



**Ardersier Port Ltd.  
Marine Ecological Impact Assessment**



**September 2018**

# Ardersier Port Ltd.

## Marine Ecological Impact Assessment

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# 1 INTRODUCTION

## 1.1 Terms of Reference

EnviroCentre Ltd was commissioned by Ardersier Port Ltd. to undertake a Marine Ecological Impact Assessment (EclA) of the proposed development, in order to identify and describe any likely significant effects arising from it. This EclA Technical Appendix (TA) details the specialist marine studies undertaken and the results of the assessment.

## 1.2 Scope of Report

The assessment has been carried out according to the latest guidance from the Chartered Institute of Ecology and Environmental Management (CIEEM)<sup>1</sup> by experienced and competent ecologists who are all Members of CIEEM and follow its Code of Professional Conduct. The lead author Karen Couper has 13 years of experience within private and public environmental organisations and has experience of EclA. Matt Heeps is the lead fisheries consultant within EnviroCentre and has used his extensive experience and knowledge to compose the relevant fish sections. Kathy Dale is the Ecology Technical Specialist within EnviroCentre, with 30 years' experience within the consultancy Sector. Kathy has been the lead ecology advisor for this project and has reviewed this EclA.

The purpose of this TA is to:

- Identify and describe all potentially significant ecological effects associated with the proposed development;
- Set out the mitigation measures required to ensure compliance with nature conservation legislation and to address any potentially significant ecological effects;
- Identify how mitigation measures will be secured;
- Provide an assessment of the significance of any residual effects;
- Set out the requirements for post-construction monitoring.

This TA is supplemented by the following information contained within Volume 3 the EIAR:

- Technical Appendix 8.2: Marine Mammal Protection Plan (MMPP); and
- Technical Appendix 8.3: Intertidal and Benthic Ecology.

This TA should be read in conjunction with Chapter 10: Underwater Noise in Volume 2 of the EAIR.

## 1.3 Proposed Development

The development is described in Chapter 3: The Proposed Development in Volume 2 of the Environmental Impact Assessment Report (EIAR) and the drawing contained within Technical Appendix 3.1 within Volume 3 of the EIAR shows the site boundary, which is referred to as 'the site' throughout this TA.

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<sup>1</sup> CIEEM (2016). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester. Available at: [https://www.cieem.net/data/files/Website\\_Downloads/Guidelines\\_for\\_Ecological\\_Impact\\_Assessment\\_2015.pdf](https://www.cieem.net/data/files/Website_Downloads/Guidelines_for_Ecological_Impact_Assessment_2015.pdf)

## **1.4 Use of Report**

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## 2 LEGISLATION, POLICY, CONSERVATION INITIATIVES AND GUIDANCE

### 2.1 Overview

The compilation of this TA has taken cognisance of the legislation, planning policies, conservation initiatives and general guidance presented in Table 2.1. The regulatory and policy context most relevant to marine ecology is described in the following sections.

**Table 2.1: Legislation, Planning Policies, Conservation Initiatives and General Guidance Related to Marine Ecology**

Scope	Document
International	<ul style="list-style-type: none"> <li>The International Union for the Conservation of Nature (IUCN) Red List of Threatened Species</li> <li>The Convention for the Protection of the Marine Environment of the North-East Atlantic (the OSPAR Convention)</li> </ul>
European	<ul style="list-style-type: none"> <li>Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (The Habitats Directive)</li> <li>The Water Framework Directive (WFD) 2000/60/EC of the European Parliament</li> <li>The Environmental Impact Assessment (EIA) Directive (2014/52/EU) on assessing the potential effects of projects on the environment</li> </ul>
National (UK)	<ul style="list-style-type: none"> <li>The Marine and Coastal Access Act 2009 (MCAA)</li> <li>The Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2017 (The EIA Regulations)</li> <li>The Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017</li> </ul>
Scottish	<ul style="list-style-type: none"> <li>The Conservation (Natural Habitats, &amp;c.) Amendments (Scotland) Regulations 2007 (The Habitats Regulations)</li> <li>The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017</li> <li>The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017</li> <li>The Marine (Scotland) Act 2010</li> <li>The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014</li> <li>The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003.</li> </ul>
Planning Policy & Other Advice Documents	<ul style="list-style-type: none"> <li>BS 42020:2013: Biodiversity Code of Practice for Planning and Development 2013</li> <li>The Scottish Biodiversity List</li> <li>The Highland Biodiversity Action Plan (BAP)</li> <li>The Inverness and Nairn Local BAP (LBAP)</li> <li>The Scottish Biodiversity Strategy 2004 and 2013</li> <li>Scottish Planning Policy (SPP) 2014</li> <li>The Inner Moray Firth Local Development Plan (LDP) (2015)</li> <li>CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition</li> </ul>

#### 2.1.1 International Union for the Conservation of Nature (IUCN) Red List of Threatened Species

The IUCN Red List provides taxonomic, conservation status and distribution information on plants, fungi and animals that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered and Vulnerable). The IUCN Red List also includes information on plants, fungi and animals that are categorized as Extinct or Extinct in the Wild; on taxa that cannot be evaluated because of

insufficient information (i.e., are Data Deficient); and on plants, fungi and animals that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation programme (i.e., are Near Threatened).

### **2.1.2 Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (The Habitats Directive)**

Adopted in 1992, the Habitats Directive aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments.

Over 1,000 animal and plant species, as well as 200 habitat types, listed in the Directive's Annexes are protected in various ways:

- Annex II species (about 900): core areas of their habitat are designated as Sites of Community Importance (SCIs) and included in the Natura 2000 network. These sites must be managed in accordance with the ecological needs of the species.
- Annex IV species (over 400, including many Annex II species): a strict protection regime must be applied across their entire natural range within the EU, both within and outside Natura 2000 sites.
- Annex V species (over 90): Member States must ensure that their exploitation and taking in the wild is compatible with maintaining them in a favourable conservation status.

### **2.1.3 The Marine and Coastal Access Act 2009**

The disposal of sediments to sea and any dredging for navigational purposes are regulated by the MCAA as licensable activities. Therefore, any application would need to consider impacts from both the dredging and the disposal activities. S69 of the MCAA states that in determining an application for a licensable activity, the appropriate licensing authority must have regard to a) the need to protect the environment, b) the need to protect human health, c) the need to prevent interference with legitimate uses of the sea, and such matters as the authority thinks relevant.

### **2.1.4 The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014**

It is an offence to intentionally or recklessly harass seals at significant haul-out sites.

### **2.1.5 The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003**

In relation to diadromous fish, the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 makes it an offence to knowingly take, fish for, buy, sell, expose for sale or be in possession of, any salmon which is unclean or immature.

Section 23 (3) of the Act also makes it an offence to obstruct or impede salmon in their passage to any spawning bed, bank or shallow during the annual close time. With regard to activities undertaken by companies that have the potential to negatively impact upon migratory salmonids, Section 57 (1) of the Act also states that: "Where an offence under any of the provisions of this Act committed by a body corporate is proved to have been committed with the consent or connivance of, or to be attributable to any neglect on the part of, any director, manager, secretary or other similar officer of the body corporate, or any person who was purporting to act in any such capacity, that person as well as the body corporate shall be guilty of the offence and shall be liable to be proceeded against and punished accordingly".

### 3 SCOPING

#### 3.1 Consultations

In order to finalise and agree the scope of the EclA, a Scoping Report was prepared and a Scoping Request was submitted to The Highland Council (THC) in March 2018 and to Marine Scotland in April 2018. Scoping opinions were received from each statutory body in June and July respectively. A summary of the relevant scoping responses is provided in Table 3.1.

**Table 3.1: Summary of Consultation Responses**

Organisation	Consultation Response	How and where addressed
The Highland Council (THC)	The EIA Report should address the likely impacts on the nature conservation interests of all the designated sites in the vicinity of the proposed development. It should provide proposals for any mitigation that it required to avoid these impacts or to reduce them to a level where they are not significant.	Designated marine sites within 60km of the proposed development have been considered within this EclA and the Habitats Regulations Appraisal (HRA) (EIAR, Volume 3, Technical Appendix 7.6).
	SNH highlight that the baseline/effects on the Moray Firth proposed Special Protection Area (pSPA) need to be considered within the EIA Report. In addition, the EIA Report should consider the effects on the Dornoch Firth and Morrich More Special Area of Conservation (SAC).	The pSPA is considered within the Terrestrial Ecology and Ornithology EclA TA and within the HRA (see EIAR, Volume 3, Technical Appendix 7.1 & 7.6).  The Dornoch Firth and Morrich More SAC is considered within this Marine Ecology EclA and within the HRA.
	The inclusion in an Appendix of the EIA Report of the Marine Mammal Protection Plan (MMPP) that considers effects and mitigation, not only on bottlenose dolphin but also common seal, as assessed within the EIA Report is also welcomed.	Cetaceans and pinnipeds are considered within the MMPP (see Technical Appendix 8.2).
	Underwater noise: SNH highlights the need to consider whether the 2013 EIA assessment of underwater noise remains up to date in the light of more recent studies.	An updated underwater noise assessment was undertaken in April 2018 by Subacoustech (see EIAR, Volume 2, Chapter 10: Underwater Noise).
	When measuring the positive and negative effects of the development a four point scale is used advising any effect to be either strong positive, positive, negative or strong negative.	This assessment has been undertaken within this report.



Organisation	Consultation Response	How and where addressed
Marine Scotland	Assumptions made previously on vessel movements to see if these are still applicable and, if not, then additional modelling may be required.	The existing vessel movement assumptions are still valid. These are provided within the MMPP (EIAR, Volume 3, Technical Appendix 8.2)
	Detail of the proposed works should be provided in an HRA report in order to properly assess the impact on the diadromous fish and seal features of the SACs.	The impacts on the diadromous fish and seal features of the SACs are detailed in the HRA (EIAR, Volume 3, Technical Appendix 7.6).
	An intertidal ecology assessment should be carried out.	An intertidal ecology assessment was undertaken by an experienced EnviroCentre ecologist in August 2018 (EIAR, Volume 3, Technical Appendix 8.3).
	An Underwater Noise Assessment should be updated taking account of recent scientific understanding in the propagation of underwater noise and cumulative impacts. Based on these conclusions, the MMPP should include details of mitigation and the use of Marine Mammal Observers (MMO) and Passive Acoustic Monitoring (PAM). If mitigation is not possible or appropriate and an impact on European Protected Species (EPS) is envisaged then an EPS licence will be required.	An Underwater Noise Assessment was undertaken during April 2018 (see EIAR, Volume 2, Chapter 10: Underwater Noise). The MMPP has considered this assessment and detailed appropriate mitigation (EIAR, Volume 3, Technical Appendix 8.2).
	Consideration should be given to the impact of the works and from increased sedimentation effects on features of the SPA, pSPA, SAC, SSSI or Ramsar site.	This has been considered on SAC's within this Marine Ecology EclA and within the HRA (EIAR, Volume 3, Technical Appendix 7.6). The impacts on SPA, pSPA, SSSI and RAMSAR sites have been considered within the Terrestrial Ecology and Ornithology EclA (EIAR, Volume 3, Technical Appendix 7.1).

### 3.2 Potential Impacts

Based on the results of the Environmental Statement (ES) undertaken in 2013, the proposed scope of the Marine EclA included the following:

- Designated sites;
- Marine mammals;
- Salmonids;
- Marine fish; and
- Intertidal and subtidal habitats, benthic fauna and vegetation.

The following designated sites, habitats and species were scoped out of the assessment for the following reasons. Designations in their context to the site are illustrated in the HRA (Technical Appendix 7.6).

- Culbin Bar SAC – designated due to coastal features that are not predicted to be affected due to the distance (10km east) and nature of the proposed development.
- River Berridale and Langwell Waters SAC – one of the designated features is Atlantic salmon that is not predicted to be affected as the site is 65km to the north east and therefore does not lie within the migratory path of Atlantic salmon.
- River Spey SAC – one of the designated features is Atlantic salmon, which is not predicted to be affected as the mouth of the Spey lies 40km southeast of the proposed development and therefore outwith the migratory path.
- River Oykel SAC - one of the designated features is Atlantic salmon, which is not predicted to be affected as the mouth of the Oykel lies 40km to the northwest and therefore not within the migratory path.
- Fin whale (*Balaenoptera physalus*) – two fin whales were recorded in the Moray Firth in 2018. These are extremely rare records with no previous records for this species in the area. It is therefore predicted that this species will not be affected by this development.
- Killer whale (*Orcinus orca*) - a pod of six orca was identified in the Moray Firth in 2016, approximately 11km northwest of Findhorn (and approximately 24km northeast of Ardersier Port). Orca may occur in coastal regions in response to breeding seals upon which the species often feeds. As this species is an infrequent visitor to the area it is predicted that it will not be affected by this development.
- Long-finned pilot whale (*Globicephala melas*) - in August 2017 a pod of 30 long-finned pilot whales travelled up the Moray Firth to North Kessock, approximately 5km west of Ardersier, meaning they would have swum within approximately 500m of Ardersier Port. The sighting was extremely rare, however important to note, as if they become stressed entire pods are known to beach themselves. As this species is a rare visitor to the area it is predicted that it will not be affected by this development.
- Humpbacked whale (*Megaptera novaeangliae*) - have been observed in the Moray Firth in 2016 and 2017. In 2016, one individual was identified from Cromarty Sutors, approximately 13km northeast of Ardersier; and in 2017 two whales were observed from between Hopeman and Burghead, approximately 42km east along the Moray coast. As this species is an infrequent visitor to the area it is predicted that it will not be affected by this development.
- Sharks – basking sharks (*Cetorhinus maximus*) are frequent visitors to the British coast, however, there are very few records within the Moray Firth. It is therefore predicted that basking shark will not be affected by the proposed development.
- Bearded seal (*Erignathus barbatus*) - are infrequent visitors to the area with one record within 10km of the proposed development during 2007. It is therefore predicted that bearded seal will not be affected by the proposed development.
- Sowerby's beaked whale (*Mesoplodon bidens*) - this species is an infrequent visitor to the area with one record approximately 50km north of the proposed development during 2001. It is therefore predicted that Sowerby's beaked whale will not be affected by the proposed development.
- Atlantic white-sided dolphin (*Lagenorhynchus acutus*) – has been recorded in 2000, 50km north of the proposed development site, and in 2007 in the Inner Moray Firth 20km south west of the proposed development. As this species is an infrequent visitor to the area it is predicted that it will not be affected by the proposed development.

- Marine fish - a range of marine fish are present within the Moray Firth including flounder, wrasse and sea bass. These will all spawn in deeper water and therefore it is predicted that these species will not be affected by the proposed development.
- Lamprey - both of the migratory lamprey species, sea lamprey (*Petromyzon marinus*) and river lamprey (*Lampetra fluviatilis*), are known to be present within the Moray Firth<sup>2</sup>, although specific data relating to their numbers locally is limited in its availability. It can only be assumed that they follow similar patterns of migration to those recorded elsewhere in Europe, in which juvenile lamprey (ammocoetes) migrate to the marine environment at similar times to the upstream migration of adult lamprey, between April and June, inclusive. As no historic records are available to conclusively confirm significant numbers of lamprey as present in the Moray Firth, it is predicted that the proposed development will not affect these species.
- European eel - available data regarding the numbers and movements of European Eel (*Anguilla anguilla*) in Scottish coastal waters and the Moray Firth in particular is limited. Eels grow very slowly in the cool, nutrient-poor waters of Scotland, and populations have therefore always been highly vulnerable to over-exploitation. Consequently there has been little historic tradition of fishing for adult eels in Scotland. Given the lack of available data, it can only be confidently assumed that any juvenile eels (elvers) that may pass through the proposed development follow typical migration patterns of upstream movement from sea into freshwater for eels in UK rivers (mid-March to the end of May inclusive), followed by a downstream migration of adults into the marine environment during October and November. As no historic records are available to conclusively confirm significant numbers of European eels as present in the Moray Firth, it is predicted that the proposed development will not affect this species.

### 3.3 Scope of Ecological Studies

The final scope of the EclA includes the following elements, which are further described in the sections below:

- A list of the important ecological features to be considered in the EclA;
- A description of the zone of influence of the proposed development; and
- The identification of key ecological impacts that should be addressed through project design.

#### 3.3.1 Important Ecological Features and Zones of Influence

The CIEEM Guidelines identify the zone of influence as the area over which ecological features may be subject to significant effects as a result of the proposed development and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries. Activities associated with the construction, operation (best and worst-case operating conditions), decommissioning and restoration phases should be separately identified. The zone of influence will vary for different ecological features depending on their sensitivity to an environmental change. It may be appropriate to identify different zones of influence for different features. The features affected could include habitats, species, and ecosystems and the processes on which they depend.

The scoping exercise narrowed down the Important Ecological Features (IEFs). The zone of influence has been set for each one (see Table 3.2).

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<sup>2</sup> Barnes, J.H., Robson, C.F., Kaznowska, S.S., Doody, J.P., & Davidson, N.C., eds. (1996). Coasts and seas of the United Kingdom. Region 3 North-east Scotland: Cape Wrath to St. Cyrus. Peterborough, Joint Nature Conservation Committee. (Coastal Directories Series.).

**Table 3.2: Important Ecological Features (IEF) and Zones of Influence**

IEF	Zone of Influence
Moray Firth SAC	Within the furthest extent from the proposed development where underwater noise affects bottlenose dolphin.
Dornoch Firth and Morrich More SAC	Within the furthest extent from the proposed development where underwater noise affects harbour seals within the Moray Firth that frequent the Dornoch Firth and Morrich More SAC.
River Moriston SAC	Within the migratory path to the River Moriston SAC through or adjacent to the proposed development.
Ardersier Seal Haul-Out	Within the seal haul-out boundary located partially within the proposed development.
Harbour porpoise	Within the Moray Firth (adjacent to the proposed development) and the furthest extent of where underwater noise affects harbour porpoise.
Bottlenose dolphin	Within the Moray Firth (adjacent to the proposed development) and the furthest extent from the proposed development where underwater noise affects dolphin species.
Common dolphin	Within the Moray Firth (adjacent to the proposed development) and the furthest extent of where underwater noise affects dolphin species.
Minke whale	Within the Moray Firth (adjacent to the proposed development) and the furthest extent of where underwater noise affects whale species.
Grey seal	Within the Moray Firth (adjacent to the proposed development) and the furthest extent of where underwater noise affects seal species.
Harbour seal	Within the Moray Firth (adjacent to the proposed development) and the furthest extent of where underwater noise affects seal species.
Atlantic salmon	Within the migratory path to the River Ness, River Moriston SAC and River Beaully through or adjacent to the proposed development.
Sea trout	Within the migratory path to the River Ness, River Moriston SAC and River Beaully through or adjacent to the proposed development.
Intertidal and Benthic Habitats and Ecology.	Within the capital dredge area of the proposed development.

### 3.3.2 Key Ecological Impacts

The potential impacts of the proposed development are outlined in the Scoping Report and in the Scoping Response. Details on the construction and operation of the proposed development are provided in the EIAR Chapter 3: The Proposed Development.

The construction programme of the proposed development would be undertaken in accordance with Marine Licences issued by Marine Scotland for capital dredging and construction works. The earliest any works would commence would be spring 2019. Duration and working hours are expected to be seven days a week, 24 hour per day for two months for the dredging, while the quay wall construction works are expected to be nine to five, for six months.

The proposed development would comprise the following main activities prior to, during and after the construction period, which could potentially have a significant negative impact on ecology in the absence of effective mitigation:

Construction phase

- Dredging of the spit would result in habitat loss;
- Dredging would create underwater noise, sediment dispersal, potential spread of Invasive Non-Native Species (INNS), and potential pollution of the waterbody (fuel leaks and spills);
- Dredging has the potential to cause disturbance to seals within the designated seal haul-out, partially within and adjacent to the site.
- Vibropiling for the construction of the quay wall would create underwater noise and potential pollution of the waterbody (fuel leaks and spills); and
- Construction activities including: access and travel on/off site; plant maintenance and storage of fuels and chemicals; movement of materials to/from site, have the potential to create above ground noise and vibration, pollution to the waterbody due to fuel leaks and spills, sediment runoff and light pollution.

Operational phase

- Maintenance dredging would cause underwater noise and sediment dispersal; and
- An increase in vessel movement would cause underwater noise and increased collision risk.

## 4 METHODS

### 4.1 Desk Study

A desk study was conducted which included:

- Data on statutory designated sites available through SNH Sitelink website<sup>3</sup> for sites up to 60km from the site;
- IUCN Red List of Threatened Species<sup>4</sup>;
- Marine mammal and fish records from the National Biodiversity Network (NBN)<sup>5</sup>;
- Marine mammal records from the Joint Nature Conservation Committee (JNCC)<sup>6 & 7</sup>;
- Marine mammal records from Seawatch Foundation<sup>8</sup>;
- Records from About Scotland's Nature: Marine Mammals (SNH)<sup>9</sup>;
- Scottish Government Designated Sites: Seal Haul-out Sites<sup>10</sup>;
- Marine mammal records from Whale and Dolphin Conservation (WDC)<sup>11</sup>;
- Marine mammal records from the Hebridean Whale and Dolphin Trust (HWDT) Whale Track<sup>12</sup>;
- Fish records from Cromarty District Salmon Fishery Board (CDSFB);
- Fish records from River Spey Salmon Fishery Board (SFB);
- UK Biodiversity Action Plan (BAP)<sup>13</sup>;
- Highland BAP<sup>14</sup>;
- Inverness and Nairn LBAP<sup>15</sup>; and
- Scottish Biodiversity List (SBL)<sup>16</sup>.

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<sup>3</sup> SNH (n.d.). SiteLink. Retrieved from <http://gateway.snh.gov.uk/sitelink/>. Last accessed August 2018

<sup>4</sup> <http://www.iucnredlist.org>. last accessed July 2018

<sup>5</sup> [www.nbnatlas.org](http://www.nbnatlas.org), last accessed July 2018

<sup>6</sup> JNCC Statutory Nature Conservation Agency Protocol for Minimising the Risk of Injury to Marine Mammals from Piling Noise (2010) available at: [http://jncc.defra.gov.uk/pdf/JNCC\\_Guidelines\\_Piling%20protocol\\_August%202010.pdf](http://jncc.defra.gov.uk/pdf/JNCC_Guidelines_Piling%20protocol_August%202010.pdf) last accessed August 2018

<sup>7</sup> Reid, J B, Evans, P G H, and Northridge, S P. JNCC Atlas of Cetacean Distribution in north-west European waters (2003) available at: [http://jncc.defra.gov.uk/PDF/CetaceansAtlas\\_web.pdf](http://jncc.defra.gov.uk/PDF/CetaceansAtlas_web.pdf). last accessed August 2018

<sup>8</sup> Seawatch Foundation: <http://www.seawatchfoundation.org.uk>, last accessed August 2018

<sup>9</sup> SNH About Scotland's Nature: Marine Mammals available at <https://www.nature.scot/plants-animals-and-fungi/mammals/marine-mammals> last accessed 21/08/2018

<sup>10</sup> Scottish Government seal Haul-out maps available at: <http://www.gov.scot/Topics/marine/marine-environment/species/19887/20814/maps> last accessed August 2018

<sup>11</sup> WDC sightings data available at: <http://www.whaledolphintrust.co.uk/sightings-recent-sightings.asp> last accessed August 2018

<sup>12</sup> HWDT sightings data available at: <https://whaletrack.hwdt.org/sightings-map/> last accessed August 2018

<sup>13</sup> JNCC (n.d.). The UK Biodiversity Action Plan. Joint Nature Conservation Committee. Retrieved from <http://jncc.defra.gov.uk/ukbap>.

<sup>14</sup> Highland BAP. <http://www.highlandbiodiversity.com/highland-bap.asp>. Last accessed August 2018

<sup>15</sup> [http://highlandbiodiversity.com/userfiles/file/acion-plans/inverness\\_nairn.pdf](http://highlandbiodiversity.com/userfiles/file/acion-plans/inverness_nairn.pdf). Last accessed August 2018

<sup>16</sup> Scottish Government (2013, April). Scottish Biodiversity List. <http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL>

## 4.2 Field Studies

An intertidal survey (Technical Appendix 8.3) was carried out on 9<sup>th</sup> August 2018 to ground truth the survey undertaken for the 2013 ES. No other field studies were undertaken.

## 4.3 Evaluation of Important Ecological Features

The evaluations are applied to those sites, habitats and species that have been scoped in to the assessment and those that are predicted to be affected by the project. These are termed Important Ecological Features (IEFs).

European, national and local governments and specialist organisations have together identified a large number of sites, habitats and species that provide the key focus for biodiversity conservation in the UK and Ireland, supported by policy and legislation. These provide an objective starting point for identifying the important ecological features that need to be considered. Table 4.1 shows a procedure for determining the geographical level of importance of site designations, habitats and species. Where a feature is important at more than one level in the table, its overriding importance is that of the highest level. Usually only the highest level of legal protection is listed.

**Table 4.1: Geographical Level of Importance of Ecological Features**

Level of Importance	Sites	Habitats	Species
<b>International</b>	Designated, candidate or proposed Special Areas of Conservation, Special Protection Areas and Ramsar sites; UNESCO (Ecological) World Heritage Sites; UNESCO Biosphere Reserves; Biogenetic Reserves.	A viable area of habitat included in Annex I of the EC Habitats Directive; a habitat area that is critical for a part of the life cycle of an internationally important species.	A European Protected Species; an IUCN Red Data Book species that is globally Vulnerable, Endangered or Critically Endangered.
<b>National (UK)</b>	Sites of Special Scientific Interest/Areas of Scientific Interest; National Nature Reserves; Nature Conservation Review Sites; Marine Conservation Zones (UK offshore).	A viable area of priority habitat listed in the UK Biodiversity Action Plan <sup>17</sup> ; an area of habitat fulfilling the criteria for designation as an SSSI/ASSI or MCZ; a habitat area that is critical for a part of the life cycle of a nationally important species.	An IUCN Red Data Book species that is Vulnerable, Endangered or Critically Endangered in the UK; a species that is Rare in the UK (<15 10km grid squares); a priority species in the UKBAP; a Schedule 5 (animal) or Schedule 8 (plant) species included in the Wildlife and Countryside Act 1981.
<b>National (Scotland)</b>	National Parks; Marine Protected Areas; Marine Consultation Areas.	Habitats of principal importance for biodiversity in Scotland.	Species of principal importance for biodiversity in Scotland.

<sup>17</sup> UKBAP priority habitats: <http://jncc.defra.gov.uk/page-5706>

Level of Importance	Sites	Habitats	Species
<b>Regional</b>	Regional Parks.	Regional Local Biodiversity Action Plan <sup>18</sup> habitats noted as requiring protection.	A species that is Nationally Scarce in the UK (present in 16-100 10km grid squares); a species that is included in the Regional LBAP; an assemblage of regionally scarce species.
<b>County / Metropolitan</b>	Local Nature Reserves; Woodland Trust Sites; Royal Society for the Protection of Birds Sites; Local Wildlife Sites.	County LBAP <sup>19</sup> habitats noted as requiring protection; semi-natural, ancient woodland >0.25ha in extent.	A species that is included in the County LBAP; an assemblage of species that are scarce at the county level.
<b>Local</b>		Semi-natural, ancient woodland <0.25ha in extent; diverse or ecologically valuable hedgerow network; semi-natural habitats that are unique or important in the local area; flushes, springs and base rich rock that support bryophyte assemblages that are widespread but localised to these habitats.	Species as defined by Local Authority lists (if available).

#### 4.4 Impact Assessment

The assessment of impacts describes how the baseline conditions would change as a result of the project and its associated activities and from other developments. The term ‘impact’ is used commonly throughout the EIA process and is usually defined as a change experienced by a receptor (this can be positive, neutral or negative). The term ‘effect’ is commonly used at the conclusion of the EIA process and is usually defined as the consequences for the receptor of an impact after mitigation measures have been taken into account. The EIA Regulations specifically require all likely significant effects to be considered. Therefore, impacts and effects are described separately and the effects for the IEFs are assessed as being either significant or not according to the importance and sensitivity of the IEF.

Significant cumulative effects can result from the individually insignificant but collectively significant effects of actions taking place over a period of time or concentrated in a location, for example:

- Additive / incremental;
- Associated / connected.

##### Assessment Criteria - Magnitude

The CIEEM guidance states that when describing changes/activities and positive or negative impacts on ecosystem structure and function, reference should be made to the following parameters:

- Magnitude;
- Extent;

<sup>18</sup> Highland BAP: <http://www.highlandbiodiversity.com/highland-bap.asp>

<sup>19</sup> Inverness and Nairn BAP: [http://highlandbiodiversity.com/userfiles/file/acion-plans/inverness\\_nairn.pdf](http://highlandbiodiversity.com/userfiles/file/acion-plans/inverness_nairn.pdf)



- Duration;
- Reversibility; and
- Timing and frequency.

**Magnitude:** refers to the size, amount, intensity and volume of an impact, determined on a quantitative basis if possible, but typically expressed in terms of relative severity, such as major, moderate, low or negligible. Extent, duration, reversibility, timing and frequency of the impact can be assessed separately but they tie in to determine the overall magnitude.

**Extent:** the area of which the impact occurs. When the IEF is the habitat itself, magnitude and extent may be synonymous.

**Duration:** the time for which the impact is expected to last prior to recovery or replacement of the IEF. This is defined in relation to ecological characteristics, rather than human timeframes. The duration of an activity may differ from the duration of the resulting impact caused by the activity and this is taken into account.

**Reversibility:** an irreversible (permanent) impact is one from which recovery is not possible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A reversible (temporary) impact is one from which spontaneous recovery is possible or for which effective mitigation is possible and an enforceable commitment has been made.

**Timing and frequency:** the number of times an activity occurs will influence the resulting impact. The timing of an activity or change may cause an impact if it happens to coincide with critical life-stages or seasons.

Criteria for describing the magnitude of an impact are presented in Table 4.2 below:

**Table 4.2: Criteria for Describing Magnitude of Impact**

<b>Magnitude</b>	<b>Description</b>
<b>Major</b>	Total or major loss or alteration to the IEF, such that it will be fundamentally changed and may be lost from the site altogether; and/or loss of a very high or high proportion of the known population or range of the IEF.
<b>Moderate</b>	Loss or alteration to the IEF, such that it will be partially changed; and/or loss of a moderate proportion of the known population or range of the IEF.
<b>Low</b>	Minor shift away from the existing or predicted future baseline conditions. Change arising from the loss or alteration will be discernible but the condition of the IEF will be similar to the pre-development conditions; and/or having a minor impact on the known population or range of the IEF.
<b>Negligible</b>	Very slight change from the existing or predicted future baseline conditions. Change barely discernible, approximating to the 'no change' situation; and/or having a negligible impact on the known population or range of the IEF.

#### Assessment Criteria – Significance

Significance is a concept related to the weight that is attached to effects when decisions are made. For the purposes of EclA, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for IEFs. In broad terms, significant effects encompass effects on the structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution).

Significant effects are quantified with reference to an appropriate geographic scale (see Table 4.1 above). The ClEEM guidance has one 'level of importance' and a geographical 'scale of significance'. This is to deal with the fact that the geographical scale at which the effect is significant is not necessarily the same as the geographic level of importance of the IEF.

Professional judgement is used to determine the significance of effects.

#### Assessment Criteria – Four Point Scale

The Highland Council requested that a four-point scale be implemented when measuring the positive and negative effects of the proposed development. The four point scale is used to advise if the effect is either:

- Negative
- Strong negative
- Positive
- Strong positive

Professional judgement is used to implement the scale.

#### Assessment Criteria – Confidence in Predictions

CIEEM does not cover levels of confidence in predictions adequately, therefore an approach has been adopted based on river conservation evaluation<sup>20</sup>. A simple, qualitative index based on professional judgement is assigned to each predicted effect as follows:

A: high confidence.

B: intermediate confidence.

C: low confidence.

Factors influencing confidence include:

- The frequency and effort of field sampling;
- Constraints to the field survey;
- The completeness of the data (field and desk);
- The age of the data (although recent data are not necessarily always more reliable than old data);
- The state of scientific knowledge relating to the predicted effects of development activities on the IEF (the accuracy of the magnitude assessment); and
- The accuracy of the assessment of significance.

#### Assessment Criteria – Success of Mitigation

The word ‘mitigation’ has developed a wider meaning and common usage in environmental assessment than its strict meaning related to reducing the severity of something. Mitigation can sometimes be used as a generic term for a wide range of counter-acting measures, all of which, as the Directive and Regulations prescribe, are intended to *prevent, reduce and where possible offset any significant adverse effect on the environment*. Mitigation can be used to encompass measures intended to avoid, cancel or reduce adverse effects (this is the ‘mitigation hierarchy’).

Mitigation and compensation measures often carry a degree of uncertainty. Uncertainty associated with a design will vary according to a number of factors, such as:

- The technical feasibility of what is proposed;
- The overall quantity of what is proposed;
- The overall quality of what is proposed;
- The level of commitment provided to achieve what is proposed;
- The provision of long-term management; and

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<sup>20</sup> SERCON: System for Evaluating Rivers for Conservation, Version 2, Technical Manual. Scottish Natural Heritage (2001).

- The timescale for predicted benefits.

The following objective scale is used for the success of mitigation:

- Certain/near certain: probability estimated at 95% chance or higher.
- Probable: probability estimated above 50% but below 95%.
- Unlikely: probability estimated above 5% but less than 50%.
- Extremely unlikely: probability estimated at less than 5%.

## 5 BASELINE

### 5.1 Designated Sites

Table 5.1 provides a list of scoped in designated sites for nature conservation within 60km of the site and states their ecological and hydrological linkages to the site.

**Table 5.1: Designated Sites**

Site Name	Designation	Distance from the Site	Designated Feature(s)	Linkage to the Site
Moray Firth	SAC	Adjacent to site	Bottlenose dolphin Subtidal sandbanks	Connected ecologically and hydrologically
Dornoch Firth and Morrich More	SAC	44km NW	Harbour seals	Connected ecologically
River Moriston	SAC	58km SW	Atlantic salmon	Connected ecologically

### 5.2 Habitats

#### 5.2.1 Intertidal

The survey of the intertidal zone immediately adjacent to the proposed licenced extent of the capital dredge area and the land disposal and spit restoration area (Technical Appendix 8.3) identified the following four biotopes:

##### **Fine sand**

The water port is dominated by fine sand (LS.LSa.FiSa) which is present on both the northern shoreline of the port and the northern shoreline of the development site. Adjacent to the development site and towards the port entrance are areas of sandflat not covered at low tide. Fine sand is also present at the lower edge of the northern (outer) shoreline of the spit, on the Moray Firth.

The sandflats adjacent to the development site on the southern shore are more productive than those towards the port entrance. Casts of the polychaete lugworm (*Arenicola marina*) and cockles (*Cerastoderma edule*) were present but not abundant. Biofilms were visible on the surface of areas of sandflat adjacent to the development site. Mudflats and sandflats not covered by seawater at low tide are an Annex 1 habitat under the Habitats Directive.

Fucoid algal species spiral wrack (*Fucus spiralis*) and bladder wrack (*Fucus vesiculosus*) were recorded growing on dispersed cobbles and boulders on the northern shore at the east of the site, and adjacent to the development site.

##### **Mobile sand**

Mobile sand (LS.LSa. MoSa) is present at the more exposed areas of the lagoon entrance, on both shores, and on the northern (outer) shore of the spit, on the Moray Firth. These areas are not covered by low tide and are largely amphipod dominated habitats. Areas of mobile sand are backed by dune habitat on both shores.

##### **Barren shingle**

Barren shingle (LS.LCS.Sh.BarSh) is present to the west of the development site on the southern shoreline of the port, on the northern shoreline of the port towards the port entrance, and within areas where land take has occurred to allow ships to turn. Shingle also occurs on the upper northern (outer) shore of the spit, on the Moray Firth.

### **Littoral rock**

Riprap has been installed on the embankment (LR.LLR) to stabilise reclaimed land on the southern shore of the port on the western boundary of the development site. Boulders in the intertidal and splash zones have been colonised by furoid algal species and barnacles.

## **5.2.2 Subtidal**

No benthic survey was required for this EclA. The results of the previous benthic surveys undertaken for the 2013 survey are detailed within the Intertidal and Benthic Ecology Report (Technical Appendix 8.3). Four intertidal biotopes were recorded:

- Sublittoral sand in low or reduced salinity (lagoons) SS.SSa.SsaLS;
- Infralittoral mobile clean sand with sparse fauna SS.SSa.IFiSa.IMoSa;
- *Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand SS.SSa.IFiSa.NcirBat; and
- Muddy sand LS.LSa.MuSa.

Mudflats and sandflats are Annex I Habitat under the EU Habitats Directive.

The muddy sand biotope is listed within the intertidal mudflats UKBAP Priority habitat.

## **5.3 Marine Mammals**

### **5.3.1 Harbour Porpoise**

Site conditioning monitoring undertaken by SNH in 2010 indicated that harbour porpoise (*Phocoena phocoena*) were detected regularly during timing porpoise detector (T-POD) monitoring<sup>21</sup> in the outer Moray Firth, only rarely Lossiemouth, and at an intermediate level at the entrance to the Cromarty Firth.

Since June 2018 there have been 23 sightings of harbour porpoise. The nearest being seen from Nairn approximately 14km to the east of Ardersier.

Harbour porpoise is a European Protected Species (EPS) and is listed as a priority species in the UKBAP.

### **5.3.2 Bottlenose Dolphin**

Monitoring is undertaken to determine the condition of the bottlenose dolphin (*Tursiops truncatus*) feature of the Moray Firth SAC. This feature is currently in Favourable condition according to the last assessment in 2010.

The monitoring used T-PODs to assess the baseline activity of cetaceans. T-POD sampling locations were positioned to the north and north east of Whiteness Head (entrance to the Cromarty Firth, Lossiemouth, and Outer Moray Firth). During these studies differing densities of bottlenose dolphin and harbour porpoise were

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<sup>21</sup> T-PODS are autonomous data recorders for detecting cetacean echolocation clicks and potentially provide cost-impactive opportunities for monitoring cetacean activity.

determined, and generally speaking dolphins were detected regularly at the entrance to the Cromarty Firth, only rarely in the outer Moray Firth, and at an intermediate level at Lossiemouth.

Cheney *et al.* (2012) conducted photo-identification surveys and Passive Acoustic Monitoring (PAM) studies in core sampling areas within the Moray Firth SAC during the summers (May to September) of 2008 to 2010. Mark-recapture analysis of photographs collected during photo-identification surveys indicated that an estimated 68 individual dolphins used the SAC during the summer of 2008, 102 in 2009 and 114 in 2010. This indicates that the number of dolphins using the SAC between 1990 and 2010 appears to be stable. However, a Bayesian capture-recapture assessment of the total abundance of the east coast bottlenose dolphin population suggests, with a high probability (99%), that this population is increasing and therefore the actual proportion of the population using the SAC may have declined.

Notwithstanding the above, at least 60% of the population has been seen within the SAC in 16 of the 21 years of photo-identification effort. Mark-recapture analysis of photographs collected during surveys in the summer of 2016 indicated that the estimated number of individual dolphins using the SAC was 103 (95% confidence interval: 93-115).

T-PODs were deployed to the west, north and north east of Whiteness Head (2008-2010), and survey transects and groups of bottlenose dolphin (with varying densities) were identified immediately adjacent/north of the development site. The deep water channel immediately adjacent/north of Whiteness Head appears to be an important area for bottlenose dolphin. There were group encounters here in 2008, 2009 and 2010, particularly during the months of May to September.

Since June 2018, Seawatch Foundation have received 200 sightings of bottlenose dolphin between Ardersier and Lossiemouth, 50km along the coast to the east. Hotspots include Lossiemouth, Hopeman, Nairn and Covesea; the closest of which being Nairn, 14km east of the site.

Chanorly Point, approximately 3km northwest of Ardersier, is a well-known bottlenose dolphin hotspot. PAM is ongoing in this area to monitor the status of the SAC feature. Between 2011 and 2016, during the summer months (May – September), the percentage of days that dolphins were detected was over 90%.

Bottlenose dolphin is an EPS and is listed as a priority species under the UKBAP.

### 5.3.3 Common Dolphin

Common dolphins (*Delphinus delphis*) are thought to prefer deeper, continental shelf waters and are occasionally seen in the North Sea between June and September. Although they could occasionally be present in the Moray Firth, they are unlikely to utilise the shallow waters in proximity to Ardersier.

Common dolphin is an EPS and is listed as a priority species under the UKBAP.

### 5.3.4 Minke Whale

Minke whales (*Balaenoptera acutorostrata*) are the most commonly seen baleen whale in Scotland and sightings are frequent and widespread from May to October, peaking in July. The southern and Outer Moray Firth are thought to be particularly important areas for minke whales. The closest recorded sightings of minke whales to the proposed Ardersier Port, submitted to Seawatch Foundation since June 2018, are off the coast off Covesea, approximately 40km to the east.

Minke Whale is an EPS and is listed as a priority species under the UKBAP.

### 5.3.5 Seals

Both harbour seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*) can be seen all around Scotland on many of the offshore islands and along much of the eastern coast. Since the 2013 ES, Whiteness Sands seal haul-out site within the Dornoch Firth has been designated as the Dornoch Firth and Morrich More SAC; a feature of which is breeding harbour seals, which are in unfavourable declining condition.

A 2015 survey conducted by St Andrews Marine Research Unit (SMRU) counted 745 harbour seals in the Moray Firth, which was a similar figure to the 2007 and 2009 surveys. However it was just over half of the 1997 figure.

There is a small section of a designated seal haul-out site within the proposed development site. This haul-out holds 20% of the Moray Firth population of harbour seals and is seen as the most important haul-out for this species not only in the Moray Firth but on the east coast of Scotland<sup>22</sup>.

Harbour seals are listed as a priority species within the UKBAP.

Grey seals are listed as a priority species within the Inverness and Nairn LBAP.

## 5.4 Fish

### 5.4.1 Atlantic Salmon

Atlantic salmon (*Salmo salar*) are known to move around and between Scottish river systems<sup>23</sup>. Historical data dating back to 1913 (Calderwood 1913-20<sup>24</sup>, Menzies 1937-38<sup>25</sup>, and Shearer 1952-88<sup>26</sup>) indicate that Atlantic salmon associated with the River Oykel SAC, Berriedale and Langwell Waters SAC, River Moriston SAC, and the River Spey SAC have been recorded in the Moray Firth, and vice versa.

On reaching the Scottish coast salmon subsequently migrate towards their natal river. The wide geographic distribution of arrival location and natal rivers generates apparently variable and random directions of movement for a given location. The apparent exception to this rule is for the east coast, south of Aberdeenshire, where the dominant direction of movement is clearly a northerly one. In addition, the dominant direction of movement for Multi-Sea-Winter (MSW) salmon on the west coast is also a northerly and easterly one given the dominance of east coast rivers in the production of MSW fish. The limited available information on adult swimming depths suggest that they spend most of their time in shallow water (generally 0-40m), although they can dive to substantial depths up to 280m. It has been hypothesised that these dives are related to feeding or predator avoidance. On reaching the Scottish coast, gut contents suggest that adult fish are often still feeding, particularly early in the year. The swimming depths utilised by adult fish in Scottish coastal waters remains unknown, but it could be highly variable (Malcolm *et al* 2010).

Data obtained for the previous ES, from the Cromarty District Salmon Fishery Board (CDSFB), showed that fish arrive in small numbers in early spring with a peak in the spring run in May. The main grilse runs are usually from mid-July to the end of September.

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22 JNCC: MF001 - Ardersier: Intertidal sandbanks west of Whiteness Head and north of Kirkton within the MoD Danger Area.

23 Malcolm I.A., Godfrey J., Youngson A.F., (2010) - *Review of migratory routes and behavior of Atlantic salmon, sea trout and European eel in Scotland's coastal environment: implications for the development of marine renewables*. Scottish Marine and Freshwater Science Vol 1 No 14. Published by Marine Scotland Science ISSN: 2043-7722.

24 Calderwood, W.L. (1913-1920) *Salmon research - Sea netting results*. Fisheries, Scotland, Salmon, Fish. (No's 1-3)

25 Menzies, W.J.M. (1937-1938) *The Movements of Salmon Marked in the Sea I. The Northwest Coast of Scotland in 1936 and 1937* Fisheries, Scotland, Salmon Fish, 1937, No. 1.

26 Shearer W.M. (1958) *The movements of salmon tagged in the sea, Montrose, 1954, 1955*. Freshwater and Salmon Fisheries Research 20.

The following data, presented in Table 5.2, was received in August 2018, from the River Spey Fishery Board (SFB), with regard to their annual catch of salmon, from 2006 – 2017.

**Table 5.2 Salmon catch 2006/17**

Year	Feb	Mar	Apr	May	June	July	Aug	Sept	Total
2006	35	263	888	1,648	1,680	1,427	3,220	2,217	<b>11,378</b>
2007	26	174	370	924	1,316	2,171	3,223	1,877	<b>10,081</b>
2008	33	234	669	1,411	2,429	1,863	3,217	1,700	<b>11,556</b>
2009	40	232	508	1,032	1,989	1,839	1,926	1,060	<b>8,626</b>
2010	12	73	249	653	1,167	2,028	2,924	2,125	<b>9,231</b>
2011	33	145	357	1,407	1,927	1,551	2,005	1,182	<b>8,607</b>
2012	50	82	309	849	1,307	2,172	1,617	1,066	<b>7,452</b>
2013	33	91	313	923	1,091	866	1,216	1,213	<b>5,746</b>
2014	32	224	319	457	649	582	1,419	830	<b>4,512</b>
2015	27	149	314	874	1,335	1,603	2,002	1,443	<b>7,747</b>
2016	25	116	423	1,027	2,349	1,695	1,271	726	<b>7,632</b>
2017	37	297	449	720	1,173	817	962	841	<b>5,296</b>
<b>Average</b>	<b>32</b>	<b>173</b>	<b>431</b>	<b>994</b>	<b>1,534</b>	<b>1,551</b>	<b>2,084</b>	<b>1,357</b>	<b>8,155</b>

It can be clearly seen from the data presented above, correlated with the previous data obtained from the CDSF, that there is a small spring run of salmon on the Spey peaking in May annually, followed by a larger, separate grilse run, peaking in July and August. The majority of catches in September comprise primarily “stale” resident fish as opposed to the previous month’s fishing, where fresh-run grilse and salmon dominate the catch.

Atlantic Salmon is listed as a priority species under the UKBAP.

#### 5.4.1 Sea Trout

Brown trout (*Salmo trutta*) exhibit a wide range of migratory behaviour that is thought to be influenced by genetics and environment. At the extreme, brown trout can migrate to the marine environment where they are known as sea trout. In contrast to salmon, sea trout post-smolts do not migrate rapidly out to sea from inshore coastal areas. Instead they tend to use near shore sea loch and fjord areas where available. It is uncertain what happens to sea trout smolts on the east coast where no such areas exist.

The following data, presented in Figure 5.1, was received from the SFB, with regard to their annual catch of sea trout, from 2006 – 2017. It should be noted that, for sea trout, only annual total catch data was available.

Trend line analysis of the sea trout data from the Spey, presented in Figure 5.1, indicates a slow decline in overall fish capture numbers during the period 2006 – 2011. It should be noted however that catch data is subject to several variables, including variation in angling pressure, consistency in reporting and meteorological conditions. It is also unclear as to whether this decline in numbers is consistent across all rivers within the Moray Firth catchment, or exclusive to only select rivers.

Sea trout is a priority species under the UKBAP.



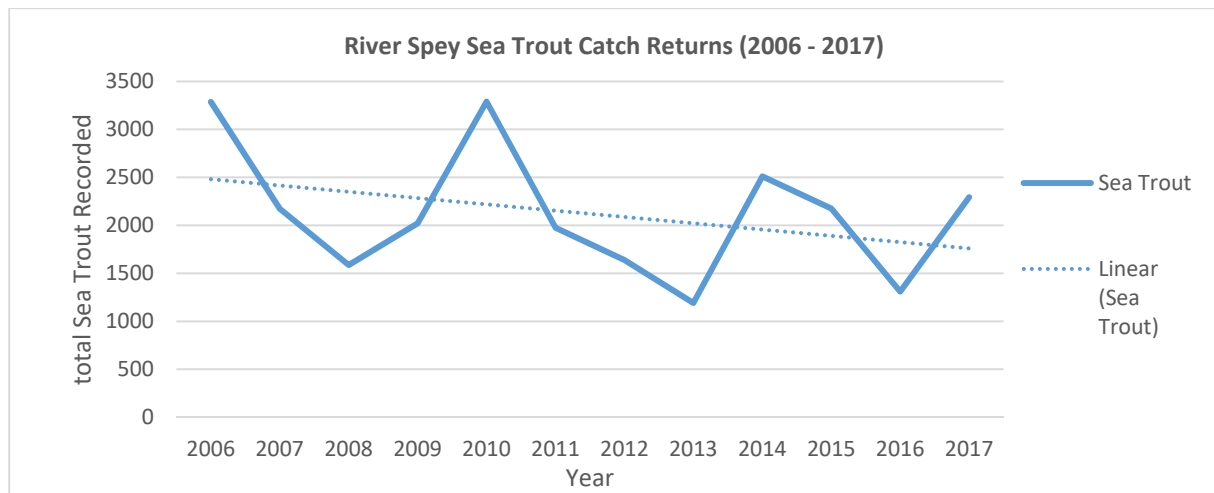


Figure 5.1: Sea trout Catch Returns (River Spey) 2006 - 2017

### 5.4.2 Salmon Smolts

Data obtained for the previous ES in 2013, from the Cromarty DSFB, stated that the peak of the smolt run (emigration) in the local area is between May and early June annually.

Additional smolt-tracking research conducted during the intervening period (Del Villar-Guerra et al. 2016<sup>27</sup>) from the Wick River, 70 miles north of the proposed development, has essentially concurred with the information provided by the Cromarty DSFB, detecting smolts migrating into the Pentland Firth from freshwater from the 28<sup>th</sup> of April and remaining present around Automated Listening Stations (ALSs) until 21<sup>st</sup> May.

## 5.5 Invasive Non-Native Marine Species

The marine invasive species wireweed (*Sargassium muticum*) was recorded during the intertidal survey. The wire weed was unattached and therefore not growing at this location. This species is native to the Asian Pacific regions but has spread throughout the Pacific region. Wireweed prefers areas of calm waters where it quickly reproduces, out competing native seaweed species, reducing light and increasing sedimentation.

## 5.6 Prediction of Future Baseline

This EclA has been undertaken using the current baseline. With the absence of development, it is predicted that the current use of the land would remain the same. As coastal habitats are dynamic it is likely that the spit would change due to natural coastal processes. The spit has already grown due to sand deposits, since the previous maintenance dredging ceased, and it is likely that this would continue without any intervention.

### 5.6.1 Climate Change

Coastal habitats are complex, dynamic and interdependent. They are important in providing sea defences, areas for recreation, biodiversity and a range of other ecosystem services.

<sup>27</sup> Del Villar-Guerra D., Gauld N.R., McIlvenny J.D., Goddijn-Murphy L.M., Youngson A.F. (2016) – Wick Smolt Tracking Project. Published by Environmental Research Institute, University of Highlands and Islands.

Increased air- and sea-surface temperatures have resulted in changes in the distribution of marine and coastal species.

Changes in the phenology of coastal species have been observed<sup>28</sup>, with the rates of change in marine species being considerably greater than those in terrestrial and freshwater systems. Recent advances in the phenology of species have not all occurred at the same rate, in some cases resulting in mismatches of timing of annual cycles of animals and their food organisms.

Rising sea levels have been associated with the loss of coastal habitats. Predicted future rises will have significant impacts on coastal and intertidal habitats, including changing geomorphological processes, further habitat loss and increasing the vulnerability of infrastructure. However, coastal systems are dynamic and have the potential to adapt to rising sea levels, but only if there is an adequate supply of sediment to allow accretion and if there is landward space for the coast to roll-back into. Sea defences and other coastal management interrupt the movement of sediment between systems and prevent natural coastal realignment.

Future changes are hard to predict because it is difficult to separate the impacts of rising sea levels from those of coastal management, including sea defences. Coastal zone management and adaptation, and the interactions with other climate drivers, nutrient deposition and habitat management, will have significant influence on the quantity, quality and location of future coastal habitats.

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<sup>28</sup> National Centre for Ecological Analysis and Synthesis. <https://www.nceas.ucsb.edu/science/climate#>

## 6 EVALUATION

The evaluations have been applied only to those designated sites, habitats and species that have been scoped in to the assessment and those where there is the potential for impacts that could result in significant adverse ecological effects as a result of the proposed development. The IEFs and the evaluations are presented in Table 6.1.

**Table 6.1: Evaluation of Important Ecological Features**

IEF	Present on site?	Present in wider area?	Importance	Justification
Moray Firth SAC	Yes	Yes	International	The SAC is adjacent to the site, but is within the dredging area. An SAC is an internationally designated site.
Dornoch Firth and Morrich More SAC	No	Yes	International	The SAC is located approximately 44km north west of the proposed development. An SAC is an internationally designated site.
River Moriston SAC	No	Yes	International	The SAC is located approximately 58km south west of the proposed development.
Harbour porpoise	No	Yes	International	Harbour porpoise is an EPS and listed as a priority species within the UKBAP.
Bottlenose dolphin	No	Yes	International	Bottlenose dolphin is an EPS and is listed as a priority species within the UKBAP.
Common dolphin	No	Yes	International	Common dolphin is an EPS and is listed as a priority species within the UKBAP.
Minke whale	No	Yes	International	Minke whale is an EPS and is listed as a priority species within the UKBAP.
Harbour seal	No	Yes	National	Harbour seal is listed as a priority species within the UKBAP.
Grey seal	No	Yes	County / Metropolitan	Grey seal is listed as priority species within the LBAP.
Atlantic salmon	No	Yes	National	Atlantic salmon is listed as a priority species under the UKBAP.
Sea trout	No	Yes	National	Sea trout is listed as a priority species under the UKBAP.
Intertidal and subtidal habitats	Yes	Yes	International	Annex 1 and UKBAP habitats

## **7 ASSESSMENT OF ECOLOGICAL IMPACTS**

In accordance with CIEEM guidance, suitable mitigation has been considered in the impact assessment below. The mitigation specified for construction and operational impacts are detailed with the CEMD (Technical Appendix 3.3) and the Marine Mammal Protection Plan (MMPP) (Technical Appendix 8.2).

### **7.1 Negative Construction Impacts**

#### **7.1.1 Moray Firth SAC**

##### **Nature of Impacts**

The two qualifying features of the protected area (subtidal sandbanks and bottlenose dolphin) may potentially be impacted by the cutter suction dredging (CSD) and vibropiling activities that would cause; removal of the sediments, increased turbidity from disturbance of the sediments, underwater noise and vibration and increase in vessel movements. These impacts may cause loss or damage to subtidal sandbanks, injury or disturbance to bottlenose dolphin and may alter its fecundity and behaviour.

Dredging of the intertidal and subtidal habitats may cause the spread of the INNS wireweed that has been recorded at the proposed development site (Technical Appendix 8.3).

The proposed development may lead to contamination of coastal water and sediments from accidental pollution incidents (see EIAR Chapter 11: Water Environment). The main risk is posed by refuelling activities. Oil spillages to the water environment would be detrimental to both water and sediment quality, and could affect the qualifying features of the SAC.

##### **Duration of Impact**

Temporary.

##### **Importance of IEF**

The Moray Firth SAC is of international importance.

##### **Magnitude of Impact**

The Moray Firth SAC comprises an area of 151,274ha. It extends from the estuary north of Inverness, along the eastern coast to Lossiemouth and the northern coast to Helmsdale. The qualifying features for this site are subtidal sandbanks and bottlenose dolphins. The Moray Firth SAC supports the only known resident population of bottlenose dolphin in the North Sea and is one of only two UK sites designated for the species as a primary qualifying feature. The north east of Scotland population is estimated to comprise approximately 195 individuals. Between 1990 and 2013, annual estimates of the number of dolphins using the SAC ranged between 43 and 134.

Bottlenose dolphins are present within the Moray Firth year round, although abundance and distribution varies between summer and winter with animals appearing more dispersed and ranging further down the east coast in winter. Although dolphins are found throughout the Moray Firth they seem to prefer certain parts of the Inner Firth, the southern Moray Firth coastline and the mouth of the Cromarty Firth. The population also ranges outwith the Moray Firth with small groups regularly occurring off the Aberdeenshire, Fife and East Lothian coasts and occasionally as far as Northumberland.

The possible effects of underwater noise on bottlenose dolphins include temporary threshold shifts (TTS) or permanent threshold shifts (PTS) in hearing and disturbance (masking and/or habitat avoidance). Bottlenose dolphins are considered to be very sensitive to noise and in extreme cases intense noises can lead to PTS in hearing which is unrecoverable hearing damage that may lead to the death of individuals. Vibropiling causes impacts of larger acoustic magnitude than dredging and so these are considered in more detail below.

The noise model (EIAR Chapter 10: Underwater Noise) indicated that vibropiling undertaken for eight hour periods would risk PTS of bottlenose dolphins within 1m of the source if the dolphins were fleeing the site and 20m if they were stationary for the whole period. It has been recorded that marine mammals will move away from the source of noise disturbance and will therefore be fleeing the area. The detailed mitigation and Marine Mammal Observation Protocol (MMOP) are detailed in the Marine Mammal Protection Plan (MMPP) (Technical Appendix 8.2) will be followed, therefore the **magnitude of the impact is low**.

Increased sedimentation during the dredging (EIAR Chapter 11: Water Environment) will be very localised and short term and not impact bottlenose dolphins. The dredged material has been assessed as being clean sand and therefore there should be no chemical pollution risks with the material. As the sediment is predominantly sand with a very small level of fines (silt or clay), turbidity impacts will be small and very local. Marine mammals often reside in turbid waters and as the area affected will be minimal, the **magnitude of the impact from increased turbidity for bottlenose dolphin is negligible**<sup>29</sup>.

Dredging will remove a section of subtidal sandbank that has built up along the spit since maintenance dredging ceased. A 120m wide channel will be created to allow access to the port. This small section of habitat loss will not impact upon the integrity of the SAC as it is a recently developed section that has formed since dredging of the port ceased. All dredged material will be deposited on land within the proposed development boundary and therefore will not impact other subtidal sandbanks within the SAC. It is therefore considered that the **magnitude of the impact of dredging upon subtidal sandbanks is negligible**.

During construction, chemical pollutants released into the water (as a result of dredging, spilled material from vessels, spillage from onshore storage of fuel or chemicals) could have temporary impacts on bottlenose dolphins either directly, or indirectly. Toxic pollutants could result in habitat avoidance, injury or death of individuals and/or reduced prey availability leading to loss of condition. Overall with mitigation detailed in the CEMD (Technical Appendix 3.3), the **magnitude of the impact of water pollution on the qualifying features of the SAC is considered to be negligible**.

Dredging may spread the INNS wireweed recorded at the proposed development site. However, the majority of the dredged material will be deposited on land and with the mitigation outlined within the Intertidal and Benthic Ecology Report (Technical Appendix 8.3) **the magnitude of this impact on the SAC is negligible**.

### **Significance of Effects**

The effects of underwater noise on the SAC are not significant.

The effects of sedimentation on the SAC are not significant.

The effects of habitat loss on the SAC are not significant.

The effects of contamination of coastal water on the SAC are not significant.

The effect of the spread of INNS on the SAC is not significant.

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<sup>29</sup> Todd, V. et al (2015). A review of impacts of marine dredging activities on marine mammals. ICES Journal of Marine Science, Volume 72, Issue 2, 1 January 2015, Pages 328–340

### **Four Point Scale Assessment**

None of the effects of the SAC are predicted to be strongly negative.

### **Confidence of Assessment**

A: high confidence.

## **7.1.2 Bottlenose Dolphin, Common Dolphin, Minke Whale and Harbour Porpoise**

### **Nature of Impact**

The proposed development would include the following activities during the construction phase that could potentially impact on bottlenose dolphin, common dolphin, minke whale and harbour porpoise: sediment dispersal from dredging of the basin area, water pollution, increase in vessel movements and noise pollution from both the dredging and the piling.

### **Duration of Impact**

Temporary.

### **Importance of IEFs**

Bottlenose dolphin, common dolphin, minke whale and harbour porpoise are all of international importance.

### **Magnitude of Impact**

During the construction phase, bottlenose dolphin, common dolphin, minke whale and harbour porpoise may be impacted by underwater noise as a result of vibropiling and dredging. The possible effects of underwater noise on marine mammals include TTS or PTS in hearing. The underwater noise modelling (EIAR Chapter 10: Underwater Noise) provides ranges within which PTS and TTS will occur for each species.

Upon interpolation of the updated underwater modelling data, it is considered that the standard, minimum 500m mitigation zone would be sufficient to mitigate against PTS/TTS during vibropiling and dredging for all marine mammal species. This is because, when fleeing (the likely reaction of any marine mammal to disturbance), the maximum TTS limit for any species is 230m. This mitigation zone would not cause a 'barrier' that would prevent animals from swimming to open water or moving within the Firth. The MMOP outlined in Technical Appendix 8.2 will be followed, therefore the **magnitude of the impact of underwater noise on these four marine mammal species is low.**

During construction, chemical pollutants released into the water (as a result of dredging, spilled material from vessels, spillage from onshore storage of fuel or chemicals) could have temporary impacts on marine mammals either directly, or indirectly, if prey items are affected. Toxic pollutants could result in habitat avoidance, injury or death of individuals and/or reduced prey availability leading to loss of condition. If standard mitigation measures for the prevention of water pollution (outlined within the CEMD) are followed the **magnitude of this impact is negligible.**

Increased sedimentation during the dredging (EIAR Chapter 11: Water Environment) will be very localised and short term and significant impacts from turbidity are improbable<sup>30</sup>. Indirect effects of dredging can include a reduction in prey abundance and diversity, primarily due to displacement and influx of toxins and pollutants into the water that can bio accumulate in the food chain. However, the dredged material has been assessed as

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<sup>30</sup> Todd, V. et al (2015). A review of impacts of marine dredging activities on marine mammals. *ICES Journal of Marine Science*, Volume 72, Issue 2, 1 January 2015, Pages 328–340

being clean sand and therefore there should be no chemical pollution risks with the material. As the sediment is predominantly sand with a very small level of fines (silt or clay), turbidity impacts will be small and very local. The dredged material will mainly be deposited on land using a CSD, therefore the potential for influx of toxins is highly unlikely. **The magnitude of this impact is negligible.**

The Moray Firth is a busy shipping lane with access to Inverness Harbour and Marina via the Firth. Therefore, vessel movements will not significantly increase within the area as only one dredge vessel will be utilised with three support vessels during the dredging and construction works. Mitigation outlined within the MMPP (Technical Appendix 8.2) will be adhered to during dredging, therefore, the **magnitude of the impact of increased vessel movements is negligible.**

#### **Significance of Effects**

The effects of underwater noise on bottlenose dolphin, common dolphin, minke whale and harbour porpoise are not significant.

The effects of sedimentation on bottlenose dolphin, common dolphin, minke whale and harbour porpoise are not significant.

The effects of water pollution on bottlenose dolphin, common dolphin, minke whale and harbour porpoise are not significant.

The effects of increased vessel movements on bottlenose dolphin, common dolphin, minke whale and harbour porpoise are not significant.

#### **Four Point Scale Assessment**

None of the effects on bottlenose dolphin, common dolphin, minke whale and harbour porpoise are predicted to be strongly negative.

#### **Confidence of Assessment**

A: high confidence.

### **7.1.3 Harbour Seal and Grey Seal**

#### **Nature of Impact**

The proposed development would include the following activities during the construction phase that could potentially impact on harbour and grey seals when in and out of the water: direct and indirect effects of sediment dispersal from dredging of the basin area, water pollution, increase in vessel movements, noise pollution from both the dredging and vibropiling and physical disturbance from people and plant.

As harbour seals are a qualifying feature of the Dornoch Firth and Morrich More SAC, any of the potential impacts stated above that could impact upon harbour seals may also affect the SAC as they are mobile and will travel in order to find prey and move between haul out sites. Harbour seals from the Dornoch Firth and Morrich More SAC could be present in the water near the proposed development and at the designated haul-out site at Whiteness Sands.

#### **Duration of Impact**

Temporary.

#### **Importance of IEFs**

Harbour seals are of national importance.

Grey seals are of county/metropolitan importance.

The Dornoch Firth and Morrich More SAC is of international importance.

### **Magnitude of Impact**

The Dornoch Firth and Morrich More SAC comprises an area of 8,700ha and is the most northerly large estuary in Britain. It extends from the mouth of the River Oykel at Bonar Bridge along the length of the Dornoch Firth to the Moray Firth. There are numerous qualifying features for this site, however, the only feature that may be affected by the development is the population of breeding harbour seals that represents 2% of the UK population. The seals utilise the large sand bars and beaches at the mouth of the Dornoch Firth as haul-out sites and for breeding. Their range extends from the Dornoch Firth and Morrich More SAC into the Moray Firth.

During the construction phase of the development, seals may be impacted by underwater noise as a result of vibropiling, vessel movements and dredging. The possible effects of underwater noise on seals include TTS or PTS in hearing, disturbance (masking and/or habitat avoidance) and in extreme cases intense noises can lead to injury or death of individuals. Seals are in within the phocid pinniped hearing group (50 Hz to 86 kHz).

Vibropiling creates a larger noise impact than dredging and so is considered in more detail. The risk zone for PTS to seals is within 1m of the noise source if they are feeding and 62m if they are stationary for the full eight hours. The TTS risk zone is 8m and 800m if they are fleeing or stationary, respectively. It is extremely unlikely that an animal would stay within this area for an extended period of time during vibropiling. By implementing a 500m MMO exclusion zone and a soft start protocol, it is assessed that the **magnitude of the underwater noise impact for both species of seal is low. The magnitude of impact on the Dornoch Firth and Morrich More SAC from underwater noise is therefore, also low.**

During construction harbour and grey seals may be disturbed on the seal haul-out area, partially within and adjacent to the development site. Disturbance may occur due to human and vehicle movements, dredging vessel and vibropiling noise. The site is already subject to frequent disturbance due to walkers, dogs and motorbikes. The mitigation detailed within the MMPP (Technical Appendix 8.2) will be adhered to, therefore **the magnitude of the impact of disturbance to seals is low.**

During construction, chemical pollutants released into the water (as a result of dredging, spilled material from vessels, spillage from onshore storage of fuel or chemicals) could have temporary impacts on seals either directly, or indirectly, if prey items are affected. However robust mitigation will be adhered to, as specified in the CEMD (Technical Appendix 3.3) to prevent direct pollution incidences. Indirect effects of dredging can include a reduction in prey abundance and diversity, primarily due to displacement and influx of toxins and pollutants into the water that can bio accumulate in the food chain. However, the dredged material has been assessed as being clean sand and therefore there should be no chemical pollution risks with the material. As the sediment is predominantly sand with a very small level of fines (silt or clay), turbidity impacts will be small and very local. The dredged material will primarily be deposited on land using a CSD, with a small volume used to reinstate the spit within the port, therefore the potential for the influx of toxins is highly unlikely. **The magnitude of the impact of pollution on seals is negligible. The magnitude of impact on the Dornoch Firth and Morrich More SAC from pollution is also negligible.**

Increased sedimentation during the dredging (EIAR Chapter 11: Water Environment) will be very localised and short term as the dredged material is predominantly sand and will fall out of suspension quickly. Marine mammals often reside in turbid waters, so significant impacts from turbidity are improbable<sup>31</sup>. **The magnitude**

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<sup>31</sup> Todd, V. et al (2015). A review of impacts of marine dredging activities on marine mammals. *ICES Journal of Marine Science*, Volume 72, Issue 2, 1 January 2015, Pages 328–340



**of the impact of increased sedimentation on seals is negligible. The magnitude of impact on the Dornoch Firth and Morrich More SAC from sedimentation is also negligible.**

The Moray Firth is a busy shipping area with access to Inverness Harbour and Marinas. Therefore, the vessel movements will not significantly increase as only one dredge vessel will be utilised with three supporting vessels during the dredging and construction works. Seals have the highest risk of injury from vessels, however the Seal Injury Avoidance Scheme (SIAS) within the MMPP (Technical Appendix 8.2), which includes monitoring of disturbance of seals within the haul-out, will be adhered to. **The magnitude of the impact of increased vessel movements upon harbour and grey seals is therefore negligible. The magnitude of impact on the Dornoch Firth and Morrich More SAC from vessel movements is also negligible.**

**Significance of Effects**

The effects of sedimentation on harbour and grey seals are not significant.

The effects of underwater noise on harbour and grey seals are not significant.

The effects of water pollution on harbour and grey seals are not significant.

The effects of an increase in vessel movement on harbour and grey seals are not significant.

The effects of disturbance to seals within the seal haul-out is not significant.

The effects of sedimentation on the SAC are not significant.

The effects of underwater noise on the SAC are not significant.

The effects of contamination of coastal water on the SAC are not significant.

**Four Point Scale Assessment**

The effects upon harbour, grey seals and the SAC are considered to be not strongly negative.

**Confidence of Assessment**

A: high confidence.

**7.1.4 Atlantic Salmon (including smolts) and Sea Trout**

**Nature of Impact**

The proposed development would include the following activities during the construction phase that could potentially impact upon salmonids: sediment dispersal from dredging, water pollution, increase in vessel movements and noise pollution from both the dredging and vibropiling. As salmon is a qualifying feature of the River Moriston SAC these activities may also impact upon the SAC.

**Duration of Impact**

Temporary.

**Importance of IEFs**

Atlantic salmon and sea trout are both of national importance.

The River Moriston SAC is of international importance.

### **Magnitude of Impact**

The River Moriston SAC comprises an area of 194.38Ha, predominantly made up of inland water bodies (89%, both running and standing water). The Moriston extends from the eastern extremity of Loch Cluanie, flowing into the north-western edge of Loch Ness at Glenmoriston. Atlantic salmon is the only qualifying feature of the SAC that may be directly affected by the proposed development, as it lies close to the potential migratory path of adult salmon destined for spawning, as well as on the migratory path of outgoing smolts.

The noise assessment (EIAR Chapter 10: Underwater Noise) showed that in order for underwater noise from dredging to cause salmonids (categorised within the assessment as “Fish: swim bladder involved In hearing”) a recoverable injury, exposure must be at a range of no more than 7m from the source and for a continuous period of exposure of no less than 48 hours. For dredging to cause a TTS in salmonids, the fish must be at a range of no more than 30m for a period of 12 hours of continuous exposure.

With respect to the effects of underwater noise from vibropiling on salmonids, the results from the assessment also found that a recoverable injury would only occur from continuous exposure to the source of the noise for a period of no less than 48 hours at a maximum range of 19m. For vibropiling to cause a TTS in salmonids, the fish must be at a range of no more than 88m for a period of 12 hours of continuous exposure. These zones do not create a barrier to migration within the Moray Firth and mitigation detailed in the CEMD (Technical Appendix 3.3), will be adhered to, therefore the **magnitude of the impacts on salmonids from underwater noise is negligible. The magnitude of the impact of underwater noise on the River Moriston SAC is also negligible.**

With any dredging activities there is the potential for a temporary associated increase in levels of suspended sediments. With respect to the proposed development, the use of the CSD will limit the dispersal of suspended sediments. Elevated levels can still have negative impacts upon fish however, by impairing their sensory systems, primarily their vision and olfactory organs, which are key in the successful detection of their home rivers when completing annual spawning migrations, as well as damaging their respiratory systems through excessive contact with sensitive gill filaments. Research undertaken upon both adult and juvenile salmonids, including Atlantic salmon and sea trout, has shown them to be highly resilient to elevated levels of suspended solids in water. Newcombe and Jensen (1996)<sup>32</sup> found impacts upon both species to be sub-lethal at 400mg ss/l over a period of two days exposure, with impairment of homing capabilities only occurring after a minimum of seven hours exposure at the same levels. The dredged material has been assessed as being clean sand and therefore there should be no chemical pollution risks with the material. As the sediment is predominantly sand with a very small level of fines (silt or clay), turbidity impacts will be small and very local. The magnitude **of the impact of water pollution and sediment dispersal associated with dredging at the proposed development on salmon and sea trout is negligible. The magnitude of the impact of water pollution on the River Moriston SAC is also negligible.**

### **Significance of Effects**

The effects of underwater noise on salmon and sea trout are not significant.

The effects of water pollution and sediment dispersal from dredging on salmon and sea trout are not significant.

The effects of underwater noise on the River Moriston SAC are not significant.

The effects of water pollution on the River Moriston SAC are not significant.

### **Four point scale assessment**

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<sup>32</sup> Newcombe, C.P. & Jensen, J.O.T. (1996) Channel Suspended Sediment and Fisheries: A Synthesis for Quantitative Assessment of Risk and Impact. North American Journal of Fisheries Management 16: 693-727, 1996.

None of the effects on Salmon and Sea Trout are predicted to be strongly negative.

### **Confidence of Assessment**

A: high confidence.

## **7.1.5 Intertidal and benthic habitats.**

### **Nature of Impact**

The proposed development would include the following activities during the construction phase that could potentially impact upon intertidal and benthic habitats: habitat loss and sediment dispersal from dredging.

### **Duration of Impact**

Temporary

### **Importance of IEF's**

The recent intertidal and previous benthic habitat surveys (Technical Appendix 8.3) identified The following Annex I habitats listed within the EU Habitats Directive:

- Intertidal habitat:
  - Mudflats and sandflats not covered by seawater at low tide.
- Subtidal habitat:
  - Saline lagoon; and
  - Subtidal sand and gravels.

These Annex 1 habitats are of international importance.

### **Magnitude of Impact**

Dredging will remove a relatively small section of intertidal and subtidal habitat that has built up along the spit since maintenance dredging ceased. A 120m wide channel will be created to allow access to the port. This small section of habitat loss will not impact upon the integrity of the surrounding habitats. All dredged material will be deposited on land within the proposed development boundary and therefore will not impact other intertidal and subtidal habitats. It is therefore considered that the **magnitude of the impact of dredging upon intertidal and subtidal habitats is negligible.**

Increased sedimentation during the dredging (EIAR Chapter 11: Water Environment) will be very localised and short term and not impact will not impact the intertidal or subtidal habitats. The dredged material has been assessed as being clean sand and therefore there should be no chemical pollution risks with the material. As the sediment is predominantly sand with a very small level of fines (silt or clay), turbidity impacts will be small and very local. The **magnitude of the impact from increased sedimentation of intertidal and subtidal habitats is negligible**<sup>33</sup>.

### **Significance of Effect**

The effects of habitat loss upon intertidal and subtidal habitats are not significant.

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<sup>33</sup> Todd, V. et al (2015). A review of impacts of marine dredging activities on marine mammals. ICES Journal of Marine Science, Volume 72, Issue 2, 1 January 2015, Pages 328–340

The effects of sedimentation on intertidal and subtidal habitats are not significant.

#### **Four Point Scale Assessment**

None of the effects on intertidal and subtidal habitats are predicted to be strongly negative.

#### **Confidence of Assessment**

A: High

## **7.2 Positive Construction Impacts**

No positive construction impacts from the proposed development are predicted.

## **7.3 Negative Operation Impacts**

### **7.3.1 Marine Mammals**

#### **Nature of Impact**

During operation harbour porpoise, bottlenose dolphin (a qualifying feature of the Moray Firth SAC), common dolphin, minke whale, harbour seal (a qualifying feature of the Dornoch Firth and Morrich More SAC) and grey seal, would potentially be impacted by maintenance dredging, which would cause increased turbidity from disturbance of sediments, and underwater noise. These impacts may cause disturbance to marine mammals and alter their behaviour.

The proposed development would lead to an increase in vessel movements in the area and could increase the risk of collision, resulting in death or injury to individuals, particularly seal species.

#### **Duration of Impact**

Permanent for the duration of the development, although each maintenance activity would be temporary.

#### **Importance of IEFs**

Harbour porpoise, bottlenose dolphin, common dolphin and minke whale are of international importance.

Harbour seal is of national importance.

Grey seal is of county/metropolitan importance.

The Moray Firth SAC is of international importance.

The Dornoch Firth and Morrich More SAC is of international Importance.

#### **Magnitude of Impact**

During the operational phase, bottlenose dolphin, common dolphin, minke whale and harbour porpoise may be impacted by underwater noise as a result of maintenance dredging. The possible effects of underwater noise on marine mammals include TTS or PTS in hearing. The underwater noise modelling (EIAR Chapter 10: Underwater Noise) provides the ranges that PTS and TTS will occur for each species.

Upon interpolation of the updated underwater modelling data, it is considered that the standard, minimum 500m mitigation zone would be sufficient to mitigate against PTS/TTS during dredging noise on all marine mammal species. This is because, when fleeing (the likely reaction of any marine mammal to disturbance), the maximum TTS limit for any species is 230m. This mitigation zone would not cause a 'barrier' that would prevent animals from swimming to open water or moving within the Firth. The MMOP outlined in Technical Appendix 8.2 will be followed, therefore the **magnitude of the impact upon marine mammals is low. The magnitude of this impact on the Moray Firth and Dornoch Firth and Morrich More SAC is therefore, also low.**

During maintenance dredging, chemical pollutants released into the water (as a result of dredging, spilled material from vessels, spillage from onshore storage of fuel or chemicals) could have temporary impacts on seals either directly, or indirectly, if prey items are affected. However robust mitigation will be adhered, as specified in the CEMD (Technical Appendix 3.3) to prevent direct pollution incidences. Indirect effects of dredging can include a reduction in prey abundance and diversity, primarily due to displacement and influx of toxins and pollutants into the water that can bio accumulate in the food chain. Only a small area will be dredged and the primarily sand sediment will have recently accumulated since the last dredge, therefore accumulation of toxins in the sediment will be minimal. The dredged material will mainly be deposited on land, therefore the potential for influx of toxins is highly unlikely. **The magnitude of this impact upon marine mammals is negligible. The magnitude of impact on the Moray Firth and Dornoch Firth and Morrich More SAC from pollution is also negligible.**

Increased sedimentation during the dredging (EIAR Chapter 11: Water Environment) will be very localised and short term as the material is highly likely to be predominantly sand which will fall out of suspension quickly. Marine mammals often reside in turbid waters, so significant impacts from turbidity are improbable<sup>34</sup>. **The magnitude of this impact upon marine mammals is negligible. The magnitude of impacts on the Moray Firth SAC and the Dornoch Firth and Morrich More SAC from sedimentation are also negligible.**

Vessel movements are anticipated to be the same as in the previous 2013 ES, with 340 ships or 680 vessel movements per year importing and exporting materials from the renewable industry. This small increase in vessel movements within the Firth is not expected to negatively impact marine mammals, except seals. Seals have the highest risk of injury from vessels, however, the SIAS within the MMPP (Technical Appendix 8.2) will be adhered to. **The magnitude of the impact of increased vessel movements on marine mammals is considered to be low. The magnitude of impacts on the Moray Firth SAC and the Dornoch Firth and Morrich More SAC from vessel movements is also low.**

#### **Significance of Effect**

The effects of sedimentation on marine mammals are not significant.

The effects of underwater noise on marine mammals are not significant.

The effects of water pollution on marine mammals are not significant.

The effects of an increase in vessel movement on marine mammals are not significant.

The effects of sedimentation on the Moray Firth SAC and Dornoch Firth and Morrich More SAC are not significant.

The effects of underwater noise on the Moray Firth SAC and Dornoch Firth and Morrich More SAC are not significant.

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<sup>34</sup> Todd, V. et al (2015). A review of impacts of marine dredging activities on marine mammals. *ICES Journal of Marine Science*, Volume 72, Issue 2, 1 January 2015, Pages 328–340

The effects of water pollution on the Moray Firth SAC and Dornoch Firth and Morrich More SAC are not significant.

The effects of an increase in vessel movement on the Moray Firth SAC and Dornoch Firth and Morrich More SAC are not significant.

#### **Four Point Scale Assessment**

None of the effects on marine mammals are predicted to be strongly negative.

#### **Confidence of Assessment**

A: high confidence.

### **7.3.2 Atlantic Salmon and Sea Trout**

#### **Nature of Impact**

During operation Atlantic salmon (a qualifying feature of the River Moriston SAC) and sea trout, would potentially be impacted by maintenance dredging, which would cause increased turbidity from disturbance of sediments, and underwater noise.

#### **Duration of Impact**

Permanent for the duration of the development, although each maintenance activity would be temporary.

#### **Importance of IEFs**

Atlantic salmon and sea trout are both of national importance.

#### **Magnitude of Impact**

Maintenance dredging is anticipated to occur approximately every two years. Maintenance dredging, in comparison to capital dredging, will be shorter in duration and will remove a lesser amount of dredged material. **The magnitude of the impacts of underwater noise and sediment dispersal from maintenance dredging on salmon and sea trout is predicted to be negligible.**

#### **Significance of Effects**

The effects of maintenance dredging noise on salmon and sea trout is not significant.

The effects of water pollution via sediment dispersal from maintenance dredging on salmon and sea trout is not significant.

#### **Four Point Scale Assessment**

None of the effects on Salmon and Sea Trout are predicted to be strongly negative.

#### **Confidence of Assessment**

A: high confidence.

### 7.3.3 Intertidal and benthic habitats.

#### Nature of Impact

The proposed development would include the following activities during the operational phase that could potentially impact upon intertidal and benthic habitats: habitat loss and sediment dispersal from dredging.

#### Duration of Impact

Permanent for the duration of the development, although each maintenance activity would be temporary.

#### Importance of IEF's

The recent intertidal and previous benthic habitat surveys (Technical Appendix 8.3) identified The following Annex I habitats listed within the EU Habitats Directive:

- Intertidal habitat:
  - Mudflats and sandflats not covered by seawater at low tide.
- Subtidal habitat:
  - Saline lagoon; and
  - Subtidal sand and gravels.

These Annex 1 habitats are of international importance.

#### Magnitude of Impact

Dredging will remove a relatively small section of intertidal and subtidal habitat that will have built up since the initial dredge. This small section of habitat loss will not impact upon the integrity of the surrounding habitats. All dredged material will be deposited on land within the proposed development boundary and therefore will not impact other intertidal and subtidal habitats. It is therefore considered that the **magnitude of the impact of dredging upon intertidal and subtidal habitats is negligible.**

Increased sedimentation during the dredging (EIAR Chapter 11: Water Environment) will be very localised and short term and will not impact the intertidal or subtidal habitats. The dredged material has been assessed as being clean sand and therefore there should be no chemical pollution risks with the material. As the sediment is predominantly sand with a very small level of fines (silt or clay), turbidity impacts will be small and very local. The **magnitude of the impact from increased sedimentation of intertidal and subtidal habitats is negligible**<sup>35</sup>.

#### Significance of Effect

The effects of habitat loss upon intertidal and subtidal habitats are not significant.

The effects of sedimentation on intertidal and subtidal habitats are not significant.

#### Four Point Scale Assessment

None of the effects on intertidal and subtidal habitats are predicted to be strongly negative.

#### Confidence of Assessment

A: High

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<sup>35</sup> Todd, V. et al (2015). A review of impacts of marine dredging activities on marine mammals. ICES Journal of Marine Science, Volume 72, Issue 2, 1 January 2015, Pages 328–340

## **7.4 Positive Operation Impacts**

No positive operational impacts from the proposed development are predicted.



## 8 GOOD PRACTICE AND MITIGATION MEASURES

### 8.1 Standard Mitigation

The following standard mitigation measures will be followed during the construction and operational phases of the proposed development:

- The CEMD (Technical Appendix 3.3) detailing pollution prevention measures that have been agreed with the regulatory authority will be adhered to, specifically:
  - Pollution Prevention Guidelines (PPG) 1: Understanding your environmental responsibilities – good environmental practices;
  - Guidance for Pollution Prevention (GPP) 5: Guidance for Pollution Prevention Works and maintenance in or near water;
  - PPG 6: Working at construction and demolition sites;
  - GGP2: Above ground oil storage tanks;
  - PPG 7: Safe storage – the safe operation of refuelling facilities; and
  - PPG 8: Safe storage and disposal of used oils.
- The MMPP (Technical Appendix 8.2) details the following measures to prevent disturbance to marine mammals:
  - Marine Mammal Observation Protocol which will be used to prevent disturbance to marine mammals during dredging and vibropiling;
  - Dredge Disposal Protocol that will be used to prevent disturbance to seals at the haul-out;
  - Seal Injury Avoidance Scheme that will be implemented to prevent injury to seals; and
  - Vessel Management Plan that will prevent injury to seals from vessels.
- The Intertidal and Benthic Ecology report (Technical Appendix 8.3) details the following mitigation measures:
  - An Environmental/Ecological Clerk of Works (ECoW) team should be appointed to monitor compliance, produce auditable records and provide onsite advice; and
  - The occurrence of INNS within the site, such as Japanese wireweed is monitored every three years (Stebbing *et al.* 2014).

The success of the above mitigation and monitoring is assessed as certain/near certain: probability estimated at 95% chance or higher.

## 9 MARINE MAMMAL LICENSING

European Protected Species (EPS) are animals and plants (species listed in Annex IV of the Habitats Directive) that are afforded protection under The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017. All cetacean species (whales, dolphins and porpoise) are EPS. If any activity is likely to cause disturbance or injury to an EPS a licence is required to undertake the activity legally.

The licensing of Marine EPSs in Scotland is shared between several regulators depending on the purpose and location of the activity in question. For activities taking place within 12 nautical miles of the coast (the Scottish Territorial Sea), EPS are protected under the 1994 Regulations. For commercial activities, including geophysical or seismic surveys (including those related to oil and gas), port and harbour developments and the installation of renewable energy devices Marine Scotland (on behalf of the Scottish Ministers) is the licensing authority under the 1994 Regulations: Regulation 39 (1) (a). For activities relating to scientific research or conservation, SNH is the licensing authority.

A licence may be granted to undertake such activities if certain strict criteria are met:

- There is a licensable purpose.
- There are no satisfactory alternatives.
- The actions authorised will not be detrimental to the maintenance of the population of the species concerned at favourable conservation status<sup>36</sup> in their natural range.

The flowchart in Figure 9.1 shows the decision-making process for licensing, taken from the Marine Scotland guidance<sup>37</sup>.

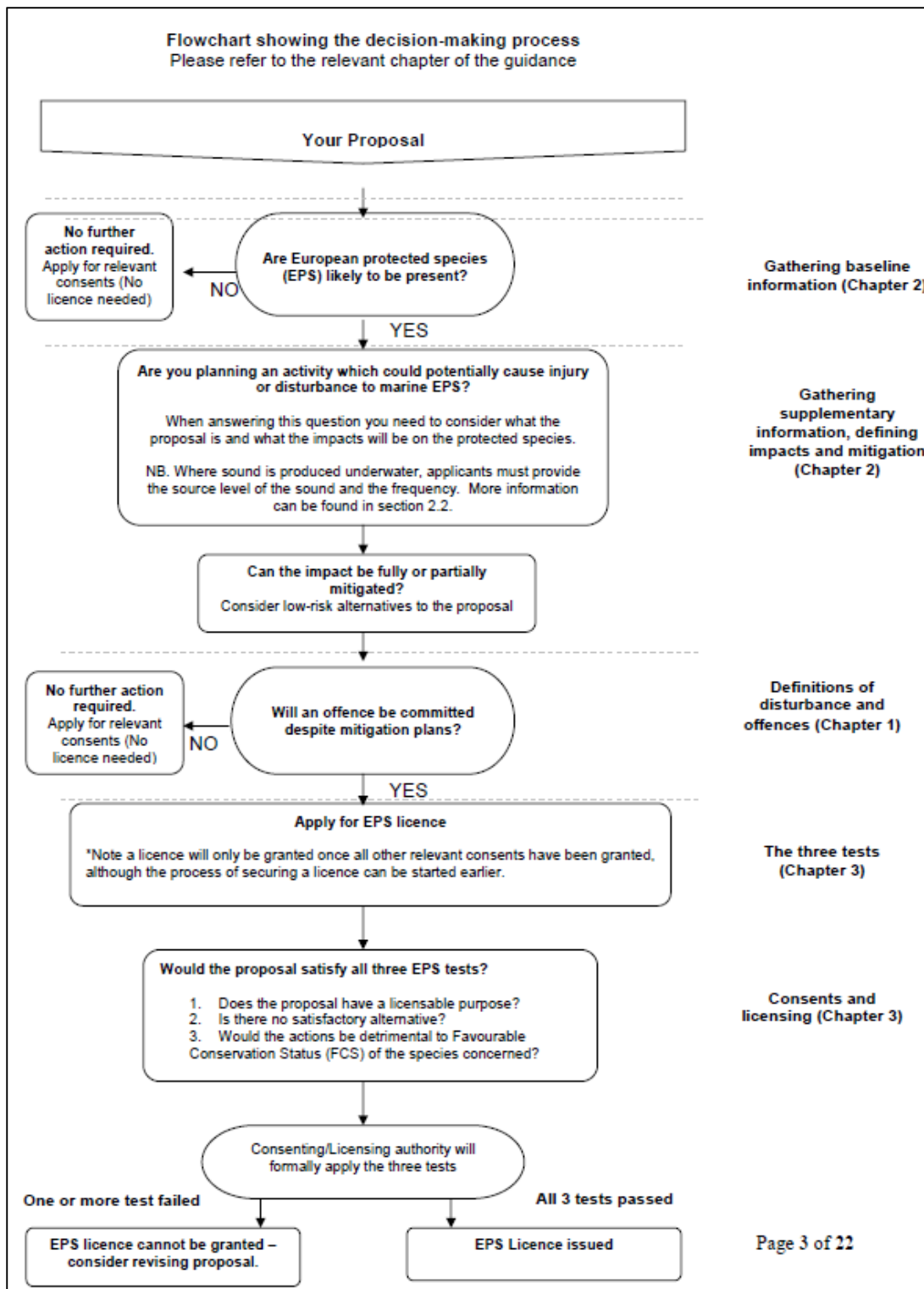
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<sup>36</sup> The ultimate objective of the Habitats Directive is to ensure that the species covered reach what is called a 'Favourable Conservation Status' and that their long-term survival is deemed secure across their entire natural range within Europe. Article 1(i) of the Habitats Directive defines Favourable Conservation Status (FCS) of a species as follows:

"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 within its natural range. The conservation status will be taken as 'favourable' when:

- population dynamics data on the species concerned indicates 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."

<sup>37</sup> Guidance for Scottish Inshore Waters: The Protection of Marine European Protected Species from injury and disturbance. Marine Scotland 2014.



**Figure 9.1: EPS Licensing Procedure**

Vibropiling and dredging have the potential to produce underwater noise at levels which could cause injury and disturbance to cetaceans. If the mitigation within the MMPP (Technical Appendix 8.2) is employed effectively, it is predicted that there will be no risk of injury, however, the mitigation measures cannot fully protect against disturbance from underwater noise. The noise modelling (EIAR Chapter 10) shows that the risk of disturbance is greater than that of injury, with TTS (disturbance) occurring over a much wider area than PTS (injury). **Therefore an EPS licence will be required for potential disturbance from vibropiling and dredging.**

## **10 RESIDUALS**

The residual effects of the proposed development are presented in Table 10.1.

**Table 10.1: Summary of Impacts on Important Ecological Features**

IEF	Importance of IEF	Nature of Impact	Duration of Impact	Magnitude of Impact	Significance of Effect	Four Point Scale Assessment	Confidence in Assessment
<b>Construction Phase</b>							
Moray Firth SAC	International	Dredging (increased turbidity and sedimentation)	Temporary	Negligible	Not significant	Not highly negative	A: high
Dornoch Firth & Morrich More SAC	International	Dredging (increased turbidity and sedimentation)	Temporary	Negligible	Not significant	Not highly negative	A: high
River Moriston SAC	International	Dredging (increased turbidity and sedimentation)	Temporary	Negligible	Not significant	Not highly negative	A: high
Atlantic salmon & Sea trout	National	Dredging (increased turbidity and sedimentation)	Temporary	Negligible	Not significant	Not highly negative	A: high
Harbour porpoise	International	Dredging (increased turbidity and sedimentation)	Temporary	Negligible	Not significant	Not highly negative	A: high
Bottlenose Dolphin	International	Dredging (increased turbidity and sedimentation)	Temporary	Negligible	Not significant	Not highly negative	A: high
Common dolphin	International	Dredging (increased turbidity and sedimentation)	Temporary	Negligible	Not significant	Not highly negative	A: high
Minke whale	International	Dredging (increased turbidity and sedimentation)	Temporary	Negligible	Not significant	Not highly negative	A: high
Grey seal	County/Metropolitan	Dredging (increased turbidity and sedimentation)	Temporary	Negligible	Not significant	Not highly negative	A: high
Harbour seal	County/Metropolitan	Dredging (increased turbidity and sedimentation)	Temporary	Negligible	Not significant	Not highly negative	A: high
Moray Firth SAC	National (Scotland)	Underwater noise (piling and dredging)	Temporary	Low	Not significant	Not highly negative	A: high
Dornoch Firth & Morrich More SAC	National (Scotland)	Underwater noise (piling and dredging)	Temporary	Low	Not significant	Not highly negative	A: high
River Moriston SAC	International	Underwater noise (piling and dredging)	Temporary	Negligible	Not significant	Not highly negative	A: high
Atlantic salmon & Sea trout	National	Underwater noise (piling and dredging)	Temporary	Negligible	Not significant	Not highly negative	A: high
Harbour porpoise	International	Underwater noise (piling and dredging)	Temporary	Low	Not significant	Not highly negative	A: high
Bottlenose dolphin	International	Underwater noise (piling and dredging)	Temporary	Low	Not significant	Not highly negative	A: high
Common dolphin	International	Underwater noise (piling and dredging)	Temporary	Low	Not significant	Not highly negative	A: high
Minke whale	International	Underwater noise (piling and dredging)	Temporary	Low	Not significant	Not highly negative	A: high
Grey seal	County/Metropolitan	Underwater noise (piling and dredging)	Temporary	Low	Not significant	Not highly negative	A: high

Harbour seal	County/Metropolitan	Underwater noise (piling and dredging)	Temporary	Low	Not significant	Not highly negative	A: high
Moray Firth SAC	International	Pollution to water	Temporary	Negligible	Not significant	Not highly negative	A: high
Dornoch Firth & Morrich More SAC	International	Pollution to water	Temporary	Negligible	Not significant	Not highly negative	A: high
Atlantic salmon & Sea trout	National	Pollution to water	Temporary	Negligible	Not significant	Not highly negative	A: high
Harbour porpoise	International	Pollution to water	Temporary	Negligible	Not significant	Not highly negative	A: high
Bottlenose dolphin	International	Pollution to water	Temporary	Negligible	Not significant	Not highly negative	A: high
Common dolphin	International	Pollution to water	Temporary	Negligible	Not significant	Not highly negative	A: high
Minke whale	International	Pollution to water	Temporary	Negligible	Not significant	Not highly negative	A: high
Grey seal	County/Metropolitan	Pollution to water	Temporary	Negligible	Not significant	Not highly negative	A:high
Harbour seal	National	Pollution to water	Temporary	Negligible	Not significant	Not highly negative	A:high
Harbour & Grey seal	National & County/ Metropolitan respectively	Disturbance to seals at Haul-out	Temporary	Low	Not significant	Not highly negative	A: high
Moray Firth SAC (subtidal sandbanks)	International	Loss of habitat	Permanent	Negligible	Not significant	Not highly negative	A: high
Subtidal and intertidal habitats	International	Loss of habitat	Permanent	Negligible	Not significant	Not highly negative	A: high
<b>Operational Phase</b>							
Moray Firth SAC	International	Maintenance dredging	Temporary	Low	Not significant	Not highly negative	A: high
Dornoch Firth and Morrich More SAC	International	Maintenance dredging	Temporary	Low	Not significant	Not highly negative	A: high
River Moriston SAC	International	Maintenance dredging	Temporary	Negligible	Not significant	Not highly negative	A: high
Atlantic salmon & Sea trout	National	Maintenance dredging	Temporary	Negligible	Not significant	Not highly negative	A: high
Harbour porpoise	International	Maintenance dredging	Temporary	Low	Not significant	Not highly negative	A: high
Bottlenose dolphin	International	Maintenance dredging	Temporary	Low	Not significant	Not highly negative	A: high
Common dolphin	International	Maintenance dredging	Temporary	Low	Not significant	Not highly negative	A: high
Minke whale	International	Maintenance dredging	Temporary	Low	Not significant	Not highly negative	A: high
Grey seal	County/Metropolitan	Maintenance dredging	Temporary	Low	Not significant	Not highly negative	A: high
Harbour seal	County/Metropolitan	Maintenance dredging	Temporary	Low	Not significant	Not highly negative	A: high
Moray Firth SAC	International	Increased vessel movement	Permanent	Negligible	Not significant	Not highly negative	A: high
Dornoch Firth & Morrich More SAC	International	Increased vessel movement	Permanent	Negligible	Not significant	Not highly negative	A: high
River Moriston SAC	International	Increased vessel movement	Permanent	Negligible	Not significant	Not highly negative	A: high
Atlantic salmon & Sea trout	National	Increased vessel movement	Permanent	Negligible	Not significant	Not highly negative	A: high

Harbour porpoise	International	Increased vessel movement	Permanent	Negligible	Not significant	Not highly negative	A: high
Bottlenose dolphin	International	Increased vessel movement	Permanent	Negligible	Not significant	Not highly negative	A: high
Common dolphin	International	Increased vessel movement	Permanent	Negligible	Not significant	Not highly negative	A: high
Minke whale	International	Increased vessel movement	Permanent	Negligible	Not significant	Not highly negative	A: high
Grey seal	County/Metropolitan	Increased vessel movement	Permanent	Low	Not significant	Not highly negative	A: high
Harbour seal	County/Metropolitan	Increased vessel movement	Permanent	Low	Not significant	Not highly negative	A: high
Subtidal and intertidal habitats	International	Loss of habitat	Permanent	Negligible	Not significant	Not highly negative	A: high

## **11 STATEMENT OF SIGNIFICANCE**

This EclA concludes that, following the effective implementation of mitigation measures, which have been designed following review of the engineering design and construction techniques, adverse effects on marine ecological IEFs will not be significant. Relevant legislation and planning policies would be adhered to and local and UK Biodiversity Action Plan targets would remain unaffected. The integrity of the Moray Firth SAC, Dornoch and Morrich More SAC and the River Moriston SAC would remain intact.