MOTT MACDONALD

European Protected Species and Basking Shark Risk Assessment

New Islay Vessel Port Enabling Works Colonsay Ferry Terminal - Licence Supporting Information

Project:	New Islay Vessel Port Enabling Works - Colonsay Ferry Terminal		
Our reference:	105612-MMD-CO-ZZ-RA-O-0002-S2-P01		
Prepared by:	[Redacted]	**Date:**	31/03/2023
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Subject:	Colonsay EPS and Basking Shark Risk Assessment - Licence Supporting Information		

1 Introduction

Mott MacDonald (MML) have prepared this risk assessment in support of a European Protected Species (EPS) and basking shark disturbance license application submitted to Marine Scotland Licensing and Operations Team (MS-LOT) to upgrade the existing assets at Colonsay Ferry Terminal, Scalasaig, on behalf of Caledonian Maritime Assets Limited (CMAL).

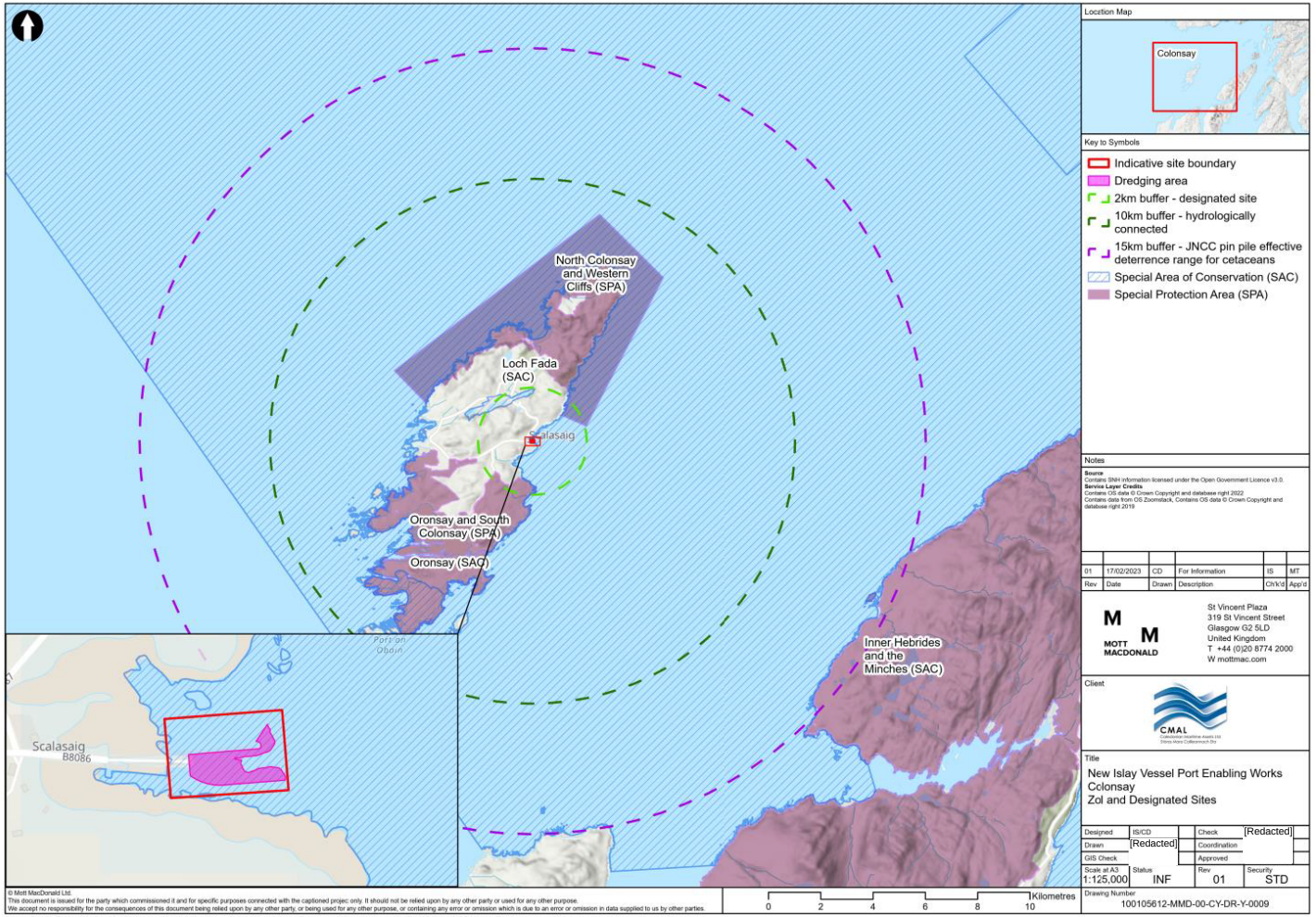
In advance of submitting the EPS and basking shark license applications to MS-LOT, MML completed a review of existing information and sought advice from NatureScot with regards to the potential impacts of the proposed construction works on protected species. As part of this, agreement was sought on proposed mitigation measures, which are included in the EPS and basking shark license applications.

2 New Islay Vessel Port Enabling Works at Colonsay Ferry Terminal

The location of the New Islay Vessel Port Enabling Works at Colonsay Ferry Terminal are on the east coast of the island of Colonsay in Scalasaig, the Inner Herbrides, Scotland. The existing Colonsay Ferry Terminal is centred at NGR NR 39600 94100 and is located within the small village of Scalasaig (see Figure 2.1).

To support new vessels with deeper draught and higher displacement at the ferry terminal, a number of changes would be required to the Colonsay Ferry Terminal, the construction work to achieve this are outlined in Section 3.1 (hereafter referred to as the Proposed Development).

Figure 2.1: Indicative site boundary and Zone of Influences for the Proposed Development



Source: Mott MacDonald, 2023

3 Works Equipment and Method Statement

The works associated with the Proposed Development comprise an upgrade to the existing assets at Colonsay Ferry Terminal and are outlined in the following sections.

3.1 Construction Phase

To support new vessels with deeper draught and higher displacement at the ferry terminal, the following modifications and alterations are proposed:

- Replacement of 10 existing fenders with new;
- Replacement of two bollards at the roundhead from T Head bollards to mushroom bollards;
- Provision of gangways which are to be at least 17m long;
- Installation of toe protection to existing piles, likely in the form of concrete filled steel collars with dowels into rock or concrete mattress installed by divers to replace the overburden on the pile toe; and
- Dredging to 5.5m below Chart Datum (CD) in order to maintain at least 1 metre of underkeel clearance. The approximate dredged area would be approximately 4120m^2 and volume 6000m^3.

The new vessel will moor to the existing bollards positioned at the roundhead, along the existing pier and on both the inner and outer lifting dolphins.

Works below the mean high water springs (MHWS) include:

- installation of toe protection; and
- dredging works.

Details of the exact methods are outlined within the supporting habitat regulation appraisal (Document reference: 105612-MMD-CO-ZZ-RP-O-0005-S2-P01). Key considerations for the risk assessment area as follows:

- Dredging works are being undertaken likely by backhoe dredging though may be undertaken by trailing suction hopper dredging;
- In order to achieve the required dredge pocket depth rock breaking activities may be required which would comprise CO_2 hydraulic fracturing using a Cardox with charges predrilled into the rock. The fractured rock may also require rock peckering using a hydraulic hammer to break the rock to the appropriate size; and
- Toe pile protection comprises diver installation of forms to produce concrete protective structures, or installation of fabric formwork for concrete mattresses which will be filled from the surface with marine grade concrete.

3.2 Operation and Decommissioning

There are no new works planned for the operational phase or plans to decommission the refurbished assets in the future as part of the Proposed Development.

3.3 Project Programme

Works will be completed over 12 – 18 months dependent on weather conditions and planned downtime.

Working hours are anticipated to be 24 hours each day, Monday to Sunday to accommodate dredging works and minimise disruption to the existing ferry service through allowing some dredging works to be undertaken overnight. However, rock breaking actives will be restricted to standard working hours between 08:00-1800

Monday to Friday and 08:00-13:00 Saturday. No rock breaking works will be undertaken on Sunday. Works will not affect existing ferry operations with regard to service.

Deliveries including the transport of materials, plant, and equipment to the development site will only take place during the following hours:

- Standard working hours: 07:00 to 18:00 on Monday to Friday
- No deliveries on Saturdays, Sundays or Public Holidays

Site access will typically be via road, i.e., wagon haulage. However, it is possible that some material may be transported by sea, e.g., by barge or ship.

Construction transport is expected to use local roads within the vicinity, and it is anticipated that one wagon per week during the construction works would be required.

To provide an indication for assessment of the extent of disturbance the construction works may cause, estimated duration ranges for the construction activities are presented in Table 3.1. These estimates have been based upon professional knowledge and experience from other projects. These estimates preclude vessel usages for the works which are likely to be very localised to the ferry terminals.

Table 3.1: Indicative activity durations

Activity	**Estimated duration range (days) (total number of days activity undertaken on i.e., not necessarily consecutive)** **Per site**
Dredging	20-60
Rock breaking (pre-drilling, Cardox fracturing and rock peckering) (if required)	Backhoe & Peckering: 10-30 Pre Drilling: 20-45 Cardox Blast: 5-30 (1 set of blasts each day)

4 Sensitive Receptors

In terms of designated protected marine areas, the site is located within the footprint of the Inner Hebrides and the Minches SAC, designated for harbour porpoise. The designated features of North Colonsay and Western Cliffs SPA (1.5km north-west) are also potentially within the study area of the Proposed Development due to its widely travelling designated seabird assemblage that includes kittiwake (*Rissa tridactyla*) and guillemot (*Uria aalge*). Both kittiwake and guillemot dive to some degree during feeding so are likely to use the marine waters within the study area of the Proposed Development.

Currently the way birds use sound underwater is poorly understood, research indicates that it is generally thought diving birds have increased underwater hearing sensitivity (Zeyl et al., 2022)[1]. Guillemot have also been shown to react to underwater noise (Hansen et al. 2020). As such, diving birds would be considered sensitive to the underwater noise disturbance. Furthermore, foraging by diving birds has been shown to be impacted by increased suspended sediments (Haney and Stone, 1988; Henkel, 2006; Darby, et al. 2022) so they would also be considered a sensitive receptor to the dredging works.

Marine mammals expected to be located in the vicinity and are potentially impacted by the works include:

- Bottlenose dolphin (*Tursiops truncatus*)

[1] This ties with other papers showing that there are established reactions by diving birds to underwater sounds (Pichegru et al., 2017; Hansen et al., 2020; Sørensen et al., 2020b) and that birds use/detect sound underwater (Therrien, 2014; Thiebault et al., 2016; 2019; Hansen et al., 2017; Larsen, Wahlberg and Christensen-Dalsgaard, 2020).

- Short-beaked common dolphin (*Delphinus delphis*)
- Harbour porpoise (*Phocoena phocoena*)
- Harbour Seal (*Phoca vitulina*)
- Grey Seal (*Halichoerus grypus*)

Other marine mammals that are not as common in the area but have the potential to be within the vicinity of the works, and therefore potentially affected, are:

- Risso's dolphin (*Grampus griseus*); predominantly recorded north of Islay and around the Outer Hebrides.
- White-beaked dolphin (*Lagenorhynchus albirostris*); predominantly seen in the Minch and north of the Outer Hebrides, and therefore unlikely that they would be present in the area.
- Atlantic white-sided dolphin (*Lagenorhynchus acutus*); predominantly located around the continental shelf areas west of the Outer Hebrides, but can move closer to the shore during summer, however, records indicate they are not common in the area around the works.
- Long-finned Pilot Whale (*Globicephala melas*); Predominantly recorded in deep waters, however, seasonally enter coastal areas with prey movements.
- Minke Whale (*Balaenoptera acutorostrata*); Predominantly feed in shallower waters and over the continental shelf however, they have been known to occur around headland, bays and inlets therefore there is potential they could be within the area.
- Killer Whale (*Orcinus orca*); Predominantly located in deeper waters, however, have been known to enter shallow waters to hunt.

Given the variable nature and effort of sightings there may be other marine mammals within the region, though those listed above are deemed most likely to be apparent within the study area of the Proposed Development. These species are shown to have auditory ranges in line with the intended equipment's operating frequencies (see Figure 4.1).

Basking sharks (*Cetorhinus maximus*) are also known to navigate Scottish waters and are hence considered a potential receptor[2]. Basking sharks prefer headlands, islands and bays with strong tidal flow and have been known to venture into shallow bays[3], on this basis, there is the potential for them to be present in the vicinity of the works whilst passing in the area. They are also known to have auditory ranges in line with the intended equipment's operating frequencies (see Figure 4.1)

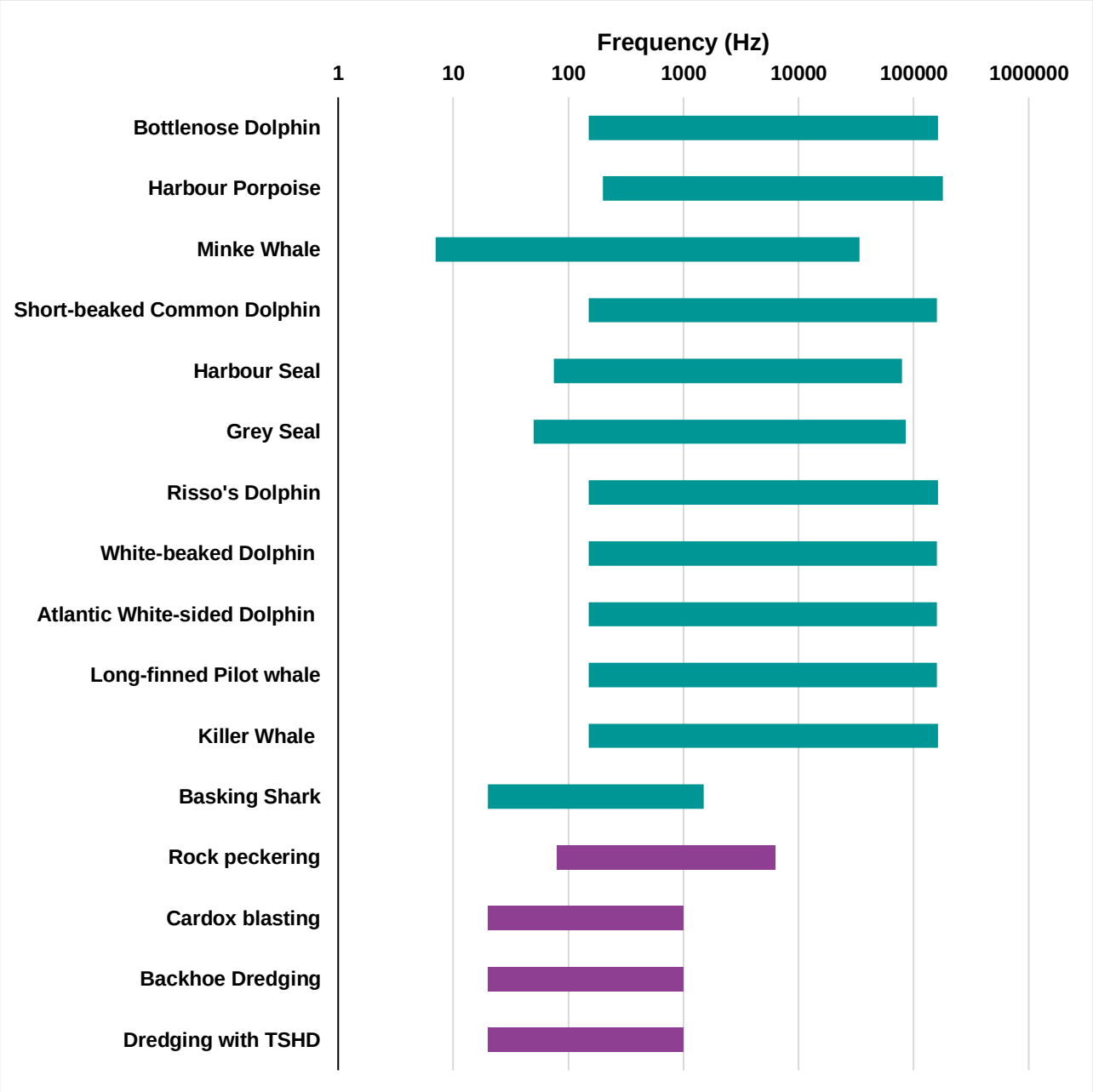
Lastly, Loch Fada SAC is located 1.5km from the Proposed Development and is designated for its habitats and presence of otter (*Lutra lutra*). It should be noted that a license has already been obtained relating to disturbance of non-breeding otters for the duration of the works and protection plans agreed with NatureScot (License Number 218152). As such, these have been excluded as receptors from this document.

A summary of receptor sensitivity is presented in Table 4.1. As such and with reference to the noise assessment (Section 5 below), these species are at risk from disturbance or harm, therefore mitigation is required for the intended works to proceed. This is outlined in Section 77.

[2] NatureScot, 2022 [Online] Available at Basking sharks | Marine Scotland Information and GeMS - Scottish Priority Marine Features (PMF) - Natural Spaces - NatureScot (snh.gov.uk).

[3] Shark Trust, 2020 [Online] Available at: About Basking Sharks | The Shark Trust

Figure 4.1: Hearing sensitivity of sensitive receptors in relation to equipment operating frequencies



Source: Adapted from Southall et al. (2007; 2019) and National Marine Fisheries Services (National Marine Fisheries Services, 2018). Basking shark range from Chapuis, et al (2019)

Table 4.1: Summary of receptor sensitivity

Receptor group	Sensitivity to underwater noise	Sensitivity to suspended sediments
Marine mammals	✓	X[4]
Basking sharks	✓	✓

[4] Victoria L. G. Todd, Ian B. Todd, Jane C. Gardiner, Erica C. N. Morrin, Nicola A. MacPherson, Nancy A. DiMarzio, Frank Thomsen, A review of impacts of marine dredging activities on marine mammals, ICES Journal of Marine Science, Volume 72, Issue 2, January/February 2015, Pages 328–340, https://doi.org/10.1093/icesjms/fsu187

Receptor group	Sensitivity to underwater noise	Sensitivity to suspended sediments
Diving birds	✓	✓
Otter	✓	✓

5 Underwater Noise Assessment

There are various noisy activities that are intended to be undertaken as part of the construction works, as outlined in Section 3.1 and summarised by type of noise produced in Table 5.1. These have the potential to either harm the ecological receptors identified in Section 4 or disturb them either from the area or altering their normal behaviour.

Table 5.1: Assessed marine construction works and their type of noise

	Pre-dredging rock breaking			Dredging	
	Rock pre-drilling	**Cardox**	**Rock peckering**	**TSHD**	**Backhoe**
Continuous noise	✓	X	X	✓	✓
Impulsive noise	X	✓	✓	X	X

TSHD: Trailer Suction Hopper Dredger

5.1 Assessment of Harmful Underwater Noise

In order to assess harm, quantitative underwater noise modelling was undertaken. Initial modelling was undertaken using the formula TL=βlog(r)+ αr (Simple Spreading Model)[5]. This provided an initial point of discussion with NatureScot and gained their agreement on receptors and relevant mitigation measures[6]. Further modelling was subsequently undertaken, using dBSea software version 2.3, to account for the local bathymetry and the sediment type around so that a more realistic prediction of underwater noise effects from the Proposed Development could be determined. This section summarises the findings of these noise modelling results where relevant and the full reports of both the Simple Spreading Model[7] and the more complex dBSea model[8], are enclosed with the license applications.

Out of the works from the Proposed Development, the pre-dredging rock breaking activities had the greatest sources levels, with Cardox emitting an estimated Sound Exposure Level for a Single Strike (SEL_{ss}) of 224 dB re 1µPa^2s at 1m and rock peckering emitting an estimated SEL_{ss} of 186 dB re 1µPa^2s at 1m. The remaining activities produced continuous noise and had a root mean square pressure level of <174 dB re 1µPa at 1m. Consequently, the results of the preliminary underwater noise calculations[7], found that the Cardox CO_2 fracturing system followed by rock peckering (impulsive sounds), will likely produce the largest effect. These indicated that for a static receptor the temporary threshold shift (TTS) in hearing from a 24 hour cumulative sound exposure (SEL_{cum}) for very high frequency (VHF) hearing group cetaceans (such as harbour porpoise) would occur at 4400m from the sound source for Cardox and 3000m for rock peckering. It should be noted that given the detonations occur within pre-bored tubes, the underwater noise dispersion from the Cardox detonation is likely to be more constrained than represented in the models which reflect a

[5] where β, the coefficient of the log term, corresponds to attenuation by spreading and β=18; while α corresponds to saltwater absorption and is assumed negligible.

[6] See Email communication with Area Officer – Marine, NatureScot. Subject: "*RE: Consenting Advice Enquiry - Mott MacDonald - New Islay Vessel Port Enabling Works Project - Construction Phase*". Dated 21/03/2023 14:36. Document Reference: 105612-MMD-00-ZZ-CM-O-0006-S2-P01

[7] Mott MacDonald, 2022. Port Colonsay – Underwater Noise Technical Note. Document reference: 105612-MMD- CO-ZZ-RP-O-1234-S2-P01

[8] Mott MacDonald, 2023. Port Colonsay – Underwater Noise Assessment. Document reference: 105612-MMD-00-ZZ-RP-O-0006-S2-P01-NIV.

highly conservative assessment. The remaining activities predicted a TTS SEL_{cum} for VHF hearing group cetaceans at much shorter distances (<290m from the sound source).

When taking account of the effects of bathymetry and sediments in the attenuation of underwater noise the dBSea model[8] showed a reduction in the TTS SELcum distance for all activities and hearing groups when compared to the Simple Spreading Model. As an example, the SELcum TTS from Cardox detonation for all cetacean hearing groups has been presented below in Table 5.2. These have indicated that for a static receptor the TTS SEL_{cum} for VHF cetaceans the distance has reduced to a maximum of 1500m.

Table 5.2: Updated Cardox modelling results for static receptor TTS SEL_{cum}

Marine mammal hearing groups	Max distance (m) below which TTS SEL_{cum} for a static receptor is exceeded rounded to two significant figures. (Mean distance in bracket)
LF	2300 (640)
HF	300 (120)
VHF	1500 (390)
PCW	480 (180)
OCW	230 (100)

Marine mammal hearing groups as per Southall *et al.* (2019) comprising low frequency (LF), high frequency (HF), very high frequency (VHF), phocid carnivores in water (PCW) and other carnivores in water (OCW) which include sea otters.

It should be noted that the underwater noise model assumes that marine fauna will remain within the vicinity of the construction activity for the full construction period. The results presented in Table 5.2 are therefore considered highly conservative as in reality this behaviour is very unlikely as it is anticipated that the marine animals would more likely flee at some point after registering a loud impulsive noise (i.e., Cardox blasting). When modelling a receptor fleeing perfectly perpendicular to the source, the dBSea model indicates a TTS SELcum occurring at <710m for Cardox for all receptor hearing groups and <60m for rock peckering for all receptor hearing groups. Consequently, the estimated distance for any harm occurring is likely lie somewhere between being a static and fleeing receptor so ensuring no marine mammals are within 1km of impulsive noise emitting activities would prevent any harm.

5.2 Assessment of Potential Disturbance from Underwater Noise

The noise modelling reports[7],[8] only consider any harm that could occur to receptors because of the works and does not include disturbance (such as a reduction in feeding), which is likely to occur over a much wider area. Disturbance thresholds are not as widely established or available compared to harm thresholds (TTS and PTS). A literature review has been undertaken to identify potential disturbance distances from the underwater noise generated. Several studies (Lucke *et al.*, 2009; Dähne et al., 2013; Thompson *et al.*, 2013) have concluded that disturbance for VHF hearing groups (Harbour porpoise) occurs when a single strike unweighted SEL of 145dB is exceeded. This unweighted SEL value has also been used by BEIS (2018) as a disturbance threshold in their assessment on impacts on the Southern North Sea special area of conservation designated to protect harbour porpoise.

As such, it is proposed that a disturbance distance on this threshold is used for the activities. It is also considered that as the VHF group is the most sensitive to disturbance and can therefore be used as a conservative disturbance distance for other hearing groups where disturbance thresholds are not established in literature. The predicted disturbance distance from single detonation of the source, calculated by the Simple Spreading Model, is 3500m for Cardox blasting, which equates to disturbance from approximately 17.3km^2 by the intended works[9].

However, as discussed in Section 4 diving birds and basking sharks are also considered sensitive to underwater noise though there is insufficient evidence available to determine an area of disturbance from it.

[9] Area covers marine waters up to mean high water spring (Holmes, 2022)

For the purpose of this risk assessment, it is thought that basking shark disturbance to be less than established for marine mammals that primarily use underwater sound to hunt and given the noise assessment showed harm at significantly smaller distances (≤300m for fish not using swim bladders in hearing based upon a static receptor). Further establishing disturbance area and quantities impacted for birds are not warranted by the current licensing requirements.

5.3 Summary

Based on the discussion in the sections above, a summary of the distances of potential effect for the different receptor types is presented in Table 5.3. This details the distances from the sound sources within which potential harm in the form of TTS could occur and also the potential distances where disturbance could occur.

Table 5.3: Summary of distances of potential effect from source

Receptor	Potential harm	Potential disturbance
Marine Mammals	<1000m for impulsive noise* <330m for continuous noise	<3500m
Basking Sharks	<300m	Unquantified though likely less than suspended sediment disturbance distances
Birds	Unknown though likely less than marine mammals	Unknown though likely less than marine mammals

* value based upon the greatest distance for a perfectly fleeing receptor being harmed at <710m and a completely static receptor being harmed at <2800m with consideration that a receptor is more likely to flee than remain stationary coupled.

6 Suspended Sediments

Dredging activities and dredge disposal may result in temporary increases in suspended sediment within the water column, posing a hazard to filter feeding organisms. The basking shark (*Cetorhinus maximus*) is an obligate ram feeder, using its gill rakers to filter zooplankton from the water. High suspended sediment concentrations (SSC) in the water column could detrimentally affect normal gill ventilation for respiration and filter-feeding, and it is possible that large, mobile planktivores such as basking shark will be disturbed by such conditions (Rohner et al., 2013). Remobilisation of sediments may also increase in organic enrichment which could potentially affect basking shark indirectly by influencing primary productivity and, therefore, prey abundance (Wilson, Wilding, and Tyler-Walters, 2020). This may also disturb their natural behaviours.

Basking shark are less sensitive to sound and are more likely to be disturbed by increases in SSC. As such, modelling has been undertaken to determine the dispersion of sediments during dredging works at Colonsay. As a precautionary approach, the greatest dispersion scenario of dredge operations being undertaken during high winds and under spring tides has been modelled[10].

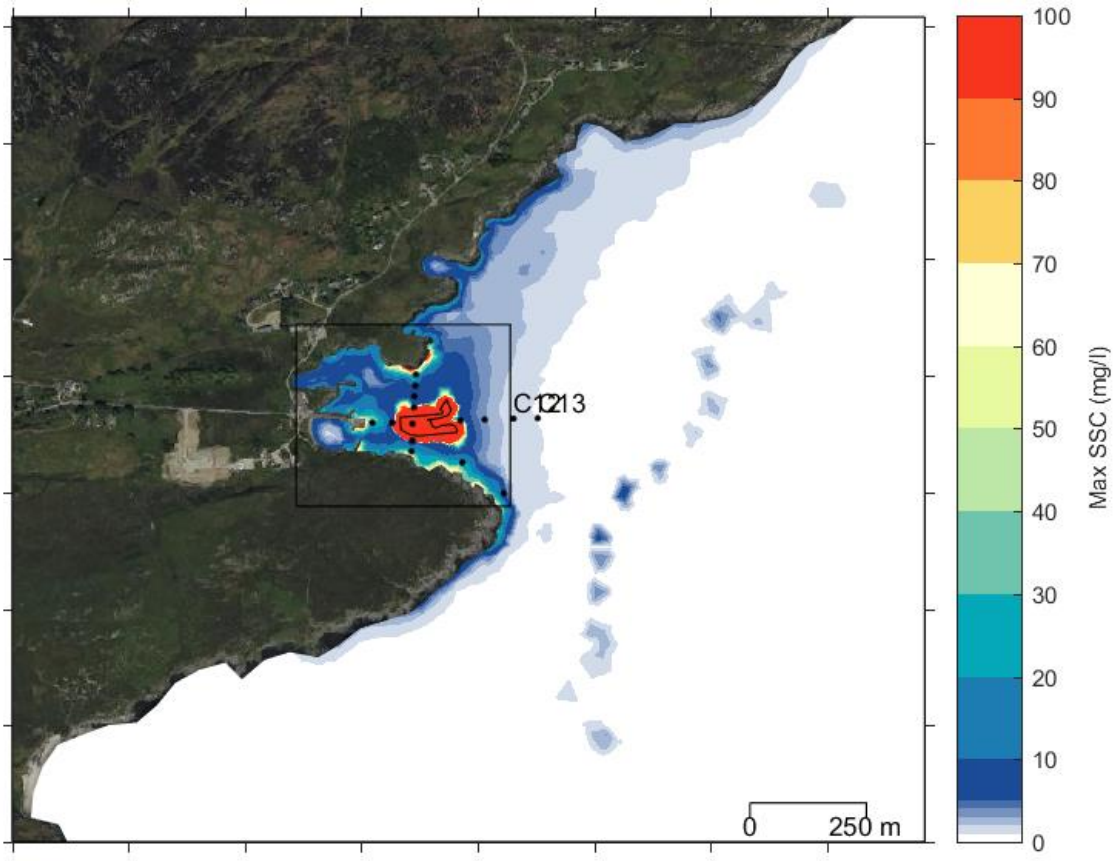
To set an appropriate distance for disturbance, the maximum extent of the maximum increased SSC occurring in each spatial cell from across the entire dredge period have been modelled (See Figure 6.1). It should be noted that the model may overemphasise concentrations within the dredge boundary as it considers instantaneous addition of the total spilled sediments in a particular spatial cell, which is likely a far worse case than the more gradual release that would occur in reality.

The furthest expanse of suspended sediments equates to approximately 1.5km from the indicative site boundary and this has been used to calculate the number of individual receptors that could be affected for the purpose of basking shark licensing. However, it should be noted that most suspended sediments are shown by the model to be short lived and very localised as supported by Figure 6.2. This figure illustrates the

[10] Mott MacDonald (2023). New Islay Vessel Enabling Works Dredge Dispersion Modelling: Colonsay. Version: March 2023 (Document reference: 105612-MMD-CO-ZZ-RP-O-0007-S2-P01)

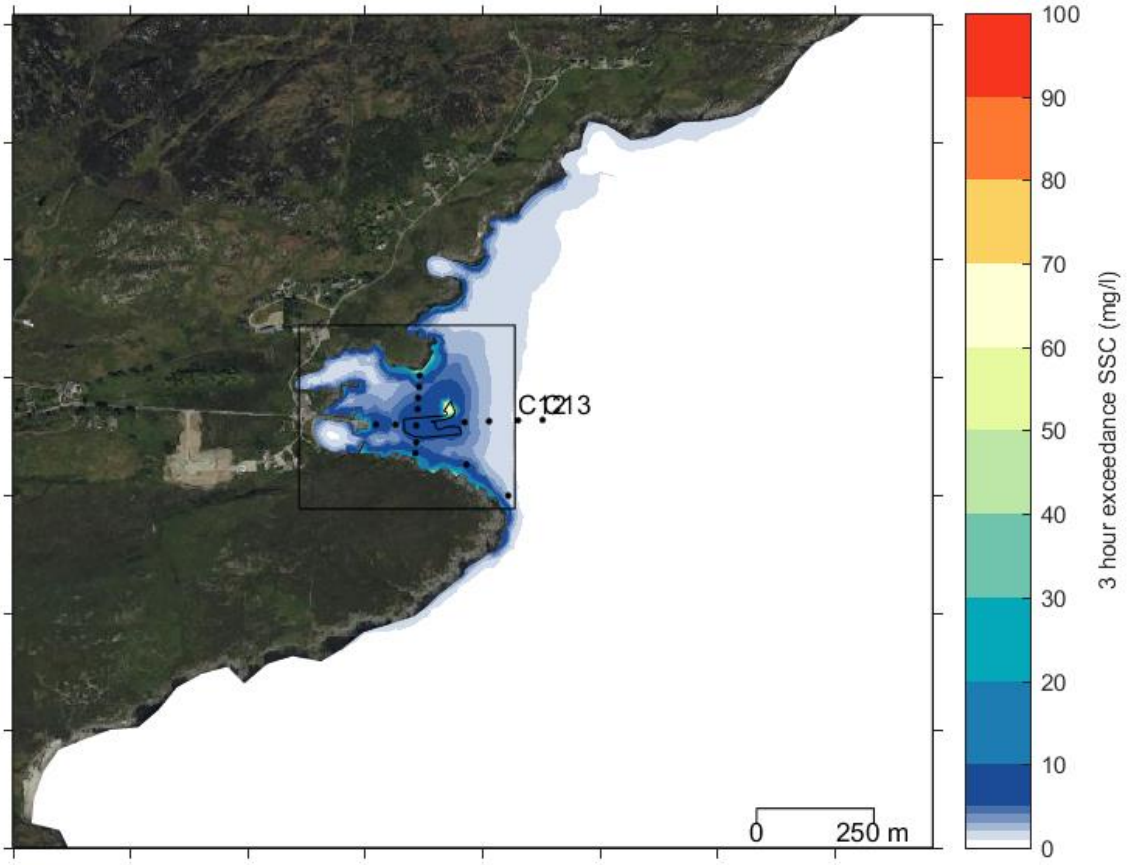
SSC which is exceeded for a total of more than 3 hours during the model simulation (noting that this may be a 3-hour continuous presence or discontinuous periods of presence totalling over 3 hours). For context, a 3-hour exceedance is approximately equivalent to a 99th percentile exceedance over the model simulation period, or a 98th percentile exceedance over the dredge period. The estimated suspended sediments disturbance area for basking sharks has been calculated to be 3.62km^2.

Figure 6.1: Maximum extents of suspended sediments across entire dredge period



Source: Mott MacDonald (2023).

Figure 6.2: Persistence concentrations above cumulative 3 Hours



Source: Mott MacDonald (2023). New Islay Vessel Enabling Works Dredge Dispersion Modelling: Colonsay. Version: March 2023 (Document reference: 105612-MMD-CO-ZZ-RP-O-0007-S2-P01)

7 Mitigation

7.1 Noise Mitigation Measures

To prevent injury to any marine mammals, basking sharks or birds, best practice guidelines in form of the Joint Nature Conservation Committee (JNCC, 2017) guidelines for minimising the risk of injury to marine mammals from piling noise[11] and relevant sections of the Scottish Marine Wildlife Watching Code (SMWWC) (NatureScot; formally Scottish Natural Heritage, 2017) shall be followed.

These shall compromise the following mandatory aspects, which have been agreed with NatureScot[12]:

- All equipment will be maintained to a high standard to minimise noise and vibration generated during the works. They will also be switched off when not in use to minimise noise and reduce air pollution.
- Toolbox talks for contractors on relevant marine receptors (See Section 4) are to take place and how best to minimise disturbance.

[11] JNCC 2010. Available at: Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise . Though use of explosive guidance has been considered the Cardox system is not quite analogous to a high order detonation given the charges are pre-drilled into the rock before detonation and rock fracturing by the rapid CO_2 expansion.

[12] Email communication with Area Officer – Marine. NatureScot. Subject: "*RE: Consenting Advice Enquiry - Mott MacDonald - New Islay Vessel Port Enabling Works Project - Construction Phase".* Dated 21 March 2023, 14:36

- Prior to commencing works, a 500m zone around non-impulsive sources and 1km zone around impulsive source shall be monitored for marine mammals, diving birds and basking sharks for 30 minutes in good daylight conditions (Beaufort Sea state 3 or less) by a suitably trained (JNCC methods) and dedicated[13] observer.
- Passive acoustic monitoring shall also be used to aid monitoring of the mitigation zones for vocalising species.
- Should marine mammals, diving birds or basking sharks be observed or acoustically detected, the start of operations should be delayed until 20 minutes after the last sighting of the receptor within the monitoring zone (500m non-impulsive sources and 1km for impulsive sources). Noting that non diving birds (i.e., those that are loafing) would not require a delay.
- Where possible equipment shall be soft started with either a ramp up in energy or gradual decreasing intervals between strikes over a period of 20-40 minutes duration. In the case of Cardox, detonations should be conducted with sequential delays between detonations to minimise shockwaves.
- Activities which generate less noise should precede the noisier activities.
- Vessels in transit and manoeuvring in coastal waters operating will be within speeds outlined by Maritime and Coastguard Agency's (MCAs) legislation and guidance[14].
- The SMWWC will also be adhered to during any vessel-based operations, measures include:
  - All vessels and equipment should be well maintained and be inspected prior to use to minimise unnecessary noise.
  - Should a marine mammal or basking shark be encountered whilst underway outside of noise emitting operations, the vessel shall avoid sudden unpredictable changes in speed, direction, and engine noise.
  - The vessel shall seek to maintain a minimum of 100m separation unless directly approached whereupon the vessel shall maintain a steady speed and course whilst not presenting propellers to the approaching animal.
  - Where birds are observed to be rafting[15] the vessel shall avoid driving through the aggregated birds and maintain a 50m separation where practicable and safe to do so.
  - Where there are birds situated on the water, the vessel shall maintain a speed below 6 knots where safe to do so.

Other noise mitigation measures for the impulsive activities have been considered though have been discounted. This is given that the intended enablement works have been designed so that the ferry terminal shall remain operational throughout to continue providing communities access to the islands. Were bubble curtains or resonators be installed they may cause significant safety concerns, be significantly costly to implement given their minimal likely reduction and disrupt access to the harbour by the ferries. Further use of acoustic deterrent devices may risk attracting marine mammals if insufficiently powerful enough or though in the case of certain models[16] they will introduce noise levels exceeding that of the intended construction works and a far greater disturbance distance.

7.2 Turbidity Changes and Pollution Mitigation Measures

Sediment dispersion modelling (see discussion in Section 6) indicates that the sediment plumes will be localised with the largest impacts from dredging works occurring within the immediate dredge area and

[13] For the periods of pre-clearance, the observer will have no other duties other than scanning to 500m zone. Though outside of this time they may undertake other roles.

[14] Maritime and Coastguard Agency, May 2014. Active marine guidance notes (MGNs) [Online] Available at: Active marine guidance notes (MGNs) - GOV.UK (www.gov.uk)

[15] Rafting is a behaviour where birds sit, often in groups, on the water close to their colony or nests.

[16] Seal (mammal) scarer | Ocean Science Consulting Ltd | Marine Science (lofitech.co.uk)

generally existing for a short duration. As such mitigation measures above for noise will also provide protection from the dredging activities.

To prevent additional sources of turbidity and potential pollution events occurring during construction operations, the following measures will be put in place:

- Pollution prevention measures specified in current Scottish Environment Protection Agency (SEPA) and Construction Industry Research and Information Association (CIRIA) guidance will be adhered to during works to avoid pollution/run-off of any material into the marine waters. These will be compiled into a Pollution Prevention Control Plan to provide information on the prevention and management of potential pollution sources into the marine environment associated with the works. This plan will also cover specific measures for marine vessel activities (e.g. dredging).
- Good housekeeping practices will be implemented on site at all times, any areas where hazardous substances have been used e.g., concrete will be sufficiently covered at the end of each day.
- Designated refuelling areas will be established, located away from waterbodies (>10m). All fuel tanks and oil drums will be bunded with imperious material. Where more than one container is stored, the bund should be capable of storing 110% of the largest tank or 25% of the total storage capacity, whichever is the greater.
- All mobile plant will be refuelled in a designated area on a temporary bunded impermeable surface and away from drains. In case of any spillages there will be a spill response kit available at each refuelling point and within each machine working within the site. Where it is impractical to refuel within a bunded area, a drip tray will be available to catch any spills caused by over fuelling.
- All tanks and containers will be kept in a secure compound and be protected from vandalism and will be clearly marked with their contents. Stores shall be located at least 10m from any waterbody.
- Oil absorbers and grab packs will be available on all vehicles and further materials, including booms.
- Adherence to the Water Management Plan (within the CEMP).
- Spill kits will be available on all plant / machinery and centrally in each area.
- Drip trays will be placed at the point where oils/fuels are transferred from one container to another.
- Requiring staff to undergo pollution toolbox talks prior to completing the Works.
- An Environmental Emergency Response Plan will be prepared by the Principal Contractor prior to construction. This will be issued as a tool box talk and kept in site offices for consultation.
- All fuel, oil and chemical deliveries will be supervised by a refuelling marshal who will be trained to deal with any spillage to prevent a pollution problem occurring
- Marine grade, non-toxic compounds and materials should be utilised for construction and any materials utilised should be fully cured before exposure to the marine environment.
- Regarding the prevention of discharges of cementitious materials and alkaline wastewaters, the following will be implemented:
  - Risk assessments for wet concreting will be completed by the Principal Contractor prior to works being carried out.
  - Concrete washout will not drain to any waterbody, drainage channel or marine environment. Impermeable areas will be designated for concrete handling/mixing and for washing and cleaning, at least 10m from surface drainage systems, local waterbodies and marine environment.
  - There will be a designated area for the washout of concrete wagons, shoots and mortar bins at the site. This will be either a lined skip or a pit lined with an impervious membrane to prevent the escape of the alkaline and silty waters entering the groundwater, surface water or marine environment.
  - Excess concrete remaining in the delivery wagon at the end of a pour will be returned to a designated collection area. Once work sites are completed any solid concrete in the washout area will be broken out and used either as suitable fill or disposed of to a licensed waste facility.

- Any effluent from the site compound will be collected in an effluent holding tank and removed from site as controlled waste. The foul effluent can only be removed from site by licensed waste disposal companies and the effluent must be taken to a fully recognised and licensed sewerage treatment works.
- All applicable vessels that travel to the site from outside of UK waters will comply with the IMO Ballast Water Management (BWM) Convention 2004 which establishes standards and procedures for the management and control of ships' ballast water and sediments. Under the Convention, all ships of 400 gross tonnes (gt) and above in international traffic are required to manage their ballast water and sediments to a certain standard, according to a ship-specific ballast water management plan. All ships will also have to carry a ballast water record book and an international ballast water management certificate.
- All vessels should also comply with the Merchant Shipping (Anti-fouling Systems) Regulations 2009, which prohibit the use of harmful organotin compounds in anti-fouling paints used on ships and establish a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems and places into UK law Regulation (EC) 782/2003 on the prohibition or organotin compounds on ships.

8 Licence Assessment Justifications

Consistent with the EPS licence assessment process[17] the following sections seek to detail the necessary information to inform the three tests for approving a licence for an activity.

8.1 Licensable Purpose (Test 1)

For a license to be issued, the project must define how it relates to one of the purposes referred to in Regulation 44 (2) of (The Conservation (Natural Habitats, &c.) Regulations 1994 (As Amended)). The project is intended to:

- Deliver the Scottish government funded enablement project which supports the economic and social development of the region allowing increased carriage capacity of the ferry terminal[18].
- Allow greener transportation with new more emission efficient vessels enabled by this development.
- Improve connectivity for the community across the Argyll and Bute.

As such it is considered that these intentions meet an imperative reason of overriding public interest (IROPI) from an economic and social nature with some benefit to the environment.

8.2 Assessment of Satisfactory Alternatives (Test 2)

The works are intended to improve port infrastructure. Consequently, the available alternative is to either:

1. Not undertake the enablement works and therefore the Island would remain restricted from being unable to use the new vessels. This would have significant impact on social and economic development of the island, which would also exacerbate pressures from projected population and service growth.

2. Not dredge but will not meet the capacity for the services to the island with the new vessels. This will restrict access to the area and would require further extension of the jetties into deeper waters to provide access without dredging. This would cause a larger change to the environment and construction would present greater harm than the Proposed Development.

[17] EPS Licence Guidelines. Marine Scotland. Available at: The protection of Marine European Protected Species from injury and disturbance. Marine Scotland.

[18] New Vessels for Islay. Available at: CMAL: New Vessels for Islay. Islay vessel enabling works

8.3 EPS Conservation Status Implications (Test 3)

The estimated density of the anticipated species that are in the estimated area of disturbance (17.34km^2) are detailed in Table 9.1: . This is used to inform the third test ensuring that the works will not be "detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range".

It should be noted that the estimated disturbed density assumes that the noise producing activities are continuous and that species will flee following the initial disturbance. However, breaks or pauses during operations allow species to re-enter the disturbance area and hence are disturbed again. No modelling has been undertaken to determine the rate at which species return when noisy activities are paused, and therefore exact quantity of disturbed species is difficult to determine. Consequently, an assumption has been made that up to a three-fold increase over the single disturbance event could be disturbed across the duration of the project (see final column in Table 8.1). This is considered a highly conservative estimate given the receptors are highly mobile and likely the majority will continue their foraging activities in the areas disturbed to rather than returning repeatedly to a disturbed area.

Table 8.1: Estimated Sightings, Densities, and Disturbance

Species	Density Estimate (individuals km^2)	Peak Sightings	Estimated number disturbed[19], during single event	Estimated total number disturbed, considering re-entry of individuals
Atlantic White-Sided Dolphin	0.002 – 0.024[a]	N/A	0.416	1.248
Basking Shark	0.100[b] -0.240[c]	14 *(Latest confirmed sighting on 19/07/2019)*	14	42
Bottlenose Dolphin	0.121[a]	7	7	21
Grey Seal	0.040 – 7.193[d] 18.385[e]	N/A	318.796	956.388
Harbour Porpoise	0.100 – 3.000[a]	5	86.702	260.106
Harbour Seal	0.018 – 0.155[d] 23.730[e]	N/A	411.487	1,234.461
Killer Whale	0.001[a]	1	1	3
Long-finned Pilot Whale	0.001[a]	N/A	0.017	0.052
Minke Whale	2.923[a]	3	52.021	156.063
Risso's Dolphin	0.237[a]	7	7	21
Short-beaked Common Dolphin	0.090[a]	50	50	150
White-beaked Dolphin	0.318[a]	N/A	5.514	16.542

Source: Density estimate ranges obtained from (a) Marine Scotland's estimates for the nearby W1 site (Hague, Sinclair and Sparling, 2020), (b) statistical approaches to aid the identification of MPAs for basking shark (Paxton et al., 2014), (c) Distribution and abundance of basking sharks (Webb et al., 2018), (d) Seal at-sea usage maps (Russell et al., 2017) cited in Hague, Sinclair, and Sparling, 2020, and (e) Datasets from Habitat-based distribution estimates for seals (Carter et al., 2022).
Peak sightings relate to recent sightings (the last 3 years unless otherwise stated) by the Hebridean Whale and Dolphin Trust (HWDT, 2023) and should be considered as the potential disturbance number where greater than the calculated density based upon per-kilometre density estimate. It should be noted that some species have only been determined from modelled density estimates. Those without sightings have been listed as N/A.

[19] The estimated number disturbed are calculated using either the recent peak sightings reported nearby 10km of the site as a maximum or using the estimated area times the publicly available estimated density of species within the region. It is felt that these are representative of the number that may fall within the area of disturbance.

9 Conclusion

The improvements from the Proposed Development at Colonsay Ferry Terminal will bring social and economic benefits by addressing the need to update the port for more efficient vessels to be able to pass through.

The main anticipated species at Colonsay include Bottlenose Dolphin, Short-Beaked Common Dolphin, Harbour Porpoise, Harbour Seal, Grey Seal and Otter. Species that have the potential to be within the vicinity of the works, and therefore included as a precautionary measure are Atlantic White-Sided Dolphin, Basking Shark, Guillemot, Killer Whale, Kittiwake, Long-finned Pilot Whale, Minke Whale, Risso's Dolphin, and White-beaked Dolphin.

To prevent any injury, mitigation measures have been recommended including monitoring for marine mammals before the works. It is expected that generally a small proportion of marine mammal population will be impacted (see Table 9.1Table 9.1:) in a relatively small area compared to their ranges. Note that although the estimated proportion of the bottlenose dolphin population disturbed is higher, their rarity across the region makes the estimate of number disturbed highly conservative when based upon recent sightings. It is likely that fewer would be disturbed though it is difficult to estimate this number. The whole duration of the project could take up to 18 months to complete though the activities are far shorter with estimated duration for dredging taking up to 2 months, and rock breaking activities (peckering and Cardox blasting) taking up to one month. Given the nature of using precautionary estimates, the majority of the works being undertaken with generally quieter sound sources than Cardox, and durations of noise activities being only a small part of the overall construction period, it is unlikely that disturbance would be long term.

With the proposed mitigation in place, there is minimal impact expected. Consequently, in line with the EPS licensing Test 3 (Section 8.3), it is felt that the required construction work for the Proposed Development would not be considered as "detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range" though it is appreciated that consideration of other works currently approved with active EPS licences contribute to this test.

Table 9.1: Abundance of protected species and the predicted number impacted (based on greatest density estimates)

Species	Predicted Number Impacted	Abundance
Atlantic White-Sided Dolphin	2	69,293[a]
Basking Shark	42	1815[d]
Bottlenose Dolphin	21	45[ab]
Grey Seal	957	120,800[c]
Harbour Porpoise	261	28,936[b]
Harbour Seal	1235	37,200[c]
Killer Whale	3	15,000[a]
Long-finned Pilot Whale	1	50,000+[b]
Minke Whale	157	10,288[b]
Risso's Dolphin	321	8,687[b]
Short-beaked Common Dolphin	150	57,417[b]

Species	Predicted Number Impacted	Abundance
White-beaked Dolphin	17	15,895[a]

Source: Abundance range obtained from (a) Marine Scotland's management unit estimates for West Scotland (Hague, Sinclair and Sparling, 2020), (b) JNCC's Updated abundance estimates for cetacean management units in UK Waters (IAMMWG, 2022), (c) Special Committee on Seals (SCOS), 2021 report for all of Scotland (SMRU, 2023), and (d) Distribution and abundance of basking sharks (Webb et al., 2018).

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