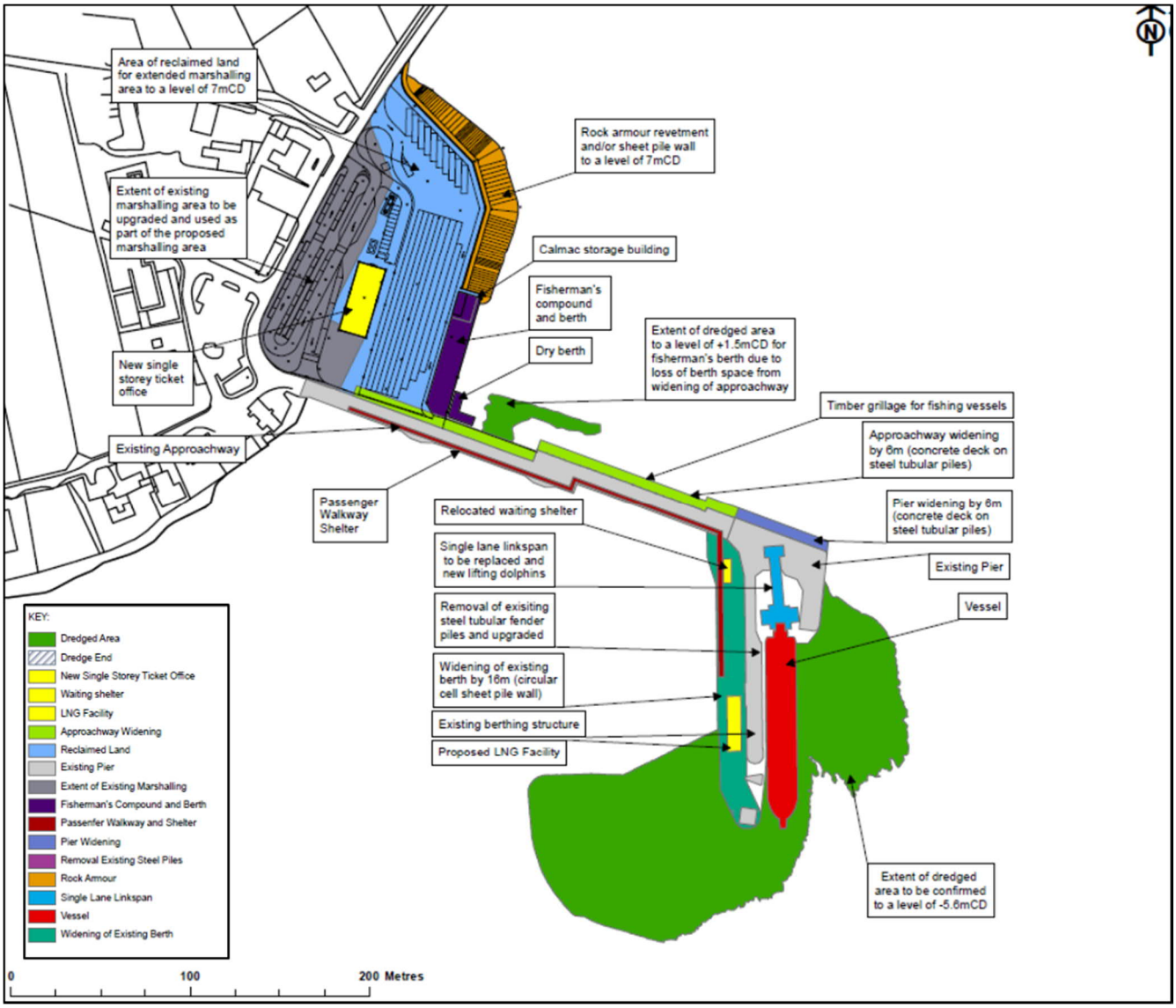
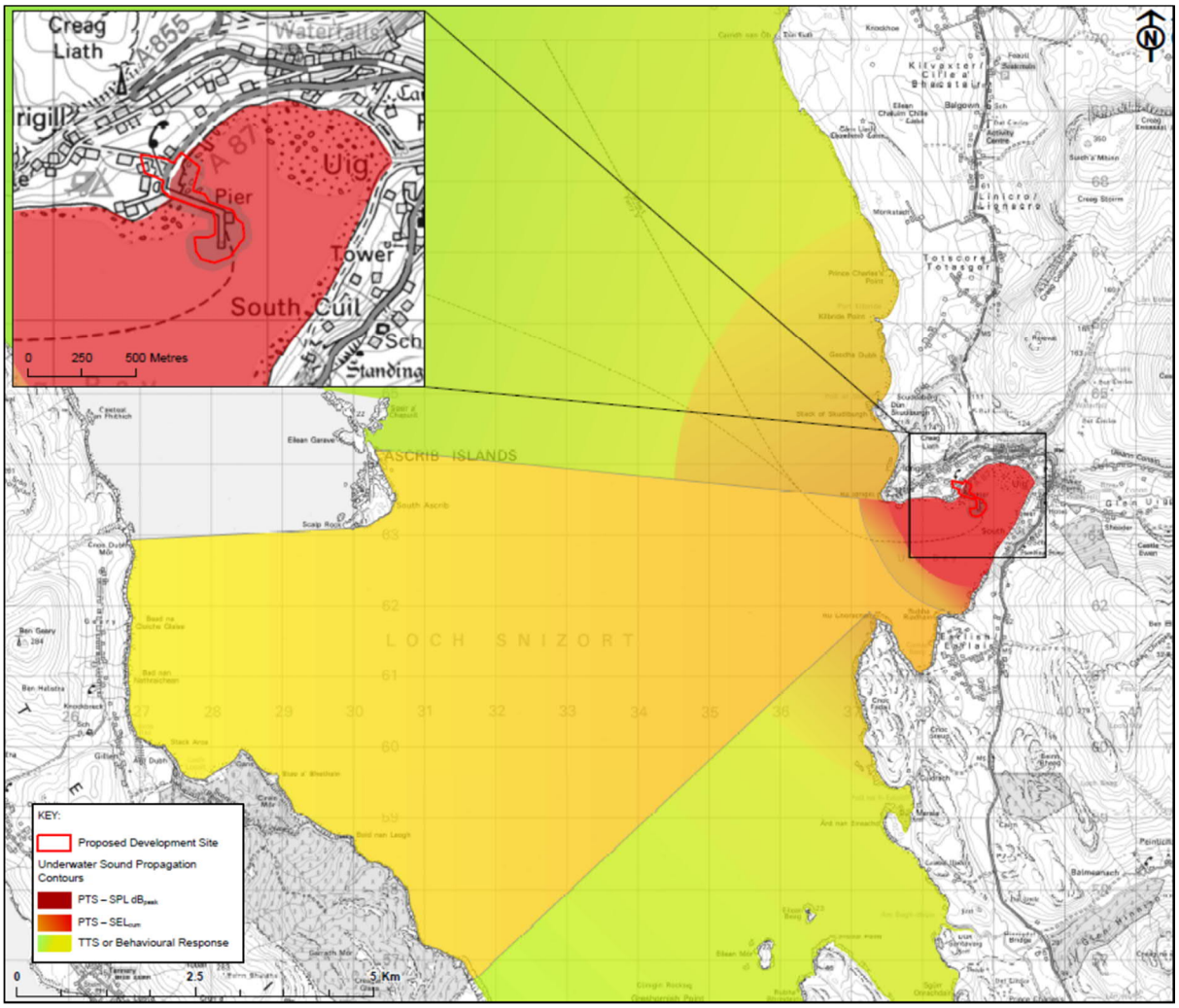


Figure A3. Anticipated underwater sound propagation contour



Appendix B Correspondence received from consultation with SNH

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

Marine Scotland – Licensing Operations Team
Scottish Government
Marine Laboratory
375 Victoria Road
Aberdeen
AB11 9DB

FAO: Claire Crookston

26 April 2019

Your ref: 06909/06910

Dear Claire,

MARINE (SCOTLAND) ACT 2010, PART 4 MARINE LICENSING
THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 (AS AMENDED
06909/0610 – Highland Council (per AECOM) – Ferry Terminal Development - Uig, Isle of Skye

Thank you for your consultation on the above proposal dated 1 March 2019. Sorry for the delay in responding.

Summary

The proposed works are within or adjacent to Inner Hebrides and the Minches Special Area of Conservation (SAC) which is of international importance for harbour porpoise. Assuming the proposed mitigation measures are applied, in our view harbour porpoise will not be adversely affected by these proposals.

The proposed mitigation measures will also help protect common seals associated with Ascrib, Isay and Dunvegan SAC.

There are likely to be impacts on Priority Marine Features but without significant impacts on regional or national status.

Background

The proposals are to redevelop Uig harbour in order to accommodate a new ferry. The proposals include capital dredging and sea disposal of the dredge material just outside the mouth of Uig Bay.

We responded to various consultations regarding the ground investigation works in 2017. We provided EIA screening advice to Transport Scotland in August 2017 and EIA scoping advice to Marine Scotland in November 2017.

Scottish Natural Heritage, King's House, The Green, Portree, Isle of Skye, IV51 9BS
Tel: 01478 612625 www.snh.gov.uk

Dualchas Nàdair na h-Alba, Taigh an Rìgh, An Àilean, Port Rìgh, An t-Eilean Sgitheanach, IV51 9BS. Fòn: 01478 612625 www.snh.gov.uk

Appraisal of the impacts of the proposal and advice

1. Marine Special Areas of Conservation (SACs)

The proposed pier and associated dredging area lie approximately 1km outside Inner Hebrides and the Minches candidate Special Area of Conservation (SAC) designated for its use by harbour porpoise. The proposed new dredge disposal site is within the SAC at the entrance to Uig Bay. The harbour works are approximately 8km from Ascrib, Isay and Dunvegan SAC, designated for its common seal population.

The status of these sites means that the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 as amended (the "Habitats Regulations") apply or, for reserved matters, The Conservation of Habitats and Species Regulations 2017. Consequently, the competent authority is required to consider the effect of the proposal on the SACs before it can be consented (commonly known as Habitats Regulations Appraisal). The SNH website has a summary of the legislative requirements (https://www.snh.scot/professional-advice/safeguarding-protected-areas-and-species/protected-species/legal-framework/habitats-directive-and-habitats-regulations).

a. Inner Hebrides and the Minches SAC

In our view, this proposal is likely to have a significant effect on harbour porpoise within Inner Hebrides and the Minches SAC. Consequently, Marine Scotland is required to carry out an appropriate assessment in view of the site's conservation objectives for its qualifying interest.

To help you do this, we advise that in our view on the basis of the information provided to date, **if the proposal is undertaken as described and in accordance with the applicants proposed mitigation, then the proposal will not adversely affect the integrity of the site**.

The appraisal we carried out considered the impact of the proposals on the following factors:

- Harbour porpoise are affected by underwater noise. Activities arising from these proposals that may increase underwater noise include:
  - piling associated with construction of the pier extension - a large number of piles of various types will be installed which are likely to have different noise levels and characteristics – this is likely to be the most significant source of underwater noise;
  - capital dredging, dredge disposal and associated increase in vessel movements during construction. It is stated that no drilling or blasting will be required and providing this is the case we agree this aspect is unlikely to be significant overall;
  - the EIA Report states that demolition of the existing sea wall is required but no details are provided. **If blasting is required further assessment will be necessary.**

- The significance of underwater noise impacts depends on the magnitude and duration of the activity. It can result in mortality, auditory injury, disturbance and the masking of key communication.
- The underwater noise modelling methodology described in the technical note is basic and unlikely to represent the actual behaviour of noise in this

area. Notwithstanding this our experience with other harbour piling suggests that the risk of instantaneous auditory damage is low and can be adequately mitigated using standard JNCC mitigation protocol. In our view there is sufficient information to reach a conclusion and no further assessment is necessary (see Annex 1 for details).

- In terms of direct mortality and injury, we are satisfied that the use of JNCC (2010) piling protocol will minimise the injury potential for harbour porpoise, other cetaceans and seals. The applicant states that they will be employing marine mammal observers and Passive Accoustic Monitoring, using a 500m mitigation zone and utilizing soft start procedures. Although there will be two piling rigs on site, there will not be simultaneous underwater piling. See Annex 3 for advice on Marine Mammal Management Plan.
- However the JNCC piling protocol does not protect against disturbance. Disturbance is most likely during the construction phase and the disturbance zone has been assessed as extending >10km from the works. Piling is either 24 or 40 months depending on the construction scenario. However average daily piling duration is <0.9hours for impact piling and <5.7 for vibratory piling. This can be regarded as temporary disturbance. We advise that it is not significant and therefore there is no risk to site integrity.
- The proposed development requires dredging, both capital and maintenance, and the disposal of this sediment at a newly licenced sea disposal site just outside Uig Bay. These activities have the potential to increase suspended and dispersed sediments, change water chemistry, particularly the release of sediment contaminants (heavy metals) into the water column and to the seabed. The concentrations predicted for the proposed development are lower than EQS values, indicating a low eco-toxicological risk, and considering the very short-term nature of the increases results in an impact of low significance.

We recommend that you consider whether it is necessary to condition the proposed mitigation.

b. Ascrib, Isay and Dunvegan SAC

In our view, this proposal is likely to have a significant effect on common seal within Ascrib, Isay and Dunvegan SAC because it is within the foraging range of the seals which haul-out within the SAC. Consequently, Marine Scotland is required to carry out an appropriate assessment in view of the site's conservation objectives for its qualifying interest.

To help you do this, we advise that in our view on the basis of the information provided to date, **if the proposal is undertaken in accordance with the applicants proposed mitigation, then the proposal will not adversely affect the integrity of the site**.

The appraisal we carried out considered the impact of the proposals on the following factors:

- We consider that there is a low risk of hearing damage (Permanent Threshold Shift) to seals.
- There is unlikely to be disturbance to seals within the SAC and any disturbance outside the SAC is unlikely to affect the conservation objectives.

2. Priority Marine Features

3

Uig Bay supports a number of Priority Marine Features (PMFs) which are habitats and species considered to be of conservation importance in Scotland's seas and are included in the National Marine Plan. Marine Scotland should consider the effect of the proposal on the PMF(s) before it can be consented.

The benthic habitat in the dredge disposal site search area is dominated by burrowed muds, including the biotope 'Seapens and burrowing megafauna in circalittoral fine mud' (SS.SMu.CFiMu.SpnMeg), although the surveys suggest that seapens are rare. This biotope is extensively distributed throughout the sea lochs of the west coast of Scotland.

Neither the grab samples nor the ROV footage found evidence of rarer biotopes and species, such as the burrowing heart urchin (*Brissopsis lyrifera*), or the tall sea pen (*Funiculina quadrangularis*) which have both been recorded nearby in earlier surveys. Although the surveys were not conclusive we consider them to be adequate. This appears to be a one-off disposal and if these species are present nearby we could expect at least partial re-colonisiation. Annex 2 of this letter provides further detail.

Utilising an existing disposal site would be good practice and appears to be more in line with NMP, especially if this site may be used for further disposal beyond the scope of this permission. However, we acknowledge that may not be straightforward if alternative sites don't have comparable levels of heavy metals.

3. European Protected Species (EPS) licencing

Impact piling and vibro-piling has the potential to disturb any cetacean in the area, and therefore we consider that an EPS licence for disturbance should be applied for covering the species listed in the EIA report (harbour porpoise, bottlenose dolphin, white beaked dolphin, common dolphin and minke whale).

The EPS licence should be for disturbance only as adherence to the JNCC 2010 piling protocol should reduce the risk of injury to minimal. Based on the densities of these species in the area, we conclude this activity will not result in a negative impact on Favourable Conservation Status (FCS).

If you would like any clarification or further advice please contact me, in our Portree office or via e-mail (alex.turner@snh.gov.uk).

Yours sincerely,

Alex Turner
Area Officer, Skye and Lochalsh
South Highland Area

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Annex 1 – Comment on underwater noise modelling

The modelling methodology described in the technical note is basic, and is unlikely to represent the actual behaviour of noise in this area.

Source levels adopted are taken from the California Department of Transport (2007). This reference, although relatively old, presents measurements from a variety of pile types (e.g. steel, wood, sheet piles, cylindrical piles). It presents levels for piling that are lower than a more recent paper of impact piling and vibratory piling at Nigg Bay, Cromarty Firth (Graham et al, 2017) and therefore these levels used may be an underestimate.

SELcum – although it is stated that this is accumulated over a 15 minute period, it is not clear how this has been calculated or whether it's appropriate to use an accumulated value as a source level.

The calculation methodology uses a basic spreading law formula, (PL = Nlog(R)) which in itself is not incorrect. However, it has been established that basic spreading laws do not represent the propagation loss well in shallow, inshore waters (Farcas et al, 2016) potentially resulting in substantial errors.

The use however, of 20logR in this case, is incorrect. The equation is presented in the form of TL = Alog(r) plus attenuation factors. It is stated that A of 20 represents low frequency sound. This is incorrect. An N (or A) of 20 in equations of this form represent spherical spreading law, to be used in circumstances where the noise can propagate in all directions equally – i.e. deep water. An 'A' of 10 does not relate to high frequency noise, but what is termed cylindrical spreading, where the sound spread is limited by the sea surface and the sea bed. Usually in shallow waters a compromise of 15 is used.

It is correct to say that physical barriers will block the noise, however looking at the geography of Uig bay, most noise will be able to travel out into loch Snizort, and therefore we question the use of a 30 dB fixed attenuation factor. 30dB is also a large reduction and is probably only appropriate where the land (or breakwater) is a barrier.

Notwithstanding these concerns related to the methodology, our experience with other harbour piling, suggests that the risk of instantaneous auditory damage is low, and in the relative near field, and so can be adequately mitigated using standard JNCC mitigation protocol.

It seems likely that the cumulative SEL ranges predicted are probably overestimates but we can't check how these have been estimated. This assumes that they have simply propagated using the noted formula, based on the SELcum values they have arrived at and recorded the range that the received level matches the NMFS threshold. Assuming of course that the starting SEL is representative. Not using the weightings for the noise propagation, but using weighted thresholds will result in a conservative estimate. Also the modelling has assumed a stationary animal (unlikely to be representative), a stationary receptor will also return a conservative estimate.

Recent noise modelling for offshore windfarm developments (Moray Firth and the Firth of Tay) have predicted a low risk of both instantaneous and accumulated PTS, with larger scale piling and for longer duration than harbour developments.

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Graham et al (2017) monitored both harbour porpoise and bottlenose dolphin during impact piling and vibro-piling over a six month period. There was vibro-piling nearly every day. The average day duration of impact piling was 0.23-8.92hr/day and for vibrations 0.02-5.97 hr/day. They found an unexpected high source level for vibration piling (SPL rms of 192 dB re 1 µPa – compared to 150-170 dB dB re 1 µPa rms @ 10m) but they found a detectable but subtle reduction in use of the area. Neither species were excluded from the area. They make the point that this study location is in a typically noisy area with vessel movements.

Our advice is that while the noise modelling is basic it is sufficient, alongside other readily available information, to reach a conclusion on this proposal.

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Annex 2 – Benthic assessment of sediment disposal site

Our assessment of the dredge disposal site has been informed by the following:

- 'Disposal site characterisation report' which includes more info on ROV transects and includes the sediment macrofauna (Appendix D);
- 'Best Practicable Environmental Option (BPEO) Assessment'
- Previous knowledge of the presence of 'Inshore deep mud and burrowing heart urchins' associated with Uig Bay fish farm.

Comments on reports

- ROV footage seems to be mostly blurred, too fast or obscured by silt stirred up by ROV, according to commentary, so is not ideal. It covers the northern and southern parts of the site only but this includes the area closest to the previous *Brissopsis* records.
- No *Funiculina* or *Brissopsis* were recorded by the ROV and only a few *Pennatula* or *Virgularia*. *Nephrops* and other burrows were seen, and so we agree with the biotope assignment – 'Seapens and burrowing megafauna in circalittoral fine mud'.
- 12 randomly distributed grab samples were collected (apparently no replicates) and these show a range of infauna, but no *Brissopsis* (or seapens), but macrofauna don't always appear in grabs. *Amphiura chiajei* is present in a few grabs and is also a characterising species of 'Inshore deep mud with burrowing heart urchins'.
- *Maera loveni* - 10 were found in 1 grab. This a PMF in its own right, and mostly recorded offshore and alongside *Nephrops*. Whilst the disposal may affect this species, they are good burrowers and probably quick to reproduce/recover. They do not appear to be widespread as they were not found in other grab samples.
- BPEO assessment concluded a new disposal site was best, but this seems to be based mainly on costs. No information was presented regarding the nature of previous disposal characteristics at Stornoway to see if Uig disposal would be compatible there. We agree that a new disposal site would be better than the one near Ullapool based on species present.
- Sediment has high levels of heavy metals (especially Chromium, Copper and Nickel) but report states that these are likely to be natural. The samples indicate they are widespread around the bay.

Conclusion

The burrowed mud PMF biotope 'Seapens and burrowing megafauna in circalittoral fine mud' is present at the disposal site. There is no evidence that the PMF 'Inshore deep mud and burrowing heart urchins' is present but there is too much uncertainty surrounding the surveys to demonstrate this conclusively. The PMF *Maera loveni* is also present but is patchily distributed.

Nevertheless it appears to be a one-off disposal (?), albeit up to 2m in depth, and if *Brissopsis* is present we could expect at least partial re-colonisation.

Utilising an existing disposal site appears to be more in line with NMP and sustainable development but we acknowledge that may not be straightforward if the Stornoway site doesn't have as high levels of heavy metals.

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Annex 3 – Advice on Marine Mammal Management Plan (MMMP)

- We support the commitment to use standard JNCC guidance. We advise that the mitigation zone for cetaceans should be the standard 500m, but that for seals this could be reduced to 100m. This is because seals are naturally curious and will sometimes investigate works such as this. The PTS range is usually within tens of meters from harbour piling and the seals can and do raise their heads above the water.
- It will be useful for the MMMP if the location(s) of the MMO is detailed, together with the experience of the MMO and PAM operators.
- The PAM system to be deployed and location and when it's intended to be used should be detailed (understanding that detection range for a harbour porpoise is about 300m on a good day).
- Details of communication protocol between the MMO/PAM operators and the piling contractors, to ensure if animals are seen in the area piling does not commence until there has been a 20 minute clear period.
- The applicant has also committed to taking noise measurements. Details will be needed for this also, in relation to the system to be used; how the levels will be analysed/calibrated; and how these levels will be reported to MS. These details can be agreed through the MMMP.

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