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Iona Breakwater Project

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GLOSSARY

Term	Definition
Cetacean	Aquatic mammals constituting the infraorder Cetacea (whales, dolphins, porpoises).
Decibel (dB)	A relative scale most commonly used for reporting levels of sound. The actual sound measurement is compared to a fixed reference level and the "decibel" value is defined to be $10 \cdot \log_{10}(\text{"actual"/"reference"})$, where ("actual"/"reference") is a power ratio. The standard reference for underwater sound pressure is 1 micro-Pascal (μPa), while 20 micro-Pascals is the standard for airborne sound. The dB symbol is often followed by a second symbol identifying the specific reference value (i.e. re 1 μPa).
Management Unit	Marine mammal Management Unit (MUs) for marine mammals in UK waters, which provide an indication of the spatial scales at which impacts of plans and projects alone, cumulatively and in combination, need to be assessed for the key cetacean species in UK waters. For cetaceans, these management units are defined by the Inter-Agency Marine Mammal Working Group. For seal species (harbour and grey seal), the Special Committee on Seals (SCOS) provided advice on seal MUs.
Permanent Threshold Shift (PTS)	A total or partial permanent loss of hearing caused by some kind of acoustic trauma. PTS results in irreversible damage to the sensory hair cells of the ear, and thus a permanent reduction of hearing acuity.
Sound Exposure Level (SEL)	The cumulative sound energy in an event, formally: "ten times the base-ten logarithm of the integral of the squared pressures divided by the reference pressure squared". Equal to the often seen " L_E " or "dB SEL" quantity. Defined in: ISO 18405:2017, 3.2.1.5
Temporary Threshold Shift (TTS)	Temporary loss of hearing as a result of exposure to sound over time. Exposure to high levels of sound over relatively short time periods will cause the same amount of TTS as exposure to lower levels of sound over longer time periods. The mechanisms underlying TTS are not well understood, but there may be some temporary damage to the sensory cells. The duration of TTS varies depending on the nature of the stimulus, but there is generally recovery of full hearing over time.

ABBREVIATIONS

Acronym	Description
ANSI	American National Standards Institute
EPS	European Protected Species
HWDT	Hebridean Whale and Dolphin Trust
FCS	Favourable Conservation Status
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
LCRI	Low Carbon Research Institute
MD-LOT	Marine Directorate - Licensing Operations Team
MPA	Marine Protected Area
MU	Management Unit
NRW	Natural Resources Wales
PTS	Permanent Threshold Shift
rms	Root mean square
SAC	Special Area of Conservation
TTS	Temporary Threshold Shift
UK	United Kingdom
UKMPS	UK Marine Policy Statement

UNITS

Unit	Description
dB	<i>Decibel</i>
Hz	<i>Hertz</i>
kHz	<i>Kilohertz</i>
<i>km</i>	<i>Kilometre</i>
<i>km²</i>	<i>Kilometre squared</i>
<i>L_E</i>	Same as SEL
<i>m</i>	<i>Metres</i>
<i>ms⁻¹</i>	Metres per second
<i>SEL</i>	<i>Sound exposure level</i>
<i>μPa</i>	<i>micro-Pascal</i>
<i>%</i>	<i>Percentage</i>

1 INTRODUCTION

1.1 Project overview

The Proposed Development for the Iona Breakwater Project (hereby referred to as “Proposed Development”) is being proposed by Argyll & Bute Council to improve the berthing facility on the Isle of Iona. Iona is a small island located to the west of the Isle of Mull. The Sound of Iona, which is orientated north-by northeast to south-by-southwest and is open to the Atlantic Ocean particularly from the southwest and separates the Isle of Iona and the Isle of Mull. At Iona, an existing ferry terminal, comprising a pier and a steep slipway, is located within the small village of Baile Mòr. A small-scale passenger ferry operates from this location between the Iona ferry terminal and the Fionnphort ferry terminal, on the Isle of Mull.

As part of the Argyll & Bute Council Local Development Plan (LDP)¹, a new strategy for Oban, Lorn and the Isles has been developed in order to address known infrastructure constraints and improve ferry services. The Proposed Development consists of the construction of a new rock armour breakwater (185m crest length) to the south of the existing slipway. Minor overburden dredging (2,017m² area, 1,225m³ dredge volume) will be required in order to accommodate the new navigation channel requirements. Descriptions of these proposed activities are provided in the **sections 1.3** and **1.4** below. RPS has been contracted by Argyll and Bute Council (‘the Client’) to prepare and support delivery of marine European Protected Species (EPS) and basking shark Licences, together with a Marine Wildlife Supporting Information Document for the Proposed Development **Figure 1-1**.

¹ [Argyll & Bute Local Development Plan - https://www.argyll-bute.gov.uk/ldp](https://www.argyll-bute.gov.uk/ldp)



Figure 1-1 Proposed Development Overview, Site Boundary and Working Areas

1.2 Purpose of the document

As some marine species in the United Kingdom (UK) are protected under law (see **section 2**) EPS and basking shark License applicants must demonstrate that risks of injury and disturbance have been duly assessed in the vicinity of the Proposed Development.

Advice received from NatureScot (2024) requested the following:

'We advise that that if consented, a European Protected Species licence is applied for in respect of disturbance aspects only, for both the construction and dredging and any subsequent further maintenance dredging operations and includes the following species:

- *Harbour porpoise*
- *Bottlenose dolphin*
- *Common dolphin*
- *White beaked dolphin*
- *Minke whale*
- *Killer whale*'.

And

'We further advise the need for a basking shark licence during construction under the Wildlife and Countryside Act'

This EPS and Marine Wildlife Supporting Information Document covers the capital dredging and the placement of the rock armour break water (the Licensable Operations) within the Proposed Development (**Figure 1-1**) and will focus on disturbance aspects only in line with NatureScot advice, as injury ranges were not exceeded. Further details on the Licensable Operations methods are presented in the design section of this report (**section 1.3**).

This document summarises the legislative context (**section 2**) with respect to marine EPS and basking shark of relevance to the Proposed Development (**section 4**) and provides an overview of the Licensable Operations (i.e. noise-producing activities) (**sections 1.4 and 5**) that will be undertaken. It describes the proposed activities, the equipment likely to be used and associated noise levels. Underwater noise modelling of the sound sources has been undertaken to assess the risk of disturbance to marine EPS and basking shark within the relevant legislative context (**section 2**).

This document was drafted using the following documents:

- NatureScot (2024)
- Volume III, Appendix 8.4: Iona and Fionnphort Ferry Ports Subsea Noise Modelling
- Volume II: Environmental Impact Assessment Report

The Licensable Operations relevant for the Proposed Development include construction of a breakwater and capital dredging and sea disposal.

1.3 Iona Breakwater design

1.3.1 Rock armour breakwater

The function of the breakwater is to provide defence from waves propagating from the prevailing southerly direction, which will provide protection for slipway users and ferry vessels. The breakwater will result in an overall reduction of wave heights, which will provide a greater grip between the ferry ramp and the slipway, significantly reducing the risks to ferry operators and passengers and vehicles boarding and disembarking the ferry.

The design details of the rock armour breakwater are listed below:

- The breakwater will be located approximately 70m south of the existing slipway in Iona.
- Crest length of circa 185m.
- 2:1 slope on outer face (non-slipway side) and 1:1.5 on the inner face (slipway side).
- The proposed maximum crest level will be 7.71m CD.
- Due to high flows through the crest during storm conditions, the crest width will be 4m.
- The base of the breakwater will be lined with a tear resistant geotextile membrane with the bedding placed on top of this layer will comprise of a 500mm deep layer of 300-1000kg graded rock.
- The core will be constructed of 1000-3000kg graded rock.
- The outer layer will be constructed of 3000-6000kg graded rock.
- A 3m wide and 2.5m high toe will be constructed on each face of 3000-6000kg graded rock. The toe will not be visible as it will be under a layer of sediment. Therefore, an area of sediment will need to be excavated, however this material will be replaced after construction is completed.
- At the end of the breakwater, a 5:1 batter will be constructed of 1000-3000kg of graded rock.
- The overall footprint of the breakwater is approximately 2.18ha.
- The rock armour breakwater will be constructed of clean quarried rock. The estimated volume of rock armour required for the proposed breakwater is 149,812 tonnes.
- It is likely that local sources of rock armour will not be suitable, however Glensanda Quarry (Aggregate Industries) in Oban has been identified as a quarry which will be capable of producing rock armour material to a grading sufficient for the application at Iona. The quarry is equipped with marine loading facilities

Vessel operations, required to support the construction of the breakwater are expected to be within the area for up to 52 weeks, with approximately 40-50 vessel movements to delivery rock armour. However, it is unlikely that vessels will be continuously operating during this time.

1.3.2 Dredging

In order to accommodate the new navigation channel requirements, some dredging works will be required, however these will be minor in nature and comprise of overburden dredging only. The approximate dredge area is 2,017m², and the approximate dredge volume to be removed is 1,225m³. It is proposed that this is carried out by a backhoe dredger, with the material deposited at MA035 Portnahaven.

Capital dredging will require the use of a backhoe excavator for up to one week of operation. Once the dredging is complete the backhoe excavator will demobilise from site.

1.4 Construction equipment

1.4.1 Construction of Breakwater

Construction of the breakwater includes all material brought to site on the flat top barge that will then be manoeuvred from the barge to construct the breakwater using the Jack up barge (OCM-50).

1.4.2 Dredging

The dredging will be undertaken using a self-propelled backhoe dredger and a secondary spud legged barge with long reach will be used to move the dredge material onto a vessel for disposal at sea.

2 LEGISLATIVE CONTEXT

Under UK and European law, some marine species are afforded protection from activities that may cause injury or disturbance. These species include (amongst others²):

- cetaceans (whales, dolphins and porpoise) and marine turtles, labelled as EPS under Annex IV of the European Commission Habitats Directive (92/43/EEC) (the “Habitats Directive”); transposed individually into UK law under the devolved administrations; and
- basking shark *Cetorhinus maximus*, protected under the Wildlife and Countryside Act 1981 (as amended) in Scotland.

2.1 Marine European Protected Species

In Scotland, the Habitats Directive is transposed into UK law by the Conservation (Natural Habitats) Regulations 1994 (as amended) (the “Habitats Regulations”), which mandates protection for EPS out to 12nm. Under Regulation 39 (1) of the Habitats Regulations, it is an offence to deliberately or recklessly disturb, injure, capture or kill a wild animal of an EPS.

Cetaceans are further protected in Scottish waters under Regulation 39 (2) of the Habitats Regulations which states that it is an offence to deliberately or recklessly disturb any dolphin, porpoise, or whale. Disturbance includes any temporary disturbance that has the potential to cause significant harm to the cetaceans present.

In brief, marine activities should not be detrimental to the population maintenance of the species concerned, with particular emphasis on breeding or resting areas across their natural range. EPS licensing makes it possible to permit certain activities that would otherwise be illegal. Marine Directorate - Licensing Operations Team (MD-LOT) (on behalf of the Scottish Ministers) is the licensing authority for marine casework and is advised by NatureScot for applications within 12nm. For Licenses to be granted, the licensing authority need to be satisfied that the following criteria are met:

- Test 1 (Overriding Public Interest Test): If the competent authority is satisfied that, there being no alternative solutions, the Proposed Development must be carried out for imperative reasons of overriding public interest, which may be of a social or economic nature (Regulation 44(2));
- Test 2 (No Satisfactory Alternatives Test): There are no satisfactory alternative locations for the Development or alternative methods to the Licensable Operations (Regulation 44(3)(a)); and
- Test 3 (Favourable Conservation Status [FCS] Test): The Licensable Operations will not be detrimental to the maintenance of the population of the species concerned at a Favourable Conservation Status (FCS) in their natural range (Regulation 44(3)(b)).

² Only those protected species susceptible to disturbance and injury from underwater noise are considered for the purposes of this assessment.

EPS that need to be considered for the Proposed Development Licensable Operations are discussed in **section 4**. If there is a risk of injury or disturbance to EPS that cannot be removed or sufficiently reduced by using alternative methods to those associated with the activity and/or mitigation measures, then the activity may still be able to go ahead under License provided that the three tests described above are satisfied.

2.2 Basking shark

Basking sharks are protected under the Wildlife and Countryside Act 1981 (as amended), It is an offence to intentionally or recklessly capture, kill, injure, take, harass or disturb any basking shark. Any activity that may result in disturbance or injury will require a derogation licence from MD-LOT to undertake the activity legally. The conditions for granting consent to a project are similar to those required for an EPS Licence, starting with the application covering a licensable purpose followed by a justification that there are no satisfactory alternatives and that the licensable actions will not be detrimental to the maintenance of the population of the species concerned at FCS in their natural range.

2.3 Favourable Conservation status

Article 1(i) of the Habitats Directive defines FCS of a species. FCS describes the situation in which the species is thriving throughout its natural range and is expected to thrive in the future. The FCS of each species considered for these Licenses has been presented in the species-specific risk assessments in **section 6.3**.

3 GUIDANCE

Marine Directorate has produced guidance concerning Scottish inshore waters and the protection of marine EPS from injury and disturbance (Marine Scotland, 2020). The guidance provides advice for marine users who are planning to carry out an activity in the marine environment which has the potential to kill, injure or disturb an EPS. The guidance clarifies the circumstances in which an EPS License is required and outlines the process to be followed in applying for a License, reflecting a precautionary approach given the uncertainties surrounding the issue of disturbance and marine EPS.

The JNCC, Natural England and Natural Resources Wales (NRW) (previously Countryside Council for Wales) have produced draft guidance concerning the Habitat Regulations and protection of marine EPS from injury and disturbance in the UK offshore marine area (JNCC *et al.*, 2010). The guidance document provides an example of a preventative approach to ensuring the strict protection of EPS in their natural range as required by Article 12 of the Habitats Directive.

The 2010 guidance defines disturbance as significant when '*it is likely to be detrimental to the animals of an EPS or significantly affect their local abundance or distribution*'. It also highlights that '*trivial disturbance*' should not be considered as a disturbance offence under Article 12. Trivial disturbance is described as '*sporadic disturbances without any likely negative impact on the animals such as that resulting in short term behavioural reactions which is not likely to result in an offence being committed*' (JNCC *et al.*, 2010).

4 SPECIES BASELINE INFORMATION

4.1 Key protected species

The marine protected species relevant to this assessment (i.e. those susceptible to disturbance from underwater noise) that are most commonly documented in the Sound of Iona, the west coast of Scotland, north-western Irish Sea and surrounding areas, are presented in the following sections. It should be noted that the monitoring success of marine wildlife sightings (ship or aerial) surveys are highly dependent on abiotic factors (sea state, visibility, re-sightings and seasonality of survey effort etc.), and whilst they are indicative of presence/absence distributions, it can be tenuous to model absolute abundance or densities.

Where density estimates have been made for geographic areas (or species management units) the highest estimates are typically utilised for conservative risk assessments in the interest of adhering to the precautionary principle. The information presented below has been reproduced from the Volume II: Environmental Impact Assessment Report.

4.1.1 European Protected Species

Harbour porpoise

Harbour porpoises *Phocoena phocoena* can be found in inshore waters throughout the Northern Hemisphere, but the density of porpoise in Hebridean waters is amongst the highest in Europe. They are the most frequently seen cetacean, accounting for almost half of sightings from the *Silurian* (Pierpoint, 2008). They are widespread and can be seen in most coastal areas of the Hebrides, with the highest encounter rates occurring around the Small Isles.

Abundance in block G of the SCANS III aerial survey covering the Proposed Development was calculated as 5,087 (95% CI = 1,701 – 10,386) (Hammond *et al.*, 2017) with a density estimate of 0.336 animals/km². Based on a boat-based visual survey conducted during May-August 2002-2004, Goodwin and Speedie (2008) reported that harbour porpoise density showed an increase for West Scotland over the study period and the population of West Scotland was estimated at 3105 (95% CI = 2032 – 4745) during August and September.

Bottlenose dolphin

The bottlenose dolphins *Tursiops truncatus* encountered in the Hebrides are near the northernmost extreme of the species' global range. They generally stay close to shore, following the coastline as they travel throughout the area, and can be seen around headlands and bays. They are most often seen in and around the Sound of Barra and throughout the Inner Hebrides, with most sightings around Mull, the Small Isles and Skye. In the Hebrides, bottlenose dolphins travel in small, social groups of between three and ten individuals, but larger group sizes are not unusual (Serani & Diez, 2017).

Based on photo-identification studies, the west coast of Scotland total abundance estimate is 41 (95% CI = 35 - 49) (Thompson *et al.*, 2011), corroborated by Cheney *et al.* (2013) who, via integrated multiple data sources, placed the west coast bottlenose dolphin population estimate in 2007 at 45 (95% CI = 33 - 66). Abundance in block G of the SCANS III aerial survey covering the Proposed Development was calculated as 1,824 (95% CI = 0 – 4,474) (Hammond *et al.*, 2017) with a density estimate of 0.121 animals/km².

Common dolphin

Short-beaked common dolphins *Delphinus delphis* were the most commonly sighted dolphin species during HWDT (2018) surveys, accounting for 4% of all marine animal sightings. Common dolphins can be seen throughout the west coast, with most sightings east of the Outer Hebrides in the Minch, Little Minch and the Sea of the Hebrides as well as in the coastal areas. Sightings of common dolphins in the Hebrides peak between April and October each year, although some animals now remain in the area throughout the winter months.

Whilst no sightings occurred in Block G of the SCANS III aerial survey, other studies reported that in the period 1992 to 2003 the relative frequency of strandings of common dolphin in northwest Scotland have increased (MacLeod *et al.*, 2005). Similarly, sightings surveys conducted from May to September 2002 and 2003 show that the relative occurrence and abundance of common dolphins increased in comparison to previous surveys conducted between 1973 and 1999 (MacLeod *et al.*, 2005). These results are corroborated by HWDT (2018) who reported that during 15 years of monitoring Hebridean seas (2003 to 2017), sightings of common dolphins have increased twenty-fold, and they are now the most commonly encountered dolphin species during the surveys.

White-beaked dolphin

White-beaked dolphins *Lagenorhynchus albirostris* have a relatively restricted range and are only found in the temperate and subarctic waters of the North Atlantic. The Hebrides are towards the southern extreme of their range, they are usually seen in open waters further from the coast and favour the waters around the Outer Hebrides and the north Minch. White-beaked dolphins are present in Hebridean waters all year round.

Whilst no sightings occurred in Block G of the SCANS III aerial survey, other studies reported that in the period 1992 to 2003 the relative frequency of strandings of white-beaked dolphin in northwest Scotland has declined (MacLeod *et al.*, 2005). Similarly, sightings surveys conducted in May-September 2002 and 2003 show that the relative occurrence and abundance of white-beaked dolphin have declined in comparison to previous surveys conducted between 1973 and 1999 (MacLeod *et al.*, 2005).

Killer whale

Killer whale *Orcinus orca* can be seen throughout the west coast of Scotland and can be seen from the shore in coastal areas as well as offshore. During HWDT (2018) surveys there have been just 16 sightings between 2002 and 2017, most of which have been of a small unique group called the West Coast

Community, the UK's only resident group of killer whales. The West Coast Community amount to eight individuals. Although the group is wide-ranging (seen along the whole of the west coast of the UK, from the Hebrides to the south of Ireland), most sightings have been within the Hebrides. Sightings of killer whales are infrequent, but they are present in Hebridean waters all year round and are generally recorded near-shore between April and October (Reid *et al.*, 2003) and further offshore between November to March. Recent surveys north and west of Scotland suggest that killer whales concentrate along the continental slope north of Shetland between May and June (Reid *et al.*, 2003). Seasonal movements may be associated with the distribution of particular prey (e.g. seals are preyed upon close to land particularly in June to October when they haul out to breed).

Minke whale

Minke whales *Balaenoptera acutorostrata* are one of the most widely distributed baleen whales and can be found from the subtropics to polar waters in the Northern Hemisphere. Their migration patterns are not fully understood, although they are thought to make a general migration between winter breeding grounds to the south of the British Isles and feeding grounds in the cooler, more productive waters during the summer. The second most frequently seen cetacean from HWDT surveys between 2003 and 2017, minke whales account for 7% of all marine animal sightings. The highest encounter rates and most frequent sightings are around the Small Isles and east of the Outer Hebrides throughout the Minch and Sea of the Hebrides.

Abundance in block G of the SCANS III aerial survey covering the Proposed Development was calculated as 410 (95% CI = 0 – 1,259) (Hammond *et al.*, 2017) with a density estimate of 0.027 animals/km².

Other cetaceans

Other cetacean species that may occur within the northern part of the Irish Sea and west coast of Scotland but are less common and not frequently observed within the region are:

- Atlantic white-sided dolphin *Lagenorhynchus acutus*;
- Striped dolphin *Stenella coeruleoalba* – often mistaken with common dolphin *Delphinus delphis*;
- Long-finned pilot whale *Globicephala melas*;
- Humpback whale *Megaptera novaeangliae*; and
- Fin whale *Balaenoptera physalus*.

Specific assessment has not been included for these species given the sparsity of data and the low risk of encountering these within the Proposed Development.

4.1.2 Basking shark

Estimating the abundance of marine species like basking shark *Cetorhinus maximus* can be challenging due to the migratory patterns and home range of this species. Basking shark is found in the Irish Sea and individuals have been observed on the surface in summer and spring months near to the Isle of Man and

further north in west Scotland, with the species typically undergoing a north-south migration through the Irish Sea ((D. W. Sims *et al.*, 2008); (Hawkes *et al.*, 2020). Large numbers of basking shark are known to aggregate around Tiree, Coll and the Skerryvore reefs (Marine Scotland, 2024) with the areas widely considered hotspots.

Marine Scotland (2024) modelling based on Paxton *et al.* (2014) provides an estimated density of basking shark in the approximate area of the Proposed Development of 0.3-0.4 animals per km² for sightings data between 2000-2012.

4.2 Designated sites

Relevant designated sites identified in the vicinity of the Proposed Development are shown in **Table 4-1**. The only designated sites being the Inner Hebrides and Minches (Special Area of Conservation (SAC)) designated for harbour porpoise and Sea of the Hebrides (Marine Protected Area (MPA)) designated for basking shark and minke whale.

Table 4-1 Designated sites identified for marine biodiversity receptors considered in this assessment

Designated sites	Closest distance to development (km)	Relevant qualifying feature
Sea of the Hebrides MPA	0	Basking shark <i>Cetorhinus maximus</i>
		Minke whale <i>Balaenoptera acutorostrata</i>
Inner Hebrides and the Minches SAC	0	Harbour porpoise <i>Phocoena phocoena</i>

NatureScot (2024) advised that the activities for the Proposed Development are not capable other than insignificantly of affecting minke whale and basking shark features of the Sea of Hebrides MPA. Also, with regard to the Inner Hebrides and the Minches SAC, that the Proposed Development will not have an adverse effect on site integrity due to the localised nature of this activity and short-term construction period. Therefore, designated sites are not considered further in this supporting information document.

5 IMPACTS OF UNDERWATER NOISE

The activities related to the Proposed Development will involve dredging and vessel noise during the construction of the breakwater, all of which produce noise levels that have the potential to impact basking sharks and marine EPS.

To understand the significance of impact of noise emissions of dredging and vessel noise, subsea noise modelling has been undertaken, and is presented in Volume III Appendix 8.4 of the EIAR.

For marine EPS, the subsea noise assessment used auditory injury threshold criteria from Southall *et al.* (2019) for the assessment of Permanent Threshold shift (PTS) and Temporary threshold Shift (TTS), and adopted the US National Marine Fisheries Service (NMFS, 2005) Level B harassment threshold for the assessment of the risk of disturbance.

For basking shark, the Sound Exposure Guidelines for fishes and sea turtles (Popper *et al.*, 2014) were used. The risk of behavioural effects is categorised in relative terms as “high”, “moderate” or “low” at three distances from the source “near” (i.e. tens of meters), “intermediate” (i.e. hundreds of meters) or “far” (i.e. thousands of meters). “

NatureScot advice (2024) agreed with the conclusion presented in the EIAR that the “*PTS and TTS in marine mammal hearing is unlikely based on the worst-case scenario*”; but also stated that “*both construction noise and vessel noise are likely to act as a disturbing factor.*” Therefore, only disturbance to marine EPS and basking shark is taken forward for consideration in this supporting information document.

For all marine mammal groups assessed in the subsea noise assessment (Volume III. Appendix 8.4) the largest range for a behavioural response was 8.17km. The potential range for disturbance is not a hard and fast line where an impact will occur on one side and not on the other. Furthermore, this estimated range is based on an “unweighted” assessment, in that there is not correction for different species hearing abilities. The subsea noise assessment presented information on the background noise environment. A “drifting-buoy” assessment of background noise was undertaken by the Low Carbon Research Institute (LCRI) marine division in July 2014. Over an eleven-hour period, noise levels at the Inner Sound site were seen to vary from 91 dB re 1 µPa during periods of low tidal flow speed, to 121 dB re 1 µPa at high tidal flow speeds. Based on this review, it was concluded that baseline underwater noise levels in high-tidal, coastal areas are likely to be in the range 91 to 121 dB re 1 µPa (rms). Therefore, the Level B noise threshold used to assess disturbance is similar to the background noise levels existing in the area. This is likely to mean that the estimated disturbance range for marine EPS is an over-estimate.

Basking shark are classified by Popper, *et al.*, 2014 as group 1 fish (fish with no swim bladder). Basking sharks have only an inner ear and no swim bladder, meaning that they are only sensitive to particle motion (Chapuis *et al.*, 2019). Assessment for disturbance was qualitative (based on Popper *et al.*, 2014). Based on the hearing ability of basking sharks the risk of disturbance from noisy activities, was concluded to be low in the EIAR (Volume II: Environmental Impact Assessment Report).

Furthermore, the effects of underwater noise arising from construction activities are predicted to be of highly localised spatial extent, short-term duration, intermittent and reversable following cessation of works.

6 THREE EPS LICENCING TESTS

6.1 Test 1: Overriding Public Interest

6.1.1 Guidance

NatureScot guidance states that under Regulation 44 of the Habitats Regulations certain activities which would normally constitute an offence against European Protected Species (EPS) can be carried out legally under a License (NatureScot, 2020). There are several different purposes for which a license can be granted including '*preserving public health or public safety or other Imperative Reasons of Overriding Public Interest (IROPI) including those of a social or economic nature and beneficial consequences of primary importance for the environment*'. Only public interests will be relevant for the Public Interest Test and generally, only when it is a long-term interest. Examples of objectives that the Scottish Government consider to be relevant to meet the Public Interest Test are provided in the Guidance and include:

- Where there is clear and demonstrable direct environmental benefit on a national or international scale;
- Where failure to proceed would have unacceptable social and/or economic consequences; and
- Where the project is of national importance, or, possibly, regional importance.

NatureScot Guidance states that, when determining an EPS License application, the licensing authority will take into account whether an activity or development is required to meet, or contribute to meeting, a specific need such as maintaining the health, safety, education or environment of Scotland's people (including sustainable development and renewable or green energy), complying with national planning policies and supporting economic or social development (including nationally important infrastructure development projects and employment) (NatureScot, 2020).

6.1.2 Policy and legislation

The following paragraphs set out some key policy support for economic development projects in general, and the Proposed Development in particular:

- Scotland's National Marine Plan provides that key priorities under the heading of Shipping, Ports, Harbours and Ferries include: '*Sustainable growth and development of ports and harbours as a competitive sector, maximising their potential to facilitate cargo movement, passenger movement and support other sectors; and Safeguarded essential maritime transport links to island and remote mainland communities*' (Marine Scotland, 2015). A key priority under the heading of Recreation and Tourism is '*Continued and improved access to marine and coastal resources for tourism activities and recreational use*'. The Proposed Development will meet the priorities of the National Marine Plan by

providing the growth and development of the breakwater, allowing passenger movement of the local community and tourists between the Fionnphort (Island of Mull) and Iona.

- The UK Marine Policy Statement 2011 (UKMPS) includes a high-level objective of ensuring a strong, healthy and just society, ensuring there is equitable access for those who want to use and enjoy the coast, seas and their wide range of resources and assets. It also recognises that properly planned developments in the marine area can provide environmental and social benefits as well as drive economic development, provide opportunities for investment and generate export and tax revenues. The Proposed Development should allow the operation of berthing and docking of the ferry, this will undoubtedly contribute to ensuring equitable access, as well as driving economic development, and providing opportunities for investment. These benefits, however, must be weighed against the environmental impacts including the extent to which development will impact on the ecosystem and other activities taking place within the marine environment.

6.1.3 Purpose of the construction of the breakwater and dredging

Iona is a small island located to the west of the Isle of Mull. The Sound of Iona, which is orientated north-by-northeast to south-by-southwest and is open to the Atlantic Ocean particularly from the southwest, separates the Isle of Iona and the Isle of Mull. At Iona, an existing ferry terminal, comprising a pier and a steep slipway, is located within the small village of Baile Mòr. A small-scale passenger ferry operates from this location between the Iona ferry terminal and the Fionnphort ferry terminal, on the Isle of Mull.

As part of the Argyll & Bute Council Local Development Plan (LDP)³, a new strategy for Oban, Lorn and the Isles was developed in order to address known infrastructure constraints and improve ferry services. The aim of the Proposed Development is to provide:

- Protect the slipway from waves, as currently the instability of the ferry, as a result of swells, presents a risk to both ferry operators, passengers embarking and disembarking, vehicles and other slipway users.
- To continue on operating the ferry during storm events or periods of intense wave action, as the health and safety risk associated with the current berthing practice means that the ferry is not able to operate and results in cancelled sailings.
- Improve the access for the residents of Iona to service provision.
- Improve access for tourism and day explorers.

The Proposed Development aims to address these issues by making the connection between the Isle of Mull and Iona safer, more efficient, and more reliable. It is not intended to facilitate an increase in the frequency of the ferry crossings and thereby no change in vessel traffic is expected as a result of the works.

³ [Argyll & Bute Local Development Plan - https://www.argyll-bute.gov.uk/ldp](https://www.argyll-bute.gov.uk/ldp)

If the Licensable Operations do not proceed, the Proposed Development would not be able to progress, making it more difficult to ensure that a suitable standard of transport connection in terms of quality, frequency and capacity are operating between Iona ferry terminal and the Fionnphort ferry terminal. This could cause the island community to suffer social and economic disadvantages.

6.1.4 Conclusions

The Licensable Operations are a solution to a fundamental and essential step required for the Proposed Development. Applying the relevant guidance, it is clear that the development which contribute to economic and social development are specifically recognised by NatureScot as the types of development which can fulfil the requirements of the Overriding Public Interest Test.

6.2 Test 2: No Satisfactory Alternatives

Regulation 44(2) of the Habitat Regulations 1994 requires the regulatory authority to be satisfied that there is no satisfactory alternative before an EPS License can be issued for the Licensable Operations. This section provides an assessment of the alternatives that were considered as part of the design of the Proposed Development. After consideration of all alternatives, it was concluded that there was no suitable alternative to the design proposed (set out in **section 1.3**).

The following sub-sections summarise the different options that have been considered as alternatives to the proposed Licensable Operations.

6.2.1 Do nothing

In the 'Do Nothing' scenario, i.e., in the absence of the Proposed Development, ferry service provision will continue to be impacted by poor weather, presenting a continued health and safety risk to ferry operators, passengers, vehicles and other slipway users.

Tourists visiting the Isle of Iona will continue to be impacted by disturbances to the ferry operations which could potentially have negative consequences for future tourist numbers and consequently, the tourist economy of the island.

Residents of Iona will continue to be impacted by disturbances to the ferry operations, which will continue to impact on the delivery of essential services.

The Proposed Development aims to address these issues by making the connection between the Isle of Mull and Iona safer, more efficient, and more attractive to both ferry customers and leisure sailors.

6.2.2 Alternative vessel

All vessels that have been identified for the Licensable Operation conform to industry and regulatory standards. The proposed vessels will have a relatively low impact on the marine environment, given the remote inshore nature of the survey area, and dispersive potential of the associated emissions. The vessels

are robust in adverse weather, allowing the Licensable Operations to be completed in time, thereby minimising the potential disturbance on the marine environment by adhering to design timeframe.

6.2.3 Alternative equipment

The use of Jack up barge (OCM-50) for the construction of the breakwater and a self-propelled backhoe dredger and a secondary spud legged barge with long reach for dredging are industry standards methodologies for the Licensable Operations.

In a 2019 Feasibility Study by Byrne Looby (Byrne Looby , 2019), five different options for a rubble mound breakwater, as well as construction methodologies, were explored with regard to the Proposed Development. The five options are presented in section 4.3.4 of the Volume II (Environmental Impact Assessment Report) as well as resources, materials and constructability information. After analysis of costs, constructability, hydrodynamic modelling, surveys and consultation responses, the current option (Jack-up barge) was selected as the best option available. This option provided the best wave protection, and medium development costs.

6.2.4 Alternative solutions

The assessment of vertical faced piers/breakwaters indicated that these types of structure were unlikely to provide a feasible solution for this project and that the use of a rubble mound (rock armour) breakwater with its wave absorbing characteristics and increased habitat for marine life would be more suited to the environment at this site.

6.3 Test 3: Favourable Conservation Status (FCS)

Regulation 44(3)(b) of the Habitat Regulations 1994 requires the regulatory authority to be satisfied that the licensed activities must not be detrimental to the maintenance of the population of species concerned at FCS in their natural range. The EU Habitats Directive includes the definitions for FCS below:

- the “conservation status” of a species means, *‘the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations [...]’*;
- the “favourable conservation status” of a species means: *‘population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.’*

The species baseline information of this report (**section 4**) has identified six key species of cetacean (NatureScot, 2024) that have the potential to occur in the vicinity of the Proposed Development and for which effects from the Licensable Operations must be assessed against FCS.

As a License is also sought under the Wildlife and Countryside Act 1981 (as amended) with respect to potential disturbance to basking shark the assessment has also considered any changes to FCS for this species.

The EIAR considered disturbance qualitatively for both marine EPS and basking shark and concluded that the magnitude of effect from underwater noise arising from construction activities to be low, with negligible significance resulting in a not significant conclusion under EIA Regulations. However, it is common practice to consider impacts to FCS by estimating the number of individual animals at risk of disturbance and comparing that to the wider management unit (MU) population in terms of percentage of the relevant MU population.

The aim of this section is to provide further supporting information to support the assessment of the likely impact of this disturbance on the FCS of the above cetaceans and basking shark.

6.3.1 Cetaceans

The relevant EPS species and potential number of species impacted by behavioural effects in the vicinity of the Proposed Development and in the Management Unit (MU) are shown in **Table 6-1**. This was estimated using an approximate area of disturbance, based on the width of the sound of Iona (1.5km and the estimated disturbed range of 8km) resulting in a potential disturbed area of 96km².

Table 6-1 Summary of potential number of EPS species impacted by behavioural effects by the Proposed Development

Species	Density estimate (# per km ²)	Estimated number of species impacted	Percentage (%) of MU (IAMMWG, 2023)	MU	Natural Range	Favourable Conservation Status (Range, JNCC, 2019)
Harbour porpoise	0.336	33	0.11	WS	Harbour porpoise is highly mobile, utilising habitats over a wide area.	Favourable
Bottlenose dolphin	0.121	12	25.8	CWSH	Bottlenose dolphin have been known to exhibit flexibility in their habitat use.	Favourable
Common dolphin	Density numbers for Block G are not available but common dolphins could be present in the area,				The common dolphin is a highly mobile and wide-ranging species encountered along the west coast of Scotland, Ireland and to the southwest of England (Reid <i>et al.</i> , 2003).	Favourable

Species	Density estimate (# per km ²)	Estimated number of species impacted	Percentage (%) of MU (IAMMWG, 2023)	MU	Natural Range	Favourable Conservation Status (Range, JNCC, 2019)
White-beaked dolphin	Density numbers in Block G are not available but white-beaked dolphins could be present in low numbers,				White-beaked dolphins have a relatively restricted range, and the Hebrides are towards the southern extreme of their range, they are usually seen in open waters further from the coast and favour the waters around the Outer Hebrides and the north Minch.	Favourable
Killer whale	Density numbers are not available but killer whales could be present in low numbers,				Killer whales are highly mobile, utilising habitats over a wide area.	Favourable
Minke whale	0.027	3	0.013	CGNS	The minke whale is known to have a large spatial distribution, undergoing seasonal movements between foraging and breeding grounds.	Favourable

The precautionary assessment of the number of animals at risk of disturbance has shown that for all marine EPS, with the exception of bottlenose dolphin, a low number of individuals are at risk of disturbance, with the percentage of the MU population being <1%.

The bottlenose dolphin assessment is based on a density estimated over a large survey block (SCANS III) and compared to a very small population (45 individuals – Cheney *et al.* (2013)). Bottlenose dolphin has been observed within the Sound of Iona; however, they are wide ranging over the west coast of Scotland. They are most often seen in and around the Sound of Barra and throughout the Inner Hebrides, with most sightings around Mull, the Small Isles and Skye. In the Hebrides, bottlenose dolphins travel in small, social groups of between three and ten individuals, but larger group sizes are not unusual (Serani & Diez, 2017). Therefore, due to the low number of individuals in this population, it is highly unlikely that there will be the number of bottlenose dolphin present in the Sound of Iona to result in the disturbance of 26% of the MU population.

This assessment is considered precautionary because it is based on an over precautionary disturbance range (estimated using the Level B harassment 120dB rms threshold), and because this threshold is close to environmental background noise levels; therefore, the area at risk of disturbance is overestimated.

The Licensable Operations will be carried out over a small area (0.02km²). Although some animals may be disturbed during the Licensable Operations, animals are expected to return to the area immediately after

the Licensable Operations have ceased. On this basis, the proposed Licensable Operations are not anticipated to prevent any EPS species population from continuing to “*maintaining itself on a long-term basis as a viable element of its natural habitats*”, as defined by the first FCS test.

All EPS species considered here are highly mobile, utilising habitats over a wide area. Therefore, these activities are not expected to reduce the range of the local EPS populations (reported as “Favourable” in the most recent FCS status assessment), with the “*natural range of the species neither being reduced nor likely to be reduced for the foreseeable future*”, as defined by the second FCS status test.

Further, any habitat likely to be affected will constitute a very small proportion of the habitats available to the EPS species populations. The Proposed Development area is not likely to represent a key habitat in the context of the wider region. As such, it is predicted that the third FCS test, namely that “*there is, and will probably continue to be, a sufficiently large habitat to maintain harbour porpoise populations on a long-term basis*”, will be satisfied.

6.3.2 Basking shark

Basking shark is classified by Popper, *et al.*, 2014 as a group 1 fish (fish with no swim bladder). Basking shark have only an inner ear and no swim bladder, meaning that they are only sensitive to particle motion (Chapuis *et al.*, 2019). They are thought to be sensitive to low frequency sounds only (between 20 Hz and 1500 Hz), with hearing sensitivity peaking between 200 Hz and 600 Hz (Carroll, *et al.*, 2017), however, little information exists on sound detection in basking shark.

The subsea noise modelling (Volume II: Environmental Impact Assessment Report) predicted, for fish with swim bladders (i.e. fish most sensitive to underwater noise), that temporary threshold shift would not occur beyond 10 m of the sound source (for both dredging and vessels). The guideline criteria for the onset of behavioural effects from Popper *et al.*, (2014) suggests that for fish with no swim bladder (which include the basking shark), the risk of behavioural effects is ‘moderate’ in the near field (tens of meters), ‘moderate’ in the intermediate field (hundreds of meters) and ‘low’ in the far field (thousands of meters).

The Licensable Operations will be carried out over a small area (0.02km²). The use of the Licensable Operations equipment is not expected to create a barrier to movement for basking shark and is therefore not expected to reduce the range the local basking shark population (reported as “Endangered” in the most recent IUCN Red List assessment).

Basking shark are found in the Irish Sea and individuals have been observed on the surface in summer and spring months near to the Isle of Man and further north, with the species typically undergoing a north-south migration through the Irish Sea (Sims *et al.*, 2008; Wilson *et al.*, 2020). Large numbers of basking shark are known to aggregate around Tiree, Coll and the Skerryvore reefs (Marine Scotland, 2024), with the areas widely considered hotspots. Any habitat likely to be affected by the Proposed Development will therefore constitute a very small proportion of the habitat available to the basking shark population.

The localised and short duration of activities associated with the Proposed Development are not likely to result in a negative effect on the basking shark population.

7 CONCLUSION

Table 7-1 provides an overview of the conclusions and associated justifications for which Licenses are required in Scottish waters.

Table 7-1 License application conclusion

Relevant License applications	Relevant legislation	Is a License being applied for?	Justification
EPS License (inshore waters)	The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)	Yes	For activities taking place in Scottish inshore waters, guidance from Scottish Government (2020) states, where an activity is likely to cause disturbance or injury to an EPS, an EPS License is required to undertake the activity legally. The Proposed Development is located entirely in inshore waters. Therefore, it is concluded that a License is required.
EPS License (offshore waters)	The Conservation of Offshore Marine Habitats and Species Regulations 2017	No	For activities taking place in Scottish waters beyond 12nm (the offshore marine area), The Marine Directorate refers to the JNCC (2010) guidance disturbance effects from these surveys on EPS are considered to qualify as ‘trivial disturbance’ (as defined by JNCC <i>et al.</i> (2010) “sporadic disturbances without any likely negative impact on the animals” as trivial disturbance) and are therefore unlikely to significantly impact the marine animal, or its population status in the wild. Considering this guidance, it is predicted that an EPS License for Scottish waters beyond 12nm is not required. It is proposed that a License will not be required.
Basking shark License	Wildlife and Countryside Act 1981	Yes	Guidance from the Scottish Government (2023) states that if an activity taking place in the Scottish Territorial Sea (0-12 nm) is likely to cause to disturbance or injury to basking sharks, a License is required to undertake activity legally. The Proposed Development is located inside of Scottish territorial waters and potential disturbance could occur. It is concluded that a License is required.

The Applicant understands that in order for an EPS License to be granted for the specific purposes set out in the Conservation (Natural Habitats) Regulations 1994 (as amended), the regulator would need to be satisfied that the Application passes each of the three tests namely: (1) Overriding public interest; (2) No satisfactory alternatives; and (3) Favourable conservation status. This document, in support of an Application for an EPS License, has sought to demonstrate compliance with these three tests.

The proposed Licensable Operations will contribute to long-term strategic economic development and regeneration whilst providing valuable services to local populations, therefore the Licensable Operations fulfil the requirements of Test 1: Overriding Public Interest. The Licensable Operations are a solution to a fundamental and essential step required for the sustainable construction of the proposed project, and the option of 'do nothing' is not considered to be a realistic option. As such it can be demonstrated that the Licensable Operations fulfil the requirements of Test 2: No Satisfactory Alternatives.

The Applicant has sought to demonstrate that, should the Proposed Development (the Licensable Operations) consents be granted, the activities would not be detrimental to the maintenance of the FCS of EPS likely to occur within the zone of potential impact of the Licensable Operations. Those EPS include harbour porpoise, bottlenose dolphin, common dolphin, white-beaked dolphin, killer whale, minke whale and basking shark.

Based on the output of noise modelling, in conjunction with available data on relevant populations, habitat use and natural range, it was demonstrated that for all seven species, they are unlikely to be significantly affected as the population as a whole. The populations of EPS in the vicinity of the Proposed Development area will continue to maintain themselves on a long-term basis as a viable component of their natural habitats.

In addition, it is unlikely that for all EPS, the Licensable Operations will reduce the range of populations, with the natural range of each species neither being reduced nor likely to be reduced for the foreseeable future. Finally, it was demonstrated that any habitat likely to be affected by the Licensable Operations will constitute a very small proportion of the available habitat to these EPS and therefore it is predicted that there is, and will probably continue to be, a sufficiently large habitat to maintain EPS populations on a long-term basis. As such the Applicant has demonstrated that the Licensable Operations fulfil the requirements of Test 3: Favourable Conservation Status.

Whilst it is not possible to rule out some level of disturbance for basking shark, it is considered that due to the relatively small area of the Proposed Development, the temporary nature of the works, and the low likelihood of a behavioural response from any basking shark to the noise generating activities, that there will not be an overall negative effect on the FCS of basking sharks.

8 REFERENCES

- Argyll & Bute Council. (2022). Volume III, Appendix 8.4: Iona and Fionnphort Ferry Ports Subsea Noise Modelling
- Argyll & Bute Council. (2022). Volume II: Environmental Impact Assessment Report
- Byrne Looby. (2019). Iona & Fionnphort Marine Access Improvements – Feasibility Study.
- Carroll, A. G., Przeslawski, R., Duncan, A., Gunning, M., & Bruce, B. (2017). A critical review of the potential impacts of marine seismic surveys on fish & invertebrates. *Marine Pollution Bulletin*, 114(1), 9-24.
- Chapuis, L., Collin, S.P., Yopak, K.E., McCauley, R.D., Kempster, R.M., Ryan, L.A., Schmidt, C, Kerr, C.C., Gennari, E., Egeberg, C.A., Hart, N.S. (2019). The effect of underwater sounds on shark behaviour. *Science Reporting*, 6. <https://doi.org/10.1038/s41598-019-43078-w>
- Cheney, B., Thompson, P. M., Ingram, S. N., Hammond, P. S., Stevick, P. T., Durban, J. W., Culloch, R. M., Elwen, S. H., Mandleberg, L., Janik, V. M., & Quick, N. J. (2013). Integrating multiple data sources to assess the distribution and abundance of bottlenose dolphins *Tursiops truncatus* in Scottish waters. *Mammal Review*, 43(1), 71-88.
- Goodwin, L., & Speedie, C. (2008). Relative abundance, density and distribution of the harbour porpoise (*Phocoena phocoena*) along the west coast of the UK. *Journal of the Marine Biological Association of the United Kingdom*, 88(6), 1221-1228. <https://doi.org/10.1017/s0025315408001173>
- Hammond, P. S., C. Lacey, A. Gilles, S. Viquerat, P. Börjesson, H. Herr, K. Macleod, V. Ridoux, M. Santos, M. Scheidat, J. Teilmann, J. Vingada, & N. Øien. (2017). *Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys.*
- Hawkes, L. A., Exeter, O., Henderson, S. M., Kerry, C., Kukulya, A., Rudd, J., Whelan, S., Yoder, N., & Witt, M. J. (2020). Autonomous underwater videography and tracking of basking sharks. *Animal Biotelemetry*, 8(1). <https://doi.org/10.1186/s40317-020-00216-w>
- IAMMWG. (2023). *Review of Management Unit boundaries for cetaceans in UK waters.* <https://data.jncc.gov.uk/data/b48b8332-349f-4358-b080-b4506384f4f7/jncc-report-734.pdf>
- JNCC, (2019) Article 17 Habitats Directive Report 2019: Species Conservation Status assessments 2019 [Article 17 Habitats Directive Report 2019 \(Species\) | JNCC - Adviser to Government on Nature Conservation](https://www.jncc.gov.uk/data/b48b8332-349f-4358-b080-b4506384f4f7/jncc-report-734.pdf)
- JNCC, Natural England, & Countryside Council for Wales. (2010). *The protection of marine European Protected Species from injury and disturbance. Guidance for the marine area in England and Wales and the UK offshore marine area.*
- MacLeod, C., Bannon, S., Pierce, G., Schweder, C., Learmonth, J., Herman, J., & Reid, R. (2005). Climate change and the cetacean community of north-west Scotland. *Biological conservation*, 124, 477-483. <https://doi.org/10.1016/j.biocon.2005.02.004>
- Marine Scotland. (2020). *The protection of Marine European Protected Species from injury and disturbance. Guidance for Scottish Inshore Waters.*
- Marine Scotland. (2024). *Case study: Basking sharks in Scottish waters.*
- NatureScot (2024) Advice received by email 24 January 2024 ref A4390280.
- NatureScot. (2020). *Guidance licensing - Test 1 - Licensable Purpose - Licence in relation to European Protected Species.* <https://www.nature.scot/doc/guidance-licensing-test-1-licensable-purpose-licence-relation-european-protected-species>
- NMFS. (2005). Scoping Report for NMFS EIS for the National Acoustic Guidelines on Marine Mammals. *Federal Register*, 70(7), 1871-1875.

- NMFS. (2018). *2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts*.
- Paxton, C. G. M., Scott-Hayward, L. A. S., & Rexstad, E. (2014). *Statistical approaches to aid the identification of Marine Protected Areas for minke whale, Risso's dolphin, white-beaked dolphin and basking shark*.
- Popper, A., Hawkins, A., Fay, R., Mann, D., Bartol, S., Carlson, T., Coombs, S., Ellison, W., Gentry, R., Halvorsen, M., Løkkeborg, S., Rogers, P., Southall, B., Zeddies, D., & Tavalga, W. (2014). *Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI (Vol. ASA S3/SC1.4 TR-2014)*. Springer. <https://doi.org/10.1007/978-3-319-06659-2>
- Reid, J., Evans, P. G. H., & Northridge, S. P. (2003). *Cetacean Distribution Atlas*.
- Scottish Government. (2015). *Scotland's National Marine Plan A Single Framework for Managing Our Seas*. <https://www.gov.scot/publications/scotlands-national-marine-plan/pages/5/>
- Serani, A., & Diez, M. (2017). Dolphin pod optimization. In International Workshop on Machine Learning, Optimization, and Big Data. *Springer, Cham*, 50-62.
- Sims, D. W., Southall, E. J., Humphries, N. E., Hays, G. C., Bradshaw, C. J., Pitchford, J. W., James, A., Ahmed, M. Z., Brierley, A. S., & Hindell, M. A. (2008). Scaling laws of marine predator search behaviour. *Nature*, *451*(7182), 1098-1102.
- Sims, D. W., Southall, E. J., Humphries, N. E., Hays, G. C., Bradshaw, C. J., Pitchford, J. W., James, A., Ahmed, M. Z., Brierley, A. S., Hindell, M. A., Morritt, D., Musyl, M. K., Righton, D., Shepard, E. L., Wearmouth, V. J., Wilson, R. P., Witt, M. J., & Metcalfe, J. D. (2008). Scaling laws of marine predator search behaviour. *Nature*, *451*(7182), 1098-1102. <https://doi.org/10.1038/nature06518>
- Southall, B. L., Finneran, J. J., Reichmuth, C., Nachtigall, P. E., Ketten, D. R., Bowles, A. E., Ellison, W. T., Nowacek, D. P., & Tyack, P. L. (2019). Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. *Aquatic Mammals*, *45*(2), 125-232. <https://doi.org/10.1578/am.45.2.2019.125>
- Thompson, P. M., Cheney B., Ingram, S., Stevick, P., Wilson, B., & Hammond, P. S. (2011). Distribution, abundance and population structure of bottlenose dolphins in Scottish waters.
- Witt, M. J., Hawkes, L. A., & Henderson, S. M. (2019). *Identifying zones where basking sharks occur more frequently within a possible MPA to aid management discussions*.