BAKKAFROST

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The Finest Salmon from SCOTLAND

# Environmental Impact Assessment Report Fish Farm Development

North Gravir, Isle of Lewis

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# Glossary of Abbreviations

| Term | Definition |
|---|---|
| 1SW | One Sea Winter |
| CnES | Comhairle nan Eilean Siar |
| ADCP | Acoustic Doppler Current Profiler |
| ADD | Acoustic Deterrent Device |
| AEOSI | Adverse Effect on Site Integrity |
| AEWA | Agreement on the Conservation of African-Eurasian Migratory Waterbirds |
| AGD | Amoebic Gill Disease |
| AIS | Automatic Identification System |
| AON | Apparently Occupied Net |
| AOS | Apparently Occupied Site |
| BAP | Best Aquaculture Practice |
| BAP | Biodiversity Action Plan |
| BCC | Birds of Conservation Concern |
| BFS | Bakkafrost Scotland Ltd. |
| Birds Directive | Council Directive 2009/147/EC on the Conservation of Wild Birds |
| BRCGS | Brand Reputation through Compliance of Global Standards |
| BSH | Broadscale Habitat |
| C.I. | Confidence Interval |
| CAB | Conformity Assessment Body |
| CAPEX | Capital Expenditure |
| CAR | The Water Environment (Controlled Activities Regulations) (Scotland) 2011 |
| CFIA | Commercial Fisheries Impact Assessment |
| CFP | Common Fisheries Policy |
| CIEEM | The Chartered Institute of Ecology and Environmental Management |
| cm | Centimetre |
| CMS | Cardiomyopathy Syndrome |
| CoGP | Code of Good Practice |
| CSIP | Cetacean Strandings and Investigation Programme |
| CWSH | Coastal West Scotland and the Hebrides |
| DBA | Desk Based Assessment |
| DDC | Drop Down Camera |
| DIN | Dissolved Inorganic Nitrogen |
| DMA | Disease Management Area |
| DVM | Diurnal Vertical Migration |
| ECE | Equilibrium Concentration Enhancement |
| EcIA | Ecological Impact Assessment |
| ECP | Escapes Contingency Plan |
| EEZ | Exclusive Economic Zone |
| EIA | Environmental Impact Assessment |
| EIA Regulations | The Town and Country Planning (Environment Impact Assessment) (Scotland) Regulations 2017 |
| EIAR | Environmental Impact Assessment Report |
| EmBz | Emamectin Benzoate |
| EMP | Environmental Management Plan |
| EMS | Environmental Management System |
| EPS | European Protected Species |
| EQS | Environmental Quality Standard |
| EU | European Union |

| Term | Definition |
|---|---|
| FAD | Fish Attraction Device |
| FAO | Food and Agricultural Organisation |
| FAWC | Farm Animal Welfare Committee |
| FCR | Feed Conversion Ratio |
| FfD | Financing for Development |
| FHI | Fish Health Inspectorate |
| FLS | Flatsetsund Engineering |
| FMA | Farm Management Area |
| FMP | Fish Mortality Plan |
| FMS | Farm Management Statement |
| FNC | Flying Net Cleaner |
| FS | Site Identification Number |
| FWPM | Freshwater Pearl Mussel |
| g | grams |
| GeMS | Geodatabase of Marine features adjacent to Scotland |
| GFSI | Global Food Safety Initiative |
| GHG | Greenhouse Gas |
| GIS | Geographic Information System |
| GLVIA | Guidelines for Landscape and Visual Impact Assessment |
| GSSI | Global Sustainable Seafood Initiative |
| GVA | Gross Value Added |
| HA | Hectare |
| Habitats Directive | Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna |
| Habitats Regulations | Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) |
| HACCP | Hazard Analysis and Critical Control Points |
| HES | Historic Environment Scotland |
| HF | High Frequency |
| HG | Hydrographic |
| HOS | Designated Seal Haul Out Site |
| HPAI | Highly Pathogenic Avian Influenza |
| HRA | Habitats Regulations Appraisal |
| Hs | Significant Wave Height |
| HSMI | Heart and Skeletal Muscle Inflammation |
| Hz | Hertz |
| IAMMWG | The Inter Agency Marine Mammal Working Group |
| ICES | International Council for the Exploration of the Seas |
| ID | Identification |
| IEF | Important Ecological Feature |
| IEMA | Institute of Environmental Management and Assessment |
| ILP | Institute of Lighting Professionals |
| IND | Individual |
| INNS | Invasive Non-Native Species |
| IPC | Integrated Pest Control |
| IPN | Infectious Pancreatic Necrosis |
| IPNV | Infectious Pancreatic Necrosis Virus |
| IQI | Infaunal Quality Index |
| ISA | Infectious Salmon Anaemia |
| ISLM | Integrated Sea Lice Management |
| IUCN | International Union for Conservation of Nature |
| JNCC | Joint Nature Conservation Committee |

| Term | Definition |
| --- | --- |
| kg | Kilogram |
| kHz | kilohertz |
| km | Kilometre |
| $km^2$ | Square Kilometre |
| L | Litre |
| LBAP | Local Biodiversity Action Plan |
| LCT | Landscape Character Type |
| LDP | Local Development Plan |
| LED | Light Emitting Diode |
| LNR | Local Nature Reserve |
| LOA | Length Overall |
| LPA | Local Planning Authority |
| LSE | Likely Significant Effect |
| LVIA | Landscape, Visual Impact Assessment |
| m | Metre |
| m/s | Metres per Second |
| $m^2$ | Square Metre |
| $m^3$ | Cubic Metre |
| MA | Management Area |
| MarESA | Marine Evidence based Sensitivity Assessment |
| MD | Marine Directorate |
| MDG | Millennium Development Goals |
| MD-LOT | Marine Directorate Licensing Operations Team |
| MLWS | Mean Low Water Springs |
| MMO | Marine Management Organisation |
| MoD | Ministry of Defence |
| MS-LOT | Marine Scotland Licensing Operations Team |
| MSW | Multi-Sea Winter |
| MU | Management Unit |
| NBN | National Biodiversity Network |
| NCMPA | Nature Conservation Marine Protection Area |
| NEPS | National Electrofishing Programme for Scotland |
| ng | Nanogram |
| NH4+ | Ammonium |
| NLB | Northern Lighthouse Board |
| NMPi | National Marine Plan international |
| NPF4 | National Planning Framework 4 |
| NRS | National Records of Scotland |
| NS | NatureScot |
| NSA | National Scenic Area |
| NSR | Noise Sensitive Receptor |
| NTS | Non-Technical Summary |
| $^{o}$ | Degrees (Directional) |
| OEL | Ocean Ecology Ltd. |
| OGL | Open Government Licence |
| OPEX | Operational Expenditure |
| OSPAR | Oslo and Paris Conventions |
| PAN | Planning Advice Note |
| PCP | Predator Control Plan |
| PD | Pancreatic Disease |
| PDV | Phocine Distemper Virus |

| Term | Definition |
|---|---|
| PE | Polyethylene |
| PGI | Protected Geographic Indication |
| PMCV | Piscine Myocarditis Virus |
| PMF | Priority Marine Feature |
| Proposed Development | The North Gravir Proposal |
| PRV | Piscine Orthoreovirus |
| PSA | Particle Size Analysis |
| pSAC | Proposed Special Area of Conservation |
| pSPA | Proposed Special Protection Area |
| QMS | Quality Management System |
| RAMSAR | The Convention on Wetlands of International Importance |
| RAS | Recirculating Aquaculture System |
| RBMP | River Basin Management Plan |
| RECC | Rural Economy and Connectivity Committee |
| RIAA | Report to Inform Appropriate Assessment |
| RIB | Rigid-hull Inflatable Boat |
| RONC | Remotely Operated Net Cleaner |
| RVS | Red Vent Syndrome |
| RYA | Royal Yachting Association |
| SAC | Special Area of Conservation |
| SAM | Scheduled Ancient Monument |
| SAMS | Scottish Association for Marine Science |
| SAV | Salmonid Alphavirus |
| SCA | Seascape Character Assessment |
| SCOS | Special Committee on Seals |
| SCT | Seascape Character Type |
| SDG | Sustainable Development Goals |
| SDM | Standard Default Method |
| SEERAD | Scottish Executive Environment and Rural Affairs Department |
| SEPA | Scottish Environment Protection Agency |
| SG | Supplementary Guidance |
| SLAP | Sea Lice Action Plan |
| SLMS | Sea Lice Management Strategy |
| SLVIA | Seascape, Landscape, Visual Impact Assessment |
| SMP | Seabird Monitoring Programme |
| SMRU | Sea Mammal Research Unit |
| SMU | Seal Management Unit |
| SOP | Standard Operating Procedure |
| SPA | Special Protection Area |
| SSSI | Site of Special Scientific Interest |
| STS | Scottish Technical Standard |
| SWFPA | Scottish Whitefish Producer Association |
| SWT | Scottish Wildlife Trust |
| T | Tonne |
| TAC | Total Allowable Catch |
| TAQ | Total Allowable Quantity |
| TCA | Trade and Co-operation Agreement |
| TGN | Technical Guidance Note |
| UKHO | United Kingdom Hydrographic Office |
| UKTAG | United Kingdom Technical Advisory Group |
| UN | United Nations |

| Term | Definition |
|---|---|
| VHMP | Veterinary Health and Welfare Plan |
| VMP | Vessel Management Plan |
| VMS | Vessel Monitoring System |
| VP | Viewpoint |
| VTR | Vessel Transit Route |
| W | Watt |
| WCA | Wave Climate Assessment |
| WCRIFG | West Coast Regional Inshore Fisheries Group |
| WEI | Wave Exposure Index |
| WFD | Council Directive 2000/60/EC - Water Framework Directive |
| WHAM | West Highlands Anchorages and Moorings |
| WIDSFB | Western Isles District Salmon Fisheries Board |
| WIFA | Western Isles Fishermen's Association |
| $yr^{-1}$ | Year |
| ZoI | Zone of Influence |
| ZTV | Zone of Theoretical Visibility |
| µg | Microgram |

# 1 Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by Bakkafrost Scotland Limited ('BFS') to support the submission of a planning application under the Town and Country Planning (Scotland) Act 1997 (as amended) for a new Atlantic salmon marine fish farm, North Gravir (the 'Proposed Development'), located off the east coast of the Isle of Lewis. The EIAR is intended to provide the consenting authority, Comhairle nan Eilean Siar (CnES), a systematic assessment of the likely significant environmental effects resulting from the Proposed Development, ensuring the determination regarding the applications consent is in accordance with the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (the 'EIA Regulations').

Guidance has been provided through the CnES's Scoping Opinion, received on 02 December 2022, along with the individual Scoping Advice of statutory consultees. It is the purpose of the EIAR to ensure both the competent authority and the general public properly understand the significance of any predicted effects, in addition to the scope for reducing these effects through effective mitigation prior to determination of the planning application.

## 1.1 Development Overview

The Proposed Development will be comprised of 5 x 200 m circumference pens, arranged in a single row of 5, in a mooring grid of 5 (120 m x 120m) cells. The overall surface area of the fish farm surface equipment will be 0.02 km$^2$. A feed barge will be permanently moored along the southern side of the grid. All equipment will be installed and maintained within a mooring area of 1.02 km$^2$. A maximum peak biomass of 4,680 T is proposed.

## 1.2 The Applicant

BFS aims to become the leading most sustainable producer of salmon in Scotland. With 50 sites in remote and rural communities of the West Coast of Scotland and Hebridean Islands and Head Office in Edinburgh, BFS is committed to the environmental, cultural, and economic growth and sustainability of rural Scotland.

Bakkafrost Scotland is engaged in all stages of the value chain, from freshwater and marine farming, to processing, sales and marketing, ensuring total value chain integrity, full traceability and Scottish provenance.

BFS rears Atlantic salmon at both freshwater and marine sites across the west coast of Scotland and the Western Isles, producing, on average, 32,358 T (gutted weight) of Atlantic salmon per annum. BFS employs 540 staff across remote and rural communities and engages with many suppliers and contractors throughout the supply chain. Over 60 % of production is exported to 26 countries around the world, with a key focus on North America and the Far East. BFS was the recent recipient of two Scotland Food & Drink Excellence Awards with the Native Hebridean Smoked Scottish Salmon product, winning both the 'Product of the Year' award and the 'Artisan Product of the Year' at the Scottish Food and Drink Awards 2022.

Aquaculture contributes significantly to global food production, with aquaculture currently accounting for 52 % of global seafood consumption[1]. BFS is focused on sustainable business development following international demand for Scottish salmon, the UK's largest food export. BFS is committed to Scottish provenance and takes great pride in producing quality Scottish salmon, whilst being committed to the environmental, cultural, economic growth, and sustainability of rural Scotland. BFS is the first salmon

[1] FAO, (2020). The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome. https://doi.org/10.4060/ca9229en

producer in Europe to be awarded 4-star Best Aquaculture Practice (BAP), with certification covering feed production, freshwater, marine, harvesting and processing operations.

### 1.2.1 Accreditations Certifications

BFS holds and maintains certification for a number of third-party certification programmes including Global G.A.P., Best Aquaculture Practice (BAP), Code of Good Practice for Scottish Finfish Aquaculture (CoGP), Protected Geographical Indication (PGI), Label Rouge, and Brand Reputation through Compliance of Global Standards (BRCGS). BFS is also certified to ISO 14001:2015 Environmental Management Systems. Third-party certification provides the customer with the highest level of confidence in the sustainability of operations, and the quality of the product, through independent auditing of BFS's operations via Conformity Assessment Bodies (CABs) against specific certification standards developed by the relevant standard owner.

#### 1.2.1.1 Global G.A.P.

Global G.A.P. is the worldwide standard for good agricultural practices. It covers a broad range of criteria including food safety and traceability, environment (including biodiversity), workers' health, safety and welfare, animal welfare, integrated pest control (IPC), quality management systems (QMS), and hazard analysis and critical control points (HACCP).

#### 1.2.1.2 Best Aquaculture Practice (BAP)

BAP is the most comprehensive, proven and trusted third-party aquaculture certification programme worldwide. The BAP programme is benchmarked against both the Global Food Safety Initiative (GFSI) and the Global Sustainable Seafood Initiative (GSSI). The BAP programme consists of five main pillars; food safety, social accountability, environmental responsibility, animal health and welfare, and traceability. BFS is the first salmon aquaculture company in Europe to achieve 4-star BAP certification.

#### 1.2.1.3 Code of Good Practice for Scottish Finfish Aquaculture (CoGP)

The CoGP provides guidance for the Scottish aquaculture industry and has been produced as a collaborative process involving industry, regulators, government, and other stakeholders. BFS is signed up to full adherence to all requirements of the CoGP. The Proposed Development will be operated in accordance with the principles of Integrated Sea Lice Management (ISLM). A Farm Management Statement (FMS) has been prepared for the fish farm; this document will be updated to consider the changes associated with the Proposed Development.

#### 1.2.1.4 Protected Geographic Indication (PGI)

PGI is an EU based scheme aimed at promoting and protecting the names of quality regional agricultural products and foodstuffs. The PGI logo is a quality mark that enables customers to easily identify quality products, allowing them to verify their authenticity in terms of regional origin or trademark production methods.

#### 1.2.1.5 Label Rouge 33/90

Label Rouge 33/90 is a highly esteemed quality assurance mark officially endorsed by the French Ministry of Agriculture. It aims to promote superior quality food or farmed product, particularly with regard to taste. To obtain this recognition, the product must meet stringent standards by adhering to a range of criteria through the production chain, including farming techniques, feed, processing, and distribution. In 1992, Scottish salmon was the first fish and first non-French product to be officially awarded the Label Rouge quality mark.

#### 1.2.1.6 Brand Reputation through Compliance of Global Standards (BRCGS)

BRCGS is the leading national standard for the retail industry covering food safety and supply chain management. It provides the framework for producers to manage and control product safety, integrity, legality and quality.

#### 1.2.1.7 RSPCA Freedom Foods

The RSPCA welfare standards for farmed Atlantic salmon are used to provide the only RSPCA-approved scheme for the rearing, handling, transport and slaughter of farmed Atlantic salmon. The standards cover the two distinct phases of farming (freshwater and marine farming). They take account of UK legislation, official codes of practice, scientific research, veterinary advice, recommendations of the Farm Animal Welfare Committee (FAWC) and the practical experience of the aquaculture industry. The standards are based upon the following 'Five Freedoms' as defined by FAWC:

- Freedom from hunger and thirst;
- Freedom from discomfort;
- Freedom from pain, injury or disease;
- Freedom to express normal behaviour; and
- Freedom from fear and distress.

Although these 'freedoms' define ideal states, they provide a comprehensive framework for the assessment of animal welfare on-farm, in transit and at the place of slaughter.

#### 1.2.1.8 Aquaculture Stewardship Council

The ASC is an independent, not-for-profit organisation that operates a voluntary, independent third-party certification and labelling programme based on a scientifically robust set of standards. These standards define criteria designed to help transform the aquaculture industry towards environmental sustainability and social responsibility using efficient market mechanisms that create value across the chain.

The ASC salmon standards addresses several key aspects, including:

- Biodiversity;
- Feed;
- Pollution;
- Disease; and
- Social.

#### 1.2.1.9 ISO 14001:2015

ISO 14001:2015 is an internationally recognised standard for Environmental Management. It sets out the criteria for an Environmental Management System (EMS) and the framework that businesses can follow to setup an effective EMS. ISO 14001:2015 provides assurance that the environmental impact of a business is being continually measured, monitored and improved. BFS has successfully transitioned to the ISO 14001:2015 standard.

## 1.3 Agenda 2030 and The United Nations (UN) Sustainable Development Goals (SDG)

The 2030 Agenda for Sustainable Development was established in September 2015 at the United Nations (UN) headquarters in New York and agreed by 194 Heads of State, Government, and High Representatives[2]. The 2030 Agenda provides a high-level policy and monitoring framework, specifically designed to stimulate and co-ordinate the activities of national Governments and organisations at an

[2] United Nations (UN), 2015: Transforming our World: The 2030 Agenda for Sustainable Development. [Online] Available at: https://sdgs.un.org/2030agenda

international scale. The agenda is widely considered to be the most comprehensive, far reaching, and demanding international agreement on sustainable development, building upon the Millennium Development Goals (MDGs) (2000 - 2015). The 2030 Agenda is comprised of 17 Sustainable Development Goals (SDGs), 169 targets and 230 indicators.

A ground-breaking financing framework for sustainable development on a global scale was established at the Third International Conference on Financing for Development (FfD) in Addis Ababa in 2015. This framework, known as the Addis Ababa Action Agenda[3], directly compliments the overarching objective of the 2030 Agenda by providing an enabling environment for sustainable development and the implementation of the SDGs. Specific attention is given to the need to support investment in productive sectors, namely agriculture and rural development.

Aquaculture is widely accepted as having a major role to play in rural development, which specifically aligns aquaculture development with the narrative of the Addis Ababa Action Agenda, and the supply of nutritious, sustainably sourced food for local, national, and international consumption. Aquaculture development has a key role to play in achieving several of the SDGs, in particular those below[4]:

- SDG 1: No poverty;
- SDG 2: Zero hunger;
- SDG 3: Good health and wellbeing;
- SDG 12: Responsible production and consumption;
- SDG 13: Climate action; and
- SDG 14: Life below water.

The nature and extent of aquaculture development should therefore be influenced strongly by the relevant SDGs, in order to ensure that sustainable development of aquaculture takes place globally. However, the Food and Agricultural Organisation (FAO) state that aquaculture, when developed appropriately, can and does already contribute significantly to the achievement of the SDGs[4].

However, the FAO state that in order for aquaculture development to fully realise its potential to contribute to the achievement of the SDGs, one specific overriding issue must be addressed[4]:

- Creating an ‘enabling environment’ for sustainable aquaculture development.

In order to create an ‘enabling environment’ for sustainable aquaculture development that positively and significantly contributes to achieving the SDGs by 2030, the FAO states that the following components must be appropriate and well designed[4]:

- Policy and planning;
- Legal and regulatory framework;
- Institutions; and
- Financial facilitation and incentives.

Together these individual components combine to create a framework that promotes and stimulates sustainable aquaculture growth, identifies and removes bottlenecks, constrains unsustainable or unfair aquaculture practice, and corrects inappropriate social constraints[4].

BFS believes that the Proposed Development, through an iterative and systematic design and development process, aligns to both national and local planning policy and guidance (see **Sub-Section**

[3] United Nations (UN) 2015: Addis Ababa Action Agenda. [Online] Available at: https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=2051&menu=35
[4] Food and Agriculture Organisation (FAO), 2017: The 2030 Agenda and the Sustainable Development Goals: The challenge for aquaculture development and management, by John Hambrey. FAO Fisheries and Aquaculture Circular No. 1141, Rome, Italy. [Online] Available at: https://www.fao.org/cofi/38663-0a3e5c407f3fb23a0e1a3a4fa62d7420c.pdf

**1.4**, below for more detail). The Proposed Development will also align to a high-level of operational sustainability through adherence to best practice operational procedures, identified through both mandatory and voluntary standards. As a result, BFS believes that the Proposed Development, along with all other BFS operations, will play a significant part in the Scottish salmon industry's contribution to achieving the SDGs outlined under Agenda 2030.

## 1.4 Planning Policy

A specific Planning Statement accompanies this application, which sets out the relevant planning policy considerations for the Proposed Development (see **Appendix C**). It considers both national and local planning policy and guidance of relevance and assesses the alignment of the Proposed Development with relevant planning policies of the Local Development Plan (LDP) and associated Supplementary Guidance (SG).

# 2 The EIA Process

## 2.1 Overview

EIA is an iterative process aimed at identifying and assessing the likely significant effects arising as a result of a proposed development, these effects having the potential to occur throughout the installation, operation and decommissioning phases of a proposed development. Where adverse significant effects are identified that cannot be avoided through embedded mitigation in the design of a proposed development, suitable mitigation measures to reduce or offset effects are proposed.

The main steps of the EIA process relating to the Proposed Development are summarised below:

- **Scoping and Consultation:** A Screening and Scoping Request and accompanying report were submitted to CnES in June 2022. The Scoping Opinion, received on 02 December 2022, has informed and focussed the scope of the EIA on likely significant effects that could be anticipated to occur as a result of the Proposed Development. A detailed summary of the Scoping responses and other consultation undertaken is provided in **Section 5**. Further opportunities were available throughout the EIA process for consultees to comment on those areas where it is felt there is the potential for significant effects under the terms of the EIA Regulations;
- **Baseline Studies:** Desk-based assessment (DBA), baseline surveys and site visits have been undertaken, as appropriate, in order to determine the baseline condition of the environment and the surrounding area that may be affected by the Proposed Development. The methods and findings are outlined within each technical assessment section;
- **Predicting and Assessing Effects:** Potential interactions between the Proposed Development and the baseline conditions have been considered. The nature of the effect, whether direct or indirect; positive, negative or neutral; long, medium, or short term; temporary or permanent, have been predicted and assessed. A generalised methodology for the assessment of significant effects is outlined in **Sub-Section 2.4.1**, with specific methodologies described in **Sub-Section 2.4.2**;
- **Mitigation and Assessment of Residual Effects:** Potential effects have been avoided or reduced wherever possible through embedded mitigation. Where this is not possible, measures to avoid, reduce and/or offset significant effects are proposed. The residual effects are then assessed to determine if any significant effects are predicted to remain following implementation of the recommended mitigation measures;
- **Cumulative Effects:** A generalised methodology for the assessment of cumulative effects arising from the Proposed Development in conjunction with other proposed or consented developments is presented in **Sub-Section 2.4.1.7**. Cumulative effects have been considered, as appropriate, within each technical assessment section; and
- **Production of the EIAR:** The results of the EIA are outlined in the EIA Report (EIAR). The required content and the structure of the EIAR is outlined in **Sub-Section 2.5**.

## 2.2 EIA Process

The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017[5] implement the European Union (EU) Directive 2014/52/EU[6], which amended Directive 2011/92/EU on the 'assessment of the effects of certain public and private projects on the environment'.

[5] Scottish Government: The Town and Country (EIA) (Scotland) Regulations 2017. [Online] Available at: https://www.legislation.gov.uk/ssi/2017/102/contents
[6] European Commission (2014) Directive 2014/52/EU [Online] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0052

The EIA Regulations outline the process of an EIA and the relevant thresholds and criteria that determine if a planning application requires EIA or not. The EIA Regulations further define what relevant environmental data is required, how the Local Planning Authority (LPA) and the respective consultees assess this environmental data, and how the Town and Country Planning (Scotland) Act 1997[7] (as amended) implement the requirements of the EIA Regulations through planning consent.

The EIA Regulations defines EIA as either:

- **Schedule 1 Development:** Development of a type listed in Schedule 1 is always EIA development; or
- **Schedule 2 Development:** Development of a type listed in Schedule 2 is EIA development if it is likely to have significant effects on the environment through aspects such as the nature, size, and location of the proposed development.

Intensive fish farming is listed within Schedule 2 of the EIA Regulations. For a proposed development to classify as Schedule 2 Development it either has to be located wholly or partly in a sensitive area (as defined in Regulation 2(1)) or meet or exceed any one of the following relevant criteria thresholds:

- The installation resulting from the development is designed to produce more than 10 T of dead fish weight per year;
- Where the development is situated in marine water, the development is designed to hold a biomass of 100 T or greater: or
- The development will extend to 0.1 hectares or more of the surface area of the marine waters, including any proposed structures or excavations.

The Proposed Development is:

- Located in the Inner Hebrides and the Minches SAC (sensitive area, as defined in Regulation 2(1));
- Is designed to produce more than 10 T of dead fish weight per year;
- Is designed to hold a peak passing biomass of 4,680 T; and
- Will cover a surface area of 1.63 ha.

As a result, the Proposed Development is classified as Schedule 2 Development, under the EIA Regulations.

The requirement for an EIA is then assessed through Schedule 3 of the EIA Regulations (Selection Criteria for Screening Schedule 2 Development). The selection criteria in Schedule 3 includes an assessment of the following:

- Characteristics of the Proposed Development;
- Location of the Proposed Development; and
- Characteristics of the potential impacts of the Proposed Development.

Due to its potential impacts on the environment, the Proposed Development is required to undergo full EIA, and the planning application is accompanied by an EIA Report.

## 2.3 The Precautionary Principle

The precautionary principle is one of the key elements for environmental protection and management policy determinations. It is applied in the circumstances where there are reasonable grounds for concern

[7] Scottish Government: The Town and Country Planning (Scotland) Act 1997 (as amended) [Online] Available at: https://www.legislation.gov.uk/ukpga/1997/8/contents

that an activity could cause harm, but where there is uncertainty about the probability of the risk and the magnitude of the potential effect.

The precautionary principle was re-enforced within Scottish legislation, post Brexit, through the UK Withdrawal from the European Union (Continuity) (Scotland) Act 2021. Under Policy 4 of the National Planning Framework 4 (NPF 4), the Scottish Government commits to the Precautionary Principle, by stating:

***"The precautionary principle will be applied in accordance with relevant legislation and Scottish Government guidance."***

An important and influential statement on the Precautionary Principle is provided in Principle 15 of the Rio Declaration 1992, which set out the "precautionary approach":

***"Where there are threats of serious or irreversible damage, a lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."***

The precautionary principle is embedded within the EIA process and included in the content requirements within the EIAR.

However, any restrictive or preventative approach taken must be objective and non-discriminatory, and in the EU context the principle of proportionality operates alongside all of the environmental principles; including the precautionary principle. Therefore, the precautionary principle should not be a reason to impede development without undue justification.

In order to apply the precautionary principle within the context of this EIA, the worst-case scenario is assessed based on known technical and scientific parameters. These parameters include technical specifications of equipment, utilisation of established and approved survey and assessment methodologies, together with established best practice techniques. Where there is uncertainty, for example the presence or absence of a protected species, this is stated and the precautionary principle is applied i.e., the species is present, unless proven otherwise.

The outcome of this scenario is then considered using risk assessment procedures to inform decisions on how to reduce the risk or threat through mitigation and management measures to acceptable levels.

## 2.4 EIA Technical Assessment Methodology

### 2.4.1 Standard Technical Assessment Methodology

Several technical assessment sections of this EIAR, as defined below, follow a standard assessment methodology:

- **Section 7: Benthic Habitats**;
- **Section 8: Water Column Impacts**;
- **Section 12: Navigation, Anchorage, Commercial Fisheries and Other Non-Recreational and Recreational Maritime Uses**
- **Section 13: Seascape, Landscape, and Visual**;
- **Section 14: Socio-Economic, Access, and Recreation**;
- **Section 15: Noise**; and
- **Section 16: Lighting**.

This standard assessment methodology is designed around a systematic process, with the main steps as follows:

- Description of the baseline condition;
- Identification and assessment of potential effects;
- Mitigation measures and residual effects;
- Cumulative effects assessment; and
- Statement of significance.

Further detail on each of the above assessment phases are provided below.

#### 2.4.1.1 Description of Baseline Condition

Prior to being able to assess the potential effects of the Proposed Development on the environment, a detailed understanding of the existing environmental condition was required. This understanding of the baseline condition was developed through a combination of primary DBA, and secondary field-based surveys, where necessary. DBAs were undertaken as the primary step, to gain a better understanding of the study area and the receptors present. Where the information and data available through the DBAs resulted in incomplete or uncertain conclusions on the baseline condition of the study area, field-based surveys were conducted by competent 3rd party contractors. The field-based surveys provided additional information and data to support the assessments of the baseline condition, in order for representative conclusions on the baseline condition to be made. The results of the DBAs and field-based surveys, where necessary, form the current baseline environmental condition for each receptor.

Moreover, Schedule 4 of the EIA Regulations requires an outline of the evolution of the baseline environmental condition without implementation of the Proposed Development as far as natural changes from the baseline can be assessed, where this 'can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge'[5]. Due to high number of variables involved, the predictions made may represent a high level of uncertainty. In these cases, the present baseline condition will be assumed as unchanged throughout the Proposed Development's lifetime.

#### 2.4.1.2 Assessment of Potential Impacts and Effects

As all three phases of the Proposed Development (construction, operation, and decommissioning) have the potential to give rise to differing impacts and subsequent effects, all three phases must be considered when assessing the potential for significant impacts and effects. The construction and decommissioning phases are generally associated with short-term, temporary impacts, whereas the operational phase is typically associated with long-term, more permanent impacts. The nature of the impacts have been identified and assessed in each individual technical assessment section, which also includes an assessment of potential cumulative impacts and effects with other developments, where relevant.

Once the identification of the potential impacts is complete, predicted changes to the existing baseline condition are identified and also an assessment of the significance of these changes is made. The determination as to whether an effect is significant, in accordance with EIA Regulations, combines professional judgement together with consideration of the following aspects:

- The sensitivity of the resource or receptor under assessment;
- The magnitude of the potential impact which occurs as a result of the Proposed Development;
- The type of impact, i.e., positive, negative, neutral, or uncertain;
- The probability of the impact occurring, i.e., certain, likely, or unlikely; and
- Whether the impact is temporary, permanent, and/or reversible.

A generalised methodology for assessing the significance of an effect is detailed below. All technical assessment sections identified within **Sub-Section 2.4.1** will follow the below methodology. With the remaining ecological technical assessment sections following an alternative methodology as outlined within **Sub-Section 2.4.2**.

#### 2.4.1.3 Sensitivity of Receptors

The sensitivity of the baseline condition, including the importance of environmental features on or near to the Proposed Development or the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance, legislation, statutory designations and professional judgement. **Table 2.1** details the general framework for determining the sensitivity of receptors.

**Table 2.1: Framework for Determining Receptor Sensitivity.**

| Sensitivity of Receptor | Definition |
|---|---|
| Very High | The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance. |
| High | The receptor has a low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of national importance. |
| Medium | The receptor has a moderate capacity to absorb change without significantly altering its present character, has some environmental value, or is of regional importance. |
| Low | The receptor is tolerant of change without detriment to its character, is of low environmental value, or of local importance. |
| Negligible | The receptor is resistant to change and is of little environmental value. |

#### 2.4.1.4 Magnitude of Impact

The magnitude of potential impacts will be identified through consideration of the Proposed Development, the degree of change to the baseline condition predicted as a result of the Proposed Development, the duration and reversibility of the potential impact, using professional judgement, best practice guidance and legislation. **Table 2.2** details the general framework for determining the magnitude of a potential impact.

**Table 2.2: Framework for Determining the Magnitude of Potential Impacts.**

| Magnitude of Potential Effect | Definition |
|---|---|
| High | A fundamental change to the baseline condition of the feature/receptor, leading to a total loss or major alteration of character. |
| Medium | A material, partial loss or alteration of character. |
| Low | A slight, detectable, alternation to the baseline conditions of the feature/receptor. |
| Negligible | A barely distinguishable change to the baseline conditions of a feature/receptor. |

If impacts of zero magnitude (i.e., none/no change) are identified, this will be made clear in the relevant technical assessment section.

### 2.4.1.5 Significance of Effect

A combination of the sensitivity of the receptor and the magnitude of the potential impacts will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects. **Table 2.3** summarises guidance criteria for assessing the overall effect and whether this is significant.

**Table 2.3: Framework for Assessment of the Significance of Potential Effects.**

| Magnitude of Impacts | Sensitivity of Receptor | | | | |
|---|---|---|---|---|---|
| | Very High | High | Medium | Low | Negligible |
| High | Major | Major | Moderate | Moderate | Minor |
| Medium | Major | Moderate | Moderate | Minor | Negligible |
| Low | Moderate | Moderate | Minor | Negligible | Negligible |
| Negligible | Minor | Minor | Negligible | Negligible | Negligible |

For the purposes of this EIA, potential effects predicted to have a significance of either '**Major**' or '**Moderate**' are considered to be '**significant**', in the context of the EIA Regulations, and are coloured red and amber above, in **Table 2.3**.

Zero magnitude of change upon a receptor will result in no effect, regardless of the receptor sensitivity.

### 2.4.1.6 Mitigation and Residual Effects

The EIA process is not a post development design assessment of environmental impacts, but rather a systematic process, that allows the development design to be informed and modified by the findings of the technical assessments, which therefore helps achieve a 'best fit' in relation to the receiving environment.

When the EIA identifies significant effects, mitigation measures are proposed in order to avoid, reduce or compensate those effects in line with the mitigation hierarchy identified in Planning Advice Note (PAN) 1/2013[8], which states you must:

- Firstly, avoid potential adverse effects;
- Secondly, reduce those which remain; and
- Lastly, where no other measures are possible, to propose compensatory measures.

There are two types of mitigation, namely that which is 'embedded' in the design and additional mitigation which may be applied once residual effects have been identified.

Embedded mitigation measures for the Proposed Development are focussed on recognised best practice management and operational measures employed routinely across all BFS operations which are built into the design of the Proposed Development.

The assessment will conclude with an examination of residual effects after additional mitigation, if required, has been applied, i.e., the overall predicted potential effects of the Proposed Development.

### 2.4.1.7 Cumulative Effect Assessment

In accordance with the EIA Regulations, the assessment has considered cumulative effects. These are effects that result from changes caused by past, present, or reasonably foreseeable developments

[8] Scottish Government: Planning Advice Note (PAN) 1/2013: Environmental Impact Assessment. [Online] Available at: https://www.gov.scot/publications/planning-advice-note-1-2013-environmental-impact-assessment/

together with the Proposed Development being assessed. The combined effects of several developments that may on an individual basis be insignificant but cumulatively or in-combination, have a significant effect have been assessed as part of the cumulative assessments.

For cumulative assessment, two types of effects are considered:

- The combined effect of individual effects, for example benthic and water column effects on a single receptor; and
- The combined effects of several developments that may on an individual basis be insignificant, but cumulatively, have a significant effect, such as landscape and visual effects of many fish farm developments.

## 2.4.2 Ecological Technical Assessment Methodology

### 2.4.2.1 Legislation, Policy, and Guidance

The following technical assessment Sections of this EIAR have utilised the Ecological Impact Assessment (EcIA) methodology:

- **Section 9: Interactions with Predatory Species;**
- **Section 10: Interactions with Wild Salmonids;** and
- **Section 11: Impacts on Species and Habitats of Conservation Importance**.

The compilation of the above identified assessments have taken cognisance of various legislation, policies, conservation initiatives and general guidance, as presented in **Table 2.4** below.

**Table 2.4: Legislation, policy, conservations initiatives and guidance considered within this assessment.**

| Scope | Documentation |
|---|---|
| Legislation | • Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna ('The Habitats Directive');<br>• Conservation (Natural Habitats, &C.) Regulations 1994 (as amended) ('The Habitat Regulations');<br>• Nature Conservation (Scotland) Act 2004;<br>• Marine (Scotland) Act 2010;<br>• The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014;<br>• Wildlife and Countryside Act 1981;<br>• Conservation of Salmon (Scotland) Act 2004; and<br>• Council Directive 2009/147/EC on the Conservation of Wild Birds ('Birds Directive'). |
| Policy and Guidance | • Scottish Biodiversity List;<br>• Scottish Priority Marine Features;<br>• Birds of Conservation Concern (BCC) 5; and<br>• CIEEM: Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal, and Marine. |

### 2.4.2.2 Assessment Methodology

#### 2.4.2.2.1 Baseline Data Collection

A DBA was carried out to identify designated sites, protected species and protected habitats of conservation importance that have the potential for connectivity with the Proposed Development. In determining the potential connectivity consideration was given to the scale and nature of the Proposed Development, the Zone of Influence (ZoI) of the impacts associated with the Proposed Development, and the ecology of the relevant species.

#### 2.4.2.2.2 Designated Sites

A search to identify statutory natural heritage designations was conducted as a component of the DBA. The search distances applied varied depending on the qualifying features for which each site is designated, with the following parameters used:

- **Special Area of Conservation and Candidate Special Area of Conservation (SAC and pSAC)**; within 10 km of the Proposed Development 35 km for salmonids and extended to 50 km for pinniped, and cetacean species;
- **Special Protection Area and Proposed Special Protection Area (SPA and pSPA)**; mean foraging range overlap;
- **Sites of Special Scientific Interest (SSSI)**; within 5 km of the Proposed Development, extended to 20 km for pinniped and cetacean species;
- **Nature Conservation Marine Protected Areas (NC MPA)**; within 10 km of the Proposed Development and extended to 50 km for pinniped and cetacean species; and
- **Designated Seal Haul-Out Sites (HOS)**; within 50 km (common seal) and 100 km (grey seal) of the Proposed Development.

#### 2.4.2.2.3 Biological Records

The DBA was supplemented with biological data from various sources. Operational wildlife logbooks from the closest BFS owned marine fish farm, Gravir, 1.6 km from the Proposed Development, were reviewed to build an understanding of the seasonal and longer-term wildlife abundance and interaction trends. In addition to this the following sources were assessed to help build an understanding of the biological baseline:

- Geodatabase of Marine Features Adjacent to Scotland (GeMS)[9];
- Marine Directorate (MD): National Marine Plan interactive (NMPi)[10];
- Marine Mammal Records from the Hebridean Whale and Dolphin Trust (HWDT) Sightings Map[11];
- Hebridean Marine Mammal Atlas[12];
- Seabird Monitoring Programme (SMP)[13];
- National Biodiversity Network (NBN)[14]; and
- The Atlas of Cetacean Distribution in Northwest European Waters[15].

### 2.4.2.3 Ecological Impact Assessment Methodology

The assessment to determine the potential significant effects of the Proposed Development on designated sites, species and habitats of conservation importance was conducted through the utilisation of the Ecological Impact Assessment (EcIA) methodology. The Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines were used to ensure an effective and objective assessment of potential significant effects.

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[9] Data.gov.uk. (2019). GeMS - Scottish Priority Marine Features (PMF) - data.gov.uk. [online] Available at: https://www.data.gov.uk/dataset/0e78afea-ac1e-4080-8758-980f2d5cff6d/gems-scottish-priority-marine-features-pmf

[10] Atkinsgeospatial.com. (2025). Marine Scotland - National Marine Plan Interactive. [online] Available at: https://marinescotland.atkinsgeospatial.com/NMPI/default.aspx?redirect=false

[11] Whale (2023). Hebridean Whale & Dolphin Trust. [online] Hebridean Whale & Dolphin Trust. Available at: https://www.hwdt.org/whale-track

[12] Mammal, M. (2023). *Hebridean Whale & Dolphin Trust*. [online] Hebridean Whale & Dolphin Trust. Available at: https://www.hwdt.org/hebridean-marine-mammal-atlas

[13] Ornithology, B.T. for (2022). *Seabird Monitoring Programme*. [online] BTO - British Trust for Ornithology. Available at: https://www.bto.org/our-science/projects/seabird-monitoring-programme

[14] National Biodiversity Network. (n.d.). *National Biodiversity Network*. [online] Available at: https://nbn.org.uk/

15 hub.jncc.gov.uk. (n.d.). *Atlas of Cetacean distribution in north-west European waters | JNCC Resource Hub*. [online] Available at: https://hub.jncc.gov.uk/assets/a5a51895-50a1-4cd8-8f9d-8e2512345adf

#### 2.4.2.3.1 Evaluation of Important Ecological Features

As stated within CIEEM guidance on EcIA, one of the key challenges is to decide which ecological features are important and should therefore be subject to detailed assessment. Within EcIA methodology these features are known as 'Important Ecological Features' (IEFs). IEFs are the features within the baseline condition that hold the most ecological value and have the greatest potential to be affected by the Proposed Development. CIEEM guidance states that the importance of an ecological feature should be considered within a defined geographical context, to determine at which particular geographical scale a feature is considered important.

European, national and local governments as well as specialist organisations have together identified a large number of designated sites, habitats, and species that provide the key focus for biodiversity conservation in the UK, supported by policy and legislation. These provide an objective starting point for identifying the IEFs that need to be considered within the EcIA. Within this section, objective judgement in combination with data on the identified designated sites, habitats and species and contextual information, such as distribution and abundance of the identified features was utilised to determine the level of importance of each feature present within the ZoI of the Proposed Development.

Within this EcIA, only ecological features determined to be important at a '**regional**' geographical level or higher were deemed to be sufficiently important to be classified as IEFs and therefore requiring detailed assessment. In accordance with CIEEM EcIA guidance, it is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to the project impacts. CIEEM guidance states that where protected species are present and there is the potential for a breach of the legislation, those protected species should always be considered as IEFs. **Table 2.5** details the procedure used within the assessment to determine the geographical level of importance of designated sites, habitats and species. Where a feature is important at more than one geographical level, its overriding importance is that of the highest level.

**Table 2.5: Geographical level of importance of ecological features.**

| Importance Value | Criteria |
|---|---|
| International | The ecological feature has little or no ability to absorb change without fundamentally altering its present character (i.e., the population of a rare and sensitive species in significant decline).<br><br>An internationally designated site (e.g., an SAC) or a site meeting criterion for international designations.<br><br>An ecological feature present in internationally important numbers (>1 % of international population). |
| National | The ecological feature has a low ability to absorb change without fundamentally altering its present character (i.e., the population of an uncommon or rare species in decline, or a common species in significant decline).<br><br>A nationally designated site (e.g., a SSSI) or a site meeting criterion for national designation.<br><br>An ecological feature present in nationally important numbers (>1 % Scottish population). |

| Importance Value | Criteria |
|---|---|
| | Large areas of priority habitats listed on Annex I of the Habitats Directive and smaller areas of such habitats that are essential to maintain the viability of that ecological resource. |
| Regional | The ecological feature has moderate capacity to absorb change without significantly altering its present character. (i.e., an uncommon or rare but stable species, or a common/widespread but declining species).<br><br>An ecological feature present in regionally important numbers (>5 % regional population).<br><br>Priorities within the Local Biodiversity Action Plans (LBAP), where they occur in sufficient abundance to maintain the local resource.<br><br>Sites not meeting criteria for SSSI selection but of greater than the local criteria below. |
| Local | The ecological feature is tolerant of change without detriment to its character (a common/widespread species that is stable, or an uncommon species is improving).<br><br>An ecological feature of low conservation value, or of national or local conservation value, but with very limited presence.<br><br>Priorities within the Local Biodiversity Action Plans (LBAP), where they occur in low abundance.<br><br>Scottish Wildlife Trust (SWT) Reserves and Local Nature Reserves (LNRs).<br><br>Areas of habitat or species considered to appreciably enrich the local ecological resource. |
| Less than Local | The ecological feature is resistant to change (any population that is improving its range and abundance).<br><br>Population of little to no conservation value, or of local conservation value but with very limited presence. |

### 2.4.2.3.2 Characterisation of Ecological Impacts

The assessment of impacts describes how the baseline condition would change as a result of the Proposed Development and its associated activities, and the in-combination impacts of the Proposed Development and other developments within the ZoI overlap with relevant IEFs. The term '**impact**' is defined as a change experienced by a receptor, that can be either positive, neutral, or negative. The term '**effect**' is defined as the consequences for the receptor as a result of the impact after mitigation measures have been considered. The effects on ecological features are assessed as 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 projects and activities taking place over a period of time or concentrated in a location, for example:

- Additive/incremental; and
- Associated/connected.

When considering ecological impacts and effects, CIEEM guidance states that reference should be made to the following characteristics:

- Magnitude;
- Extent;
- Duration;
- Frequency and timing; and
- Reversibility.

**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 extent is the spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions (e.g., noise transmission underwater).

**Duration:** Whether the impact is short, medium or long-term, permanent or temporary.

**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.

**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 which may be counteracted by effective mitigation.

Criteria for determining the magnitude of an impact are presented in **Table 2.6**, below:

**Table 2.6: Criteria for describing the magnitude of an impact.**

| Magnitude | Description |
|---|---|
| Major | 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. |
| Moderate | 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. |
| Low | 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. |
| Negligible | 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. |

#### 2.4.2.3.3 Significance of Effects

The significance of an effect results from the interaction between its magnitude and the importance of those receptors that might be affected. Significant effects are quantified with reference to an appropriate geographic scale. However, the 'scale of significance' of an effect may not be the same as the geographical context in which the feature is considered important. For example, an effect on a species which is on a national list of species of principle importance for biodiversity may not have a significant effect on the species national population.

Scientific judgement is used to determine the likely significance of effects in relation to identified IEFs.

## 2.5 The EIAR

The results of the EIA are presented in the EIAR, which, as prescribed in Schedule 5 of the EIA Regulations[5], must include:

- A description of the development comprising information on the site, design, size and other relevant features of the development;
- A description of the likely significant effects of the development on the environment (presented within each technical assessment section);
- A description of the features of the development and any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
- A description of the reasonable alternatives studied by the developer, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment;
- A non-technical summary of the information presented within the main EIAR; and
- Any other information specified in schedule 4 of the EIA Regulations relevant to the specific characteristics of the development and to the environmental features likely to be affected.

Unless stated otherwise the information noted above is found within each technical assessment section. In addition, a non-technical summary (NTS) must be provided.

**Sub-Section 5.3** of this EIAR states which elements have been scoped in and scoped out of the EIA, following pre-application discussions and receipt of the Scoping Opinion. Impacts and effects which are not considered to be significant do not need to be described.

## 2.6 Statement of Competency

The EIA Regulations, under Regulation 5 (5) state the following:

***"In order to ensure the completeness and quality of the EIA report:***

- ***The developer must ensure that the EIA report is prepared by competent experts; and***
- ***The EIA report must be accompanied by a statement from the developer outlining the relevant expertise or qualifications of such experts."***

The EIAR has been prepared by competent experts, both within BFS and external. Therefore, the requirements of Regulation 5 (5), as above, are satisfied. **Table 2.7** below details the relevant qualifications, expertise and contributions of the professionals involved with the preparation and review of the EIAR.

**Table 2.7: Contributors to the EIA.**

| Contributor | Expertise | Scope |
|---|---|---|
| Development Officer<br>Bakkafrost Scotland | BSc (Hons) Applied Freshwater and Marine Biology – Atlantic Technical University – Galway<br><br>MRes Aquaculture – University of Galway | EIA Project Manager, responsible for the delivery of all EIA / planning related workstreams;<br><br>Author of technical and non-technical chapters and supporting appendices. |

| Contributor | Expertise | Scope |
|---|---|---|
| | Project Fundamentals Qualification – Association for Project Management<br><br>Eight years' experience working in the Scottish and Irish aquaculture industry. | |
| Site Development Manager Bakkafrost Scotland | BSc Physical Geography – University of Aberdeen<br><br>MSc Marine Resource Development and Protection – Heriot-Watt University<br><br>Practitioner IEMA member<br><br>18 years' experience working in the Scottish aquaculture industry. | Responsible for the review of technical and non-technical EIAR chapters and appendices. |
| Environmental Modeller Bakkafrost Scotland | BSc Marine Science with Oceanography and Robotics – The Scottish Association for Marine Science (SAMS) / The University of the Highlands and Islands.<br><br>Over 2 years' experience working in the Scottish aquaculture industry. | Responsible for all technical modelling workstreams and associated report preparation. |
| ERM (Environmental Consultancy) | ERM are the world's largest pure play sustainability consultancy, providing consultancy services across a variety of environmental, social and governance areas. | ERM are responsible for the origination and delivery of the SLVIA and associated workstreams.<br><br>ERM are also responsible for the technical review of ecology specific workstreams. |
| Ocean Ecology Ltd. (OEL) | OEL is a leading marine environmental consultancy specialising in providing survey, technical and advisory services to organisations.<br><br>They have specific expertise in assessing and monitoring marine ecological communities, protected habitats, fisheries and cetacean populations and provide expert advice on the | OEL are responsible for the delivery of the benthic visual survey and the origination of associated reports. These deliverables were used to determine the benthic baseline condition within the relevant technical chapters. |

| Contributor | Expertise | Scope |
|---|---|---|
| | design and implementation of marine monitoring to both developers and regulatory bodies. | |
| Anatec Ltd. | Anatec Ltd. is a leading service provider in risk based decision making. | Anatec are responsible for the origination and delivery of a Baseline Maritime Activity Assessment. |
| DHI | MIKE Powered by DHI is a leading software suite designed for water modelling and simulation, supporting engineers, scientists, and water management professionals. It offers advanced tools for managing various water environments, including rivers, coastal areas, and urban infrastructure. The platform is widely used in urban planning, offshore projects, and natural resource management, providing precise and comprehensive results to enhance decision-making. | DHI undertook all sea lice modelling and associated report preparation. |

# 3 Description of the Proposed Development

## 3.1 Development Proposal

The proposal is for the development of a new Atlantic salmon marine fish farm off the east coast of the Isle of Lewis, details of the location are provided within **Appendix A**. The Proposed Development is to be known as 'North Gravir'. Surface equipment will be comprised of five 200 m circumference circular pens arranged in one group, in one line, and oriented on a bearing of 007°W. A feed barge will be permanently moored to the south of the group. All surface and sub-surface equipment will be established within a 1.02 $km^2$ mooring area. The proposed maximum standing biomass for the Proposed Development is 4,680 T. Proposed equipment and the equivalent surface areas are specified in **Table 3.1**. Production details are summarised in **Table 3.2**. Co-ordinates for the Proposed Development's mooring area, pen grid and ancillary equipment are quoted in **Table 3.3**.

**Table 3.1: Summary of Proposed Equipment**

| Equipment | Number | Specification | Equivalent Surface Area ($m^2$) | |
|---|---|---|---|---|
| | | | Individual | Total |
| Pens | 5 | Circular, 200 m circumference black polyethylene pens. | 3,183.10 | 15,915.49 |
| Top Net Supports | 25 (per pen) | 8 m fibreglass poles spaced at 8 m intervals around the pen. | N/A | |
| Subsurface Mooring Grid | 1 grid containing 5 pen squares | One 120 m x 120 m grid square per pen. Total grid dimension of 120 m x 600 m. | 14,400 | 72,000 |
| Feed Barge | 1 | Length 28.35 m, width 13.5 m | 382.73 | |
| Mooring Area | n/a | Mooring area, within which all mooring lines, chains and anchors will be contained. | 1,022,359 | |
| **Total Area of Surface Equipment Only** | | | 16,298.23 | |

**Table 3.2: Summary of Site Details**

| | |
|---|---|
| **Maximum Biomass** | 4,680 T |
| **Maximum Stocking Density** | 19.60 $kg/m^3$ |
| **Fallow Period (minimum)** | 28 days |

**Table 3.3: North Gravir Proposed Co-ordinates**

| Reference Point | WGS-84 | | OSGB | |
|---|---|---|---|---|
| | Latitude | Longitude | Easting | Northing |
| NW Mooring Area Corner | 58.06330048 | -6.36643096 | 142561 | 916581 |
| NE Mooring Area Corner | 58.06463380 | -6.35311975 | 143355 | 916679 |
| SE Mooring Area Corner | 58.05335488 | -6.34910087 | 143511 | 915409 |
| SW Mooring Area Corner | 58.05202203 | -6.36240810 | 142717 | 915312 |
| NW Pen Grid Corner | 58.06093694 | -6.35942019 | 142957 | 916292 |
| NE Pen Grid Corner | 58.06107376 | -6.35740479 | 143077 | 916299 |
| SE Pen Grid Corner | 58.05573273 | -6.35611437 | 143115 | 915700 |
| SW Pen Grid Corner | 58.05559593 | -6.35812947 | 142995 | 915693 |
| Site Centre | 58.05833485 | -6.35776715 | 143036 | 915996 |
| Feed Barge | 58.05434 | -6.35685 | 143061 | 915548 |

### 3.1.1 Bathymetry

Bathymetry data for the Proposed Development and surrounding marine environment was generated from Admiralty data collected and stored as part of the 'North Minch Blk' bathymetry dataset[16]. Analysis of this bathymetric dataset indicates that the mean depth within the mooring area is 54.7m. As can be seen within **Figure 3.1**, below, the bathymetry within the mooring area is a uniform slope going from 30 m depth on the west side of the proposed planning boundary to 100 m depth on the east side.

[16] Admiralty Maritime Data Solutions (2022). Seabed Mapping Service. [online] Available at: https://seabed.admiralty.co.uk/

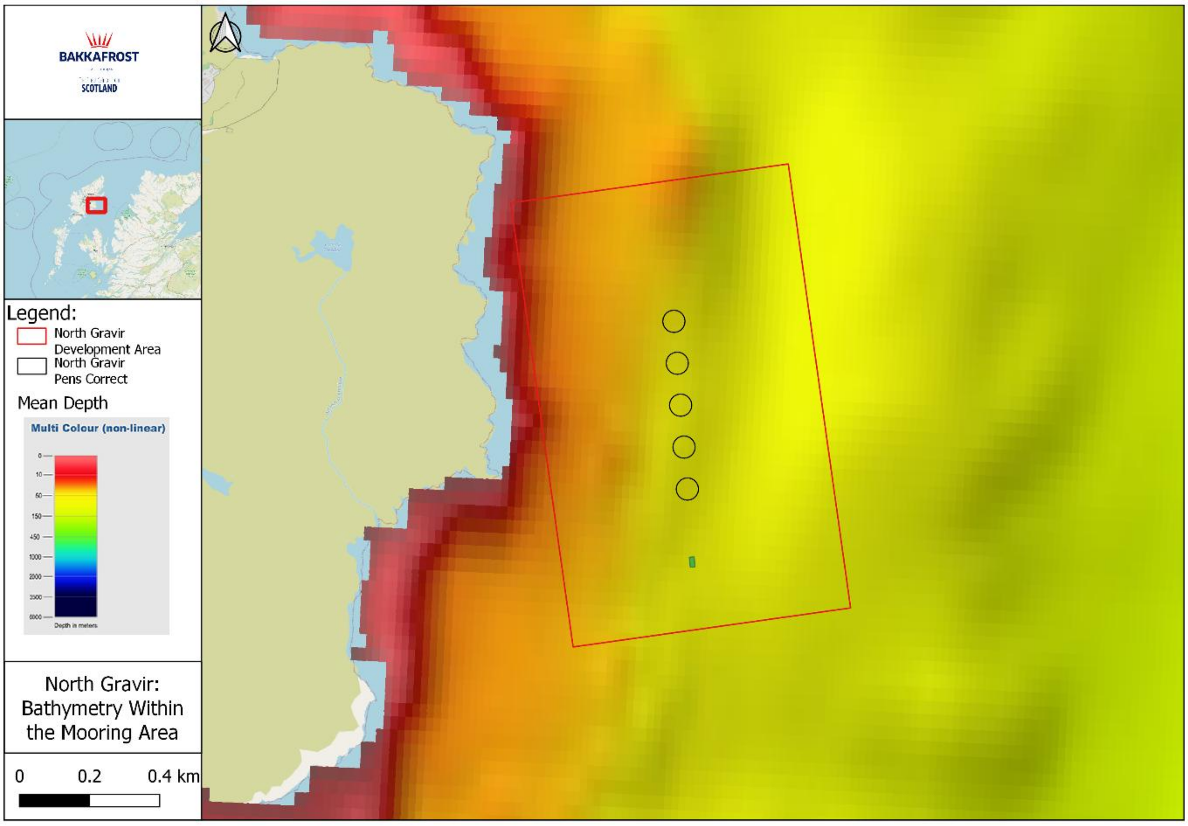


**Figure 3.1: Bathymetry within the mooring area of the Proposed Development[17].**

## 3.1.2 Hydrography

An Acoustic Doppler Current Profiler (ADCP) was deployed at the Proposed Development location on the following dates:

- First Deployment: 04/08/2021; and
- Second Deployment: 08/10/2021

These datasets were stitched together, by filling the gaps with repeated data replicating the spring-neap and flood-ebb cycles, to create a seamless 128.3-day time-period in 20-minute timesteps. This data was trimmed to represent 90-days of seamless hydrographic data. A summary of the hydrographic (HG) conditions for the Proposed Development is provided in **Table 3.4**, below.

**Table 3.4: Summary of Hydrographic Conditions at North Gravir.**

| Hydrographic Summary | | |
|---|---|---|
| Sub-Surface Currents | Mean Speed | 0.159 m/s |
| | Direction | 180° |
| | Mean Residual Current Speed | 0.035 m/s |
| Pen-Bottom Currents | Mean Speed | 0.155 m/s |
| | Direction | 177° |
| | Mean Residual Current Speed | 0.032 m/s |
| Near-Bed Currents | Mean Speed | 0.128 m/s |
| | Direction | 175° |
| | Mean Residual Current Speed | 0.027 m/s |

[17] Map data copyrighted OpenStreetMap contributors and available from https://www.openstreetmap.org

## 3.2 Infrastructure

Equipment specifications are guided by site specific requirements based on HG and environmental conditions likely to be experienced at the development location. All equipment and site installation will be in accordance with the Marine Directorate Technical Standard for Scottish Finfish Aquaculture[18], which is implemented by regulations under the Aquaculture and Fisheries (Scotland) Act 2013[19]. Relevant equipment specifications and attestations are provided within **Appendix B**.

### 3.2.1 Pens

The Proposed Development will be comprised of a single group of 5 pens of 200 m circumference (63.7 m diameter). Each pen will have a surface area of 3,183.10 $m^2$, with a total surface area for all 5 pens of 15,915.5 $m^2$ or 1.59 ha. The pens will be orientated parallel to the dominant coastal edge, at a bearing of 007 °W. All pens will be manufactured out of a flexible, yet robust and durable, polyethylene material. All pens will have a walkway around the perimeter to allow safe access to staff when carrying out husbandry operations. Handrails will also be installed on all pens, which are approximately 1.30 m in height. All pens will be dark grey or black in colour to minimise visual intrusion and impact on the landscape and seascape. An example of the type of pen is shown in **Appendix B**.

### 3.2.2 Pen Nets

The net depth of the Proposed Development will be 15 m. Nets will be manufactured by Knox and will be specifically designed to suit environmental conditions and husbandry requirements. The site will deploy Sapphire Seal Pro netting (or similar), this netting is constructed out of different combinations of polyolefins and co-polymers and, as such, it is highly compact, resulting in a final product that displays greater rigidity than that of regular Polyethylene (PE) braided netting. This netting also has a higher bite and cut resistance than traditional containment netting, providing an additional level of predator deterrence.

Sinker tubes will be deployed at the Proposed Development to ensure that all pen nets are correctly tensioned and thereby hold their volume and structure within the water column. Sinker tubes are rigid circular structures, manufactured from high density plastic and filled with chain or steel wire, which are attached to the pen structure and held level with the base of the pen net. The pen net attaches to the sinker tube at regular intervals to ensure adequate tensioning across the entire pen net. It is proposed that the sinker tubes for the Proposed Development be designed with a weight per metre value of 80 kg/m, to ensure maximum net structural integrity in the high energy environment.

Correct net tensioning also helps to reduce the impact of predator interactions, as a uniformly taut pen net presents as a 'wall' to any underwater predator, with no slack areas for entanglement or purchase on the net through which a seal can grab or bite fish. Therefore, the use of an effective net tensioning system significantly reduces the need for anti-predator nets and with it also reduces the risk of entanglement of predatory species, such as diving birds and seals.

Biofouling, where organisms such as algae and hydroids attach to underwater structures, can occur on pen nets and associated structures. Seal Pro netting has a compact and smooth twine construction, meaning that in comparison to other types of netting it is far more resistant to fouling, as it has less potential anchor points. BFS contracted divers will regularly inspect the pen nets, which on average will be cleaned every 10 days. Pen nets are cleaned by using specialist mechanical net cleaners (Remotely

[18] Scottish Government: Marine Directorate (June 2015) A Technical Standard for Scottish Finfish Aquaculture. [Online] Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2015/06/technical-standard-scottish-finfish-aquaculture/documents/00479005-pdf/00479005-pdf/govscot%3Adocument/00479005.pdf

[19] Scottish Government: Aquaculture and Fisheries (Scotland) Act 2013. [Online] Available at: https://www.legislation.gov.uk/asp/2013/7/contents

Operated Net Cleaners (RONCs) and Flying Net Cleaners (FNCs)) which use mechanical arms and concentrated jets of water to dislodge fouling organisms.

### 3.2.3 Top Nets

Pole mounted top nets will be installed at the Proposed Development to prevent access to avian predators, the netting will have a ceiling mesh size of 75 mm and a sidewall mesh size of 75 mm, in line with current NatureScot (NS) guidance[20]. A pole mounted system has been selected instead of the traditionally used hamster wheel support system (circular floating central support structures placed within each pen over which the top nets are hung). Each pen will have 25 pole supports, each with a height of 8 m (**Appendix B**), between which the top net is hung. The poles will be dark grey or matte black in colour to reduce visual impact. The top nets will be highly tensioned to ensure maximum effectiveness by minimising ingress into the pens by avian predators and by reducing the risk of entanglement.

Top nets will be inspected and re-tensioned on a daily basis, as part of the site containment checks, records of which will be held on site. Maintenance will be conducted as and when required, based on the findings of the daily checks. The combination of daily checks and maintenance will ensure that the top nets are effective at both deterring avian predator interactions and reducing the likelihood of entanglement and entrapment.

The installation of pole mounted top nets for the Proposed Development will also have a number of advantages over the traditional hamster wheel support system, these include:

- Minimising pen furniture, which can lead to collision and result in fish welfare and quality issues;
- Minimising the loads on pen handrails, which can result in deformity of the pen structure at high energy sites;
- Reducing visual impact, associated with the increased pen furniture; and
- Allowing easier access for wellboats and service vessels pen side, thereby improving efficiency of husbandry operations.

An example of the type of top net system to be installed is provided in **Appendix B**.

### 3.2.4 Feed Barge

The feed barge will be fully automated and will have a feed holding capacity of 600 T, split across a number of purpose-built feed silos. The proposed barge is the Scale Aasgard 600, which has a length of 28.35 m and a beam of 13.5 m. When unloaded the feed-barge has a maximum height above the waterline of 10.29 m and when fully loaded it has a maximum height above the waterline of 8.70 m.

A plan of the proposed barge is available in **Appendix B**.

The Scale AQ Aasgard 600 feed barge is certified against the Norwegian standard NS 9415:2009, which was implemented through the NYTEK regulations in December 2003. The barge is specifically dimensioned to withstand a significant wave height of 6 m. The significant wave height modelled for the development location is 6 m (1 in 50 year), therefore the Aasgard 600 feed barge is determined to be suitable for the expected environmental conditions.

[20] NatureScot: Interim Technical Briefing Note: Pole-mounted top nets and birds at finfish farms. [Online] Available at: https://www.nature.scot/sites/default/files/2022-02/Interim%20Technical%20Briefing%20Note%20-%20Pole mounted%20top%20nets%20and%20marine%20birds.pdf

### 3.2.5 Lighting

Navigational lighting requirements for the infrastructure will be agreed with the Northern Lighthouse Board (NLB). Underwater lighting may be used during production cycles, the requirement for this will be influenced by factors, such as:

- Stock;
- Timing of input of fish through the year;
- Nutritional status at certain times of the year;
- Energetic reserves;
- Weight;
- Growth rate; and
- Photoperiod.

The decision on whether to deploy underwater lighting during a production cycle will be made by the Area Manager, the Head of Marine Production, and the Biology Director.

Dependent on stocking times, the worst case scenario for the use of underwater lighting would be from input during quarter (Q) 4 through to June the following year. The stocking time of the Proposed Development may vary year on year therefore the use of underwater lighting may be for a much reduced temporal period in comparison to the worst case scenario.

It is proposed that low energy, long life LED lights will be used in each pen. The lighting will be installed at a depth of 6 m within all pens stocked with fish and directed downwards into the pens, and not offsite. The potential effect from the lights will be a slight underwater illumination, seen as a green glow, which has minimal visibility from the surface. No unnecessary surface lighting will be used at the Proposed Development, and any pen and barge lighting will be specified in the Marine Moorings and Navigation Licence.

An example of the type of lighting to be installed as part of the Proposed Development is available in **Appendix B**.

## 3.3 Husbandry

The Proposed Development will incorporate a number of enhanced management measures including good husbandry, dedicated nutritionists, veterinary services, and the use of biological and physical treatments, where appropriate. An Environmental Management Plan (EMP) for all BFS fish farms on the east coast of Isle of Lewis is proposed, including Gravir, and North Gravir. A key aspect of the EMP is to ensure compliance with a quality assured ISLM plan. The draft EMP is provided in **Appendix E**.

### 3.3.1 Production Cycle

An example production cycle for the proposed maximum biomass of 4,680 T is provided within **Appendix D**. The Production Plan provides detail on the input numbers, expected growth, estimated mortality, and predicted harvest numbers.

BFS made an application to the Scottish Environment Protection Agency (SEPA) for a Controlled Activities Regulations (CAR) licence under the Water Environment (Controlled Activities) (Scotland) Regulations 2011, which was received by SEPA on 22 May 2024. SEPA issued a draft CAR Licence (**Appendix T**) for the Proposed Development on 11 October 2024. The maximum weight of fish held at any time at the Proposed Development shall not exceed 4,680 T. The CAR Licence states that a minimum fallow period of 28 consecutive days must be adhered to between production cycles.

Over the fallow period essential maintenance and any repairs will be carried out at the Proposed Development to prepare for the input of the next production cycle. At the end of each production cycle, all the nets will be removed from the pens and sent to the manufacturer for testing, inspecting, cleaning, and repair. Following inspection and repair, if necessary, nets that achieve specific quality standards will be cleaned and disinfected before being returned to the site.

All surface and sub-surface mooring and grid infrastructure will be inspected at the end of each production cycle. The inspection will be undertaken by specialist competent contractors, who will carry out the inspection against the requirements of the Marine Directorate: A Technical Standard for Scottish Finfish Aquaculture[18]. Any remedial work will be completed, and a 'Declaration of Compliance' will be issued by the specialist contractor stating that the inspected infrastructure meets the standards laid out within the Marine Directorate Technical Standard.

#### 3.3.1.1 Stocking

At the start of each production cycle, a wellboat will be used to stock the Proposed Development with smolts over a 1 to 2 month period.

#### 3.3.1.2 Feeding

BFS works to ensure an optimal diet for the stocked fish. The Proposed Development will use Havsbrún feed, which is a subsidiary of the Bakkafrost Group. This allows for greater control and oversight of feed requirements across BFS operations. Havsbrún produce their own fish meal and oil, which means that they are uniquely situated to select the highest quality meal and oil for use in fish feed production. Moreover, the meal and oil used in the fish feed comes from the same species of fish on which wild salmonids would feed in the wild. Vitamins and minerals are added to the feed to support the fish's immune system and disease resistance is promoted through the use of functional feeds. Medicated feed will be provided by EWOS. Medicated feed accounts for a much reduced proportion of the total feed usage during a production cycle in comparison to the standard feed.

The proposed feed system is fully automated with high-definition underwater cameras in place to monitor feed response, and general fish health and welfare.

Feed and feed equipment for the normal operation of the Proposed Development will be stored in the feed barge, with the feed housed in purpose-built silos. Feed deliveries to the site will be carried out by sea, which significantly reduces the requirement for transporting feed by road to the shorebase. Feed deliveries will take place at a maximum of once every two weeks throughout the production cycle with the feed barge being fully restocked every two weeks. Whilst food would be delivered by sea whenever possible, there may be some occasions, e.g., poor weather, when deliveries by road to the Gravir shore base may be required. It is anticipated that any additional feed boat activity will have a low impact on maritime traffic in the vicinity of a site. The estimated consumption rate per production cycle is 8,985 T of feed, based on a feed conversion ratio (FCR) of 1.2 kg of feed to 1 kg of salmon.

#### 3.3.1.3 Grading

Company-wide best practice grading risk assessments and procedures will be implemented at the Proposed Development. Grading operations are carried out at various stages of a production cycle as a means to sort a population into size brackets. This is normally to reduce stocking densities in pens by splitting large grades and small grades, to reduce the effect of dominance hierarchies within a population, to ensure a uniform uptake of feed within the pens, or to prepare pens for harvesting in order to take the highest yield per batch for harvest.

Grading is normally carried out via wellboat. Fish in individual pens are crowded, then pumped onto the wellboat and through a grader, with specific size panelling in place to grade the population as required. Once the fish have been graded, they are then pumped back into the relevant pen.

Fish are graded approximately 2 to 3 times during the production cycle. Fish health is checked prior to grading taking place by BFS Biology staff. Whilst fish are being graded, they will be continually monitored to ensure they are not experiencing unacceptable levels of stress or welfare issues. The nominated fish welfare officer is responsible for determining if mitigation measures are required to maintain or re-establish good fish welfare during the grading operations, such as increasing the volume of space available to the fish.

#### 3.3.1.4 Harvesting

Harvesting will normally take place over six months in the second year of production. During these harvesting months the harvest wellboat will make no more than 12 trips per month. Marine vessel activity during harvesting operations will have a low impact on the maritime traffic in the vicinity of the Proposed Development.

To maintain a high level of fish welfare, the maximum length of time that fish can be crowded in the net is limited. Once on board the wellboat, fish will be transported live to the BFS harvest station, located at Ardyne. Conditions within the wells are monitored by camera and sensors, both oxygen and temperature are controlled. During transport fish are chilled in order to reduce stress levels, the rate of chilling will not exceed 1.5 °C per hour. At the harvest station, fish are pumped ashore and killed via unrecoverable percussive stunning.

### 3.3.2 Fish Health & Welfare

BFS has a dedicated team of biologists who are responsible for carrying out regular health checks and monitoring and managing biosecurity throughout the company's operations. BFS also employs dedicated veterinarians. BFS focuses on the prevention of disease through effective proactive monitoring and biosecurity controls. Comprehensive Veterinary Health and Welfare Plans (VHWP) are put in place for each fish farm and final decisions regarding the requirement to treat and the appropriate type of treatment are made by the company veterinarian.

BFS is committed to achieving the highest standards of animal husbandry within the salmon farming industry. In an effort to achieve this BFS has commissioned the development of the BFS Fish Welfare Standard, focused on delivering the goal of producing the finest quality Scottish salmon to the highest standards of animal welfare. This new comprehensive, integrated and dynamic Fish Welfare Standard is specific to BFS and is audited by an independent third party. The standard is structured to support the highest level of welfare at each specific stage of production from broodstock through to harvesting. The objective of the standard is to ensure BFS maintains and, where appropriate, enhances its commitment to best practice welfare. The BFS standard provides a complete best practice guide for site teams, with a strong focus on driving continuous improvement. The standard will be regularly reviewed and updated on an annual basis to reflect industry changes and improvements in real time.

BFS follows a stringent quality assured ISLM plan. This plan aims to actively reduce the use of medicinal products, whilst increasing the use of biological control (i.e., cleanerfish), freshwater treatments, and mechanical treatment methods (i.e., hydrolicers and optilicers). Preventative health management is integral to BFS's improved sea lice strategy, as sea lice control cannot be viewed in isolation to other health challenges that may impact on the ability to carry out delousing operations. Amoebic Gill Disease (AGD) and Pancreas Disease (PD) have historically been limiting factors for sea lice interventions, as both of these diseases can significantly reduce a salmon's ability to tolerate a handling event.

Health monitoring occurs routinely (monthly during the winter months, fortnightly during the summer months), although BFS also conducts enhanced surveillance where applicable, with weekly sampling conducted when a specific population requires more attention. All disease results are collated and reviewed twice weekly, with a triage system implemented during higher risk periods. The primary aim of this health monitoring strategy is to intervene at the pre-clinical stage and mitigate clinical disease. BFS implements a rolling freshwater treatment strategy as a means to maintain good gill health, aiming to treat all farms every 4-6 weeks, thereby keeping AGD at very low levels. However, depending on the specific health status of individual fish farms, some farms may be treated more frequently and other farms less frequently.

A robust vaccination programme is in place, which includes vaccination against furunculosis, Infectious Pancreatic Necrosis (IPN), and PD. Where clinical disease is observed, lower stress intervention options may need to be utilised, such as increased cleanerfish stocking density, short medicinal baths or freshwater treatments. Alternatively, healthy, robust fish could be treated with any of the sea lice removal options available, including mechanical treatments.

Sea lice monitoring is conducted as soon as the fish are able to be caught with feed and a hand net. BFS operates to an enhanced sea lice monitoring regime. Every stocked pen will be sampled on a weekly basis when water temperature is < 10 °C, and twice weekly when water temperatures are > 10 °C. At least 10 fish should be sampled from each pen, with sea lice life stages identified and counted, sea lice damage scores are also recorded. If extenuating circumstances preclude sampling of 10 fish from each pen, a minimum of 25 fish (5 fish from 5 pens) will be sampled. BFS's sea lice thresholds for treatment are significantly lower than those stated in the CoGP, which allows time for resource to be organised and treatment to be administered without loss of sea lice control. During a production cycle, bioassays may be conducted to determine the trend in sea lice sensitivity and help make treatment decisions.

A Sea Lice Action Plan (SLAP) is drawn up at the start of every new production cycle, coinciding with the Veterinary Health and Welfare Plan (VHWP) and the end of cycle review. Once fish are stocked both a cleanerfish stocking plan and a SLICE treatment forecast are produced. All available and appropriate tools for sea lice control are taken into consideration. These are outlined below with further detail provided in the EMP, included within **Appendix E**.

#### 3.3.2.1 Cleanerfish

The salmon louse (*Lepeophtheirus salmonis*) is the most common parasite of farmed salmon and is one of the biggest challenges facing the aquaculture industry. Cleanerfish represent an effective biological method for the removal of sea lice. This means that delousing can potentially be carried out without the use of medications, reducing the use of chemicals, and reducing the likelihood of resistance developing to delousing medications.

The Proposed Development will be stocked with ballan wrasse (*Labrus bergylta*). To ensure that the ballan wrasse act as an effective sea lice control measure, their stocking density in relation to the stocked salmon will range from 3 to 6 %. The ballan wrasse will be stocked ahead of the first summer to ensure effective acclimatisation before the sea lice burden may potentially develop, from experience this has proven to be an effective stocking strategy.

The ballan wrasse to be stocked at the Proposed Development are likely to come from both farmed and wild origin (50/50 split). BFS works with wild wrasse suppliers to ensure sustainable levels of wild capture. In line with the MD mandatory criteria, all wrasse fishermen must have a wild wrasse fishing letter of derogation.

Ballan wrasse health screening and monitoring will be carried out, this will help ascertain whether freshwater interventions will also benefit the ballan wrasse, by managing their own gill health. The duration of the freshwater intervention will be reduced if it is decided that the ballan wrasse are to receive the intervention also. If it is decided that the ballan wrasse will not receive the intervention alongside the salmon, recovery from the crowd will be started ahead of the intervention. This will be done via creels, hand-nets, passive grading nets and the de-waterer onboard the wellboat. This also provides another opportunity to monitor and screen the ballan wrasse population before returning them to the pen.

Ahead of any mechanical intervention, every effort will be made to remove the ballan wrasse, prior to crowding or during crowding, before the start of the intervention. The ballan wrasse will be removed via creels, hand-nets, passive grading nets and the de-waterer onboard the wellboat. This also provides another opportunity to monitor and screen the ballan wrasse population before returning them to the pen. The welfare of the ballan wrasse will be monitored at all times alongside the salmon throughout the duration of the crowd.

#### 3.3.2.2 Medicinal Interventions

BFS has a number of different medicinal intervention options available, all licenced by SEPA. The Proposed Development will be regulated against a ‘Controlled Activities Regulation (CAR) consent. The expected permitted medicinal sea lice intervention options include:

- In-feed medicines;
  - SLICE (Emamectin Benzoate);
- Topical treatments;
  - Alphamax (Deltamethrin); and
  - Salmosan VET (Azamethiphos).

Final permitted values will be in line with the SEPA licencing determination.

Strategic in-feed treatments will be administered as per the site-specific sea lice management plan. SLICE is an in-feed sea lice treatment, with the active ingredient of Emamectin Benzoate (EmBz). This is fed to the fish, usually over a week, and is usually given to the fish on a routine basis even if very low numbers of lice are present, in order to prevent escalation. Once smolts are transferred into marine pens SLICE will be fed from as soon as the fish are fully feeding, giving ample protection to the salmon during this vulnerable phase of the growing cycle, if consent is available to use the medicine. Where limited medicinal consent is available, partial site treatment may be applied, or the farm will be offered freshwater baths in combination with Flatsetsund Engineering (FLS) to treat for sea lice if required. Biological control (wrasse) may also be stocked earlier to offer some protection to sea lice infection while the fish are smaller and more vulnerable.

Bath interventions can be administered either through full enclosure tarpaulins (wedge or cone), and increasingly in the fully enclosed wells of wellboats. Bath treatments may be alternated to minimise the risk of resistance developing within the sea lice population. However, results from bioassays and analysis of pre and post treatment sea lice counts will determine how intervention chemicals will be used.

The SEPA approved marine modelling identified sufficient amounts of Alphamax (deltamethrin) and Salmosan (azamethiphos) for use as efficacious and practical treatment substances for control of sea lice. Assuming typical tarpaulin size, the consented amount of Azamethiphos allows for 1 pen per 3 hour period and 3 pens within a 24 hour period to be treated, therefore the whole farm could be treated within 2 days. The consented amount of Deltamethrin allows for treatment of the whole farm within 1 to 2 days. These amounts enable satisfactory treatment under the SLMS.

The approved treatment amounts of SLICE (EmBz), Alphamax (Deltamethrin) and Salmosan/Azasure (Azamethiphos) give sufficient medicines for an efficacious treatment strategy to be applied at the Proposed Development.

All bath treatments adhere to BFS procedures and medicines are prescribed by the company veterinarian, taking health and lice trends into consideration. Further details on the use of medicinal treatments are provided within the EMP (**Appendix E**). A Sea Lice Management Statement is also provided (**Appendix F**).

#### 3.3.2.3 Non-chemical Interventions

BFS utilise a number of non-chemical interventions in order to reduce reliance on medicinal sea lice interventions. Mechanical interventions are a novel technology, which are constantly being improved, for better sea lice clearance, better fish welfare, and lower environmental impact. There are several technologies currently used for the physical removal of sea lice, some of which BFS implement extensively, whilst others are used on a more ad-hoc basis.
The mechanical treatments currently in use include:

- **Hydrolicer/Flatsetsund Engineering (FLS):** Hydrolicer systems use low pressure water jets to remove sea lice from the salmon. This system reduces the sea lice burden without the need for chemical intervention (which has environmental benefits). Sea lice are filtered out, via sea lice bags attached to the discharge pipework and/or drum filtration and disposed of. The sea lice do not re-enter the water column, thereby reducing the potential for resettlement post treatment. BFS currently has three mechanical treatment vessels, one dedicated mechanical vessel and two wellboats with an FLS system installed. BFS also has the option to hire additional resource from third parties, if required. Generally, hydrolicer treatment operations result in a clearance percentage of at least 85 %;
- **Thermolicer system:** Thermolicer systems utilise warm water to remove sea lice from salmon. Sea lice have a low tolerance to sudden thermal shifts in temperature. Fish are pumped into the thermolicer system, where they are then passed through the treatment system and bathed in lukewarm water. This process kills the sea lice, which fall off the salmon and are collected. The salmon are then returned to their pen post-treatment. Thermolicer treatments conducted by BFS have resulted in 85 % clearance;
- **Optilicer system:** Optilicer systems are very similar to thermolicer systems, relying on warm water to thermally shock sea lice; and
- **SkaMik:** The SkaMik system utilises a combination of water jets and brushes to physically dislodge sea lice. The system is highly effective at removing all sea lice stages from salmon, with a documented clearance rate of 97 %. The system also has a large capacity, with the potential to treat up to 100 T per hour. The SkaMik system works by pumping the salmon from the pen through a drainage chamber, a flushing chamber, a brush chamber, and then a final flush chamber, with the whole process taking 1.5 seconds. All sea lice are collected in a filter system and destroyed.

Freshwater interventions have proven to be a valuable tool for both gill health and sea lice control. Details on freshwater interventions currently utilised by Bakkafrost are provided below:

- **Freshwater intervention:** For interventions targeting only AGD, a freshwater intervention for a minimum of 3 hours is sufficient. For interventions targeting both AGD and sea lice, the freshwater intervention may be extended up to 12 hours. Cleanerfish, in particular wrasse, can be sensitive to freshwater interventions. Wrasse will tolerate an exposure of approximately 3 hours. Prior to freshwater intervention, efforts are taken to remove the cleanerfish from the pens using creels. Site operatives are present at the crowding event to hand net wrasse over the sweep net. These combined efforts reduce the risk of wrasse entering the wells of the intervention vessel. Intervention vessels also have a cleanerfish de-watering capacity on board, which allows the wrasse to be separated from the salmon during loading, and these can then be returned to the pen without exposure to freshwater. The addition of FLS systems to the freshwater vessels gives the option of delousing via FLS on discharge from the wellboat. Lice are collected via drum filtration. Early trials of freshwater (3 hours) and FLS on discharge has resulted in > 90 % lice clearance. This delousing option reduces the risk of having to administer long exposure freshwater treatments to the salmon populations, thereby further reducing the risk that wrasse will be exposed to freshwater for longer than 3 hours.

- **Freshwater and chemical treatment**: Medicines can be used in conjunction with freshwater interventions to optimise effectiveness. BFS has developed protocols to ensure optimal combinations and intervention times are used. Intervention strategies are developed and led by the Biology Department.

The combination of both cleanerfish and non-chemical treatments has been shown to reduce post-treatment resettlement, thus reducing the need for chemical treatments. Further details are provided within the EMP (**Appendix E**).

### 3.3.3 Mortalities

Mortalities will be removed from the pens on a daily basis (weather permitting) using a LIFT-UP system, this is in line with current BFS best practice. Mortalities collect at the base of the pen net, in the centre, and are then pumped up to the surface via a collection pipe during daily mortality removal operations. Any mortalities removed will be collected on the pen-side, in purpose-built containers then transferred to the barge, where an ensiling system will process them into a stable liquid form. When required, ensiled waste will be removed by boat for disposal (Further details are provided in the Fish Mortality Plan (FMP) (**Appendix G**). In addition to this, there will be regular diver inspections of all five pens, during which, mortalities that have not collected in the LIFT-UP basket will be noted and the Site Manager informed. Mortalities will then be removed and the LIFT-UP removal system inspected.

### 3.3.4 Predator Control

A Predator Control Plan (PCP) for the Proposed Development is provided as part of the EMP (**Appendix E**). This document provides detail on the risk of predation and the measures taken to minimise the risk of predator related escapes. The PCP will be reviewed throughout the production cycle and the Proposed Development's risk status will be reviewed to reflect ongoing predator interactions. At the end of each production cycle the document will undergo an end of cycle review, where predator interactions and the effectiveness of control measures will be reviewed and modified if required. Predator control measures that will be deployed at the Proposed Development include specific equipment choice and design, best practice husbandry measures and an ongoing assessment of local wildlife trends. Analysis of existing information on wildlife presence in the area has been undertaken and it is anticipated that seals are likely to be the most significant potential predator. For this reason, the farm will be equipped with multiple methods of seal deterrence, these measures will be monitored regularly to assess their effectiveness. Further information on these is provided below.

#### 3.3.4.1 Equipment

The following equipment forms a key part of the predator control strategy:

- **Rigid Netting:** As outlined in **Sub-Section 3.2.2**, the Proposed Development will utilise Seal Pro netting (or similar), which is designed to reduce the potential for seal interactions.

- **Net Tensioning:** Correct net tensioning will ensure the netting presents as a wall to any potential predators. As stated in **Sub-Section 3.2.2**, the pen nets will be effectively tensioned via sinker tubes.
- **Top Nets:** As outlined in **Sub-Section 3.2.3**, sufficiently tensioned top nets will be used primarily to protect the stock from avian predation, but also to stop seals from entering the pens from the surface.
- **Seal Blinds:** Seal blinds may also be used, which are sections of material hanging down from net panels, acting as a curtain to prevent seals from reaching the fish from below the pen.

#### 3.3.4.2 Effective Husbandry

Maintenance of effective husbandry practices will help to reduce the number of avian predators attracted to the Proposed Development, thereby reducing the risk of interaction and entanglement. There will be careful control of fish feed to make sure that it is not left available, for example feed spreaders will face downwards and will be set to spread feed evenly. Scarecrows may also be used at the Proposed Development, should there be an increase in predatory avian interaction.

The presence of mortalities building up at the base of pens is a known attractant to seals. Therefore, an effective mortality removal procedure, as proposed in **Sub-Section 3.3.3** and **Appendix G**, will reduce the risk of predatory seal interactions.

Careful farm and waste management procedures, in the form of daily containment and integrity checks of all surface equipment with associated maintenance work, if required, and a Waste Management Plan (**Appendix P**) will be in place to ensure that net and rope debris do not enter the marine environment, thereby reducing the potential for entanglement.

The Proposed Development will be kept in a neat and tidy condition and any rubbish found on the adjacent shoreline will be collected on a regular basis to minimise the impacts of marine litter, as outlined within the Waste Management Plan.

#### 3.3.4.3 Wildlife Log Assessment

Staff will keep a log of the wildlife observed, to species level (where possible) around the Proposed Development, recording factors such as numbers, behaviour and type of interaction. This will help to determine the need for, and effectiveness of, predator control measures, whilst also informing the end of cycle predator control review process, by building an understanding of both seasonal and longer-term local wildlife trends.

#### 3.3.4.4 Acoustic Deterrent Devices

BFS has committed to not using ADDs as standard practice at the Proposed Development. In circumstances of exceptional welfare concern for stocked fish, BFS will consult with NS, the LPA, and the Marine Directorate – Licensing Operations Team (MD-LOT) to discuss how best to proceed and to obtain approval for any ADD use. It is likely that a European Protected Species (EPS) licence will be required for all currently available ADDs unless it can be demonstrated that the device proposed for use will not cause disturbance to cetaceans. An EPS licence can be applied for via the MD-LOT who will consult with NS on any applications.

### 3.3.5 Husbandry Considerations for 200 m Circumference Pens

Within their Scoping Advice, in response to the Screening and Scoping Request, MD have requested further information to support the use of such large pens considering the potential impacts on procedures. The information below has been provided to address this request. This Sub-Section should be read in combination with **Sub-Section 3.3.2** and **Sub-Section 3.4**.

Five 200 m circumference pens will be installed at the Proposed Development. These pens will take approximately 3 hours to prepare for treatment (compared to approximately 2 hours preparation time for 120 m pens). However, despite the increased preparation time per pen, the reduced overall number of pens needed as a result of the installation of 200 m circumference pens results in increased operational efficiency. This is shown in the table below.

**Table 3.5: Summary of pen preparation efficiency for 120 m, 160 m, and 200m circumference pens.**

| Efficiency Parameter | 120 m pens | 160 m pens | 200 m pens |
|---|---|---|---|
| Treatment preparation time/ pen | 2 hours | 3 hours | 4 hours |
| No. pens for equivalent volume (15 m nets = 238,732.6 $m^2$) | 14 | 8 | 5 |
| Treatment preparation time/ site | 28 hours | 24 hours | 20 hours |

As a result of the operational efficiencies anticipated in relation to the installation of 200 m circumference pens and the availability of suitable support infrastructure, it is determined that the installation of 200 m circumference pens at the Proposed Development will not negatively impact on procedures and containment.

### 3.3.6 Infrastructure Specific Training Programme

The Proposed Development would represent the first use of 200 m circumference pens by BFS within Scotland. Therefore, to ensure that all staff are adequately trained to carry out their responsibilities BFS, in collaboration with the manufacturer of the pens, will undertake a period of training and knowledge exchange. Key operational personnel from the Proposed Development will travel to an existing fish farm utilising the manufacturer's 200 m circumference pens. This section of the training programme is designed to allow the staff to fully understand and gain operational competence in how to work with 200 m circumference pens during various handling events, such as fish health interventions and harvesting.

Once the 200 m circumference pens are ready to be installed at the Proposed Development, a senior technician from the manufacturer will assist with and oversee the installation of the complete system. The senior technician will then remain onsite to provide support until the Proposed Development is ready to receive fish at first stocking.

Once the Proposed Development is stocked and the first production cycle is underway, the manufacturer will also offer ongoing local support, as required.

## 3.4 Access and Communications

The Proposed Development will be routinely serviced from the existing BFS Gravir shorebase, where staff and workboats will depart from. Under normal operating conditions it is envisaged that one return journey a day for one workboat and one smaller rigid-hull inflatable boat (RIB) will be made from the shorebase to the Proposed Development.

Access to the Proposed Development will be via a 9 m RIB or via a landing craft type workboat up to 23 m in overall length, these boats will also be used to transport visitors and diver teams to the Proposed Development when required.

BFS has experience of operating in exposed locations, along with dealing with the specific challenges that this brings. All infrastructure planned to be installed for the Proposed Development has been designed and built to withstand the expected conditions at the development location (**Appendix B**).

The associated primary marine vessels for the Proposed Development, the 9 m RIB and 23 m workboat, can both operate and work safely in elevated sea states. Therefore, these vessels will not be a limiting factor in maintaining operations at the Proposed Development, despite it being located in a moderately exposed location. Moreover, the secondary marine vessels, including wellboats, are designed to operate safely in extreme weather conditions. The mooring system for the Proposed Development has also been modelled and designed to take into account wellboats moored alongside pens in elevated sea states.

Remote monitoring technology is used at existing farms in exposed locations and this will also be used at the Proposed Development. Remote monitoring technology helps to ensure the safety of staff conducting routine husbandry operations, equipment checks, and sea lice counts, and also the safety of visitors, such as dive teams and industry regulators. The system is also used to ensure that the health, welfare, and containment of the stock is not compromised by conditions experienced at the location.

Cameras below the water surface within the pens will be used to remotely monitor fish behaviour, feeding and fish health and welfare. Cameras above the water surface will be used to monitor sea conditions and feeding operations as well as monitoring the state of the overall environment. This information will be available via remote connectivity and fed back to the shorebase. This enables remote feeding, thereby meaning that when staff are unable to reach the Proposed Development due to inclement weather, feeding operations can occur as normal through the remote system. BFS are also investigating systems to remotely manage the feed silo hatches and other functionality on feed barges to allow timely unmanned feed deliveries (if required) to the barge, alongside a full monitoring system for that process.

For robust communications, depending on successful licence determination, BFS will install a relay station to establish line of sight and transmit the signal from the feed barge to the shorebase. Telephony and data communication lines at the shorebase will be upgraded, if required. Alternatively, 4G and satellite communications can be utilised.

## 3.5 Reporting Requirements

SEPA require data returns to be submitted for each farm which include detail on biomass stocked, number and weight of mortalities, feed volume administered, and quantities of treatment chemical used. These records are broken down month by month and provided on a quarterly basis; they must also be available for inspection by SEPA at any reasonable time. Records must be maintained for a period of six years, as per the conditions of the SEPA CAR licence (**Appendix T**). SEPA require prior notification of any planned treatment (bath or in-feed) at any farm. Further to this, on an annual basis, SEPA also receives records of the use of non-restricted chemicals i.e., cleaning chemicals.

SEPA require prior notification of any planned wellboat treatment. The permitted medicines for a wellboat treatment are based on what has been permitted on the SEPA CAR licence consent (**Appendix T**). SEPA also require submission of records of wellboat treatments, which include detail of the vessel used, location, and quantities of permitted medicines used, these are submitted on a quarterly basis.

MD-LOT also licences the placement of marine equipment under the Marine (Scotland) Act 2010[21] (Part 4), which includes all moorings.

[21] Scottish Government: Marine (Scotland) Act 2010. [Online] Available at: https://www.legislation.gov.uk/asp/2010/5/contents

It is also a requirement to report to the MD Fish Health Inspectorate (FHI) any unintentional releases of fish from marine or freshwater fish farms.

Internal and external audits of farming operations and procedures are undertaken as part of the internal QMS, external 3rd party accreditation, and customer requirements.

Records are audited and reviewed regularly in line with internal procedures with an aim to assess the overall performance of the company. Each individual farm is audited annually by an independent certification assessment body (CAB).

## 3.6 Construction of the Proposed Development

The proposed Development will be accessed from the existing Gravir shorebase, where staff and work boats will depart for the site. It is proposed that the shorebase is expanded to accommodate extra staff and the need for more operational space if the proposed development is granted permission. Discussions are currently underway with the landowner of the shorebase regarding this requirement. There will also be an option to have an offshore base should the potential for shore expansion not be viable.

### 3.6.1 Construction and Installation of all Marine Equipment

The anticipated order of construction events is outlined below. Any specifications on timing or duration of construction or installation activities which are required through the consenting process may affect the proposed programme. Other factors which may affect the proposed programme are weather and ground conditions experienced on location. All major, large-scale construction activities will take place off-site.

#### 3.6.1.1 Construction of Equipment

##### 3.6.1.1.1 Grid and Mooring System

The grid and mooring system analysis has been carried out by specialist manufacturer, this involved a detailed modelling phase based on environmental parameters including current velocities and wave height. The outputs of this modelling outline the required components needed to ensure a robust and effective grid and mooring system for the Proposed Development. Once the modelling outputs are complete, the manufacturer can then construct the system from component equipment, this includes the construction of the 27 plough anchors (1,500 kg). As all construction of the grid and mooring system takes place off-site, activities onsite are limited to the installation of the system, as described in **Sub-Section 3.6.1.2**.

##### 3.6.1.1.2 Pens

The five pens that are proposed for installation at the Proposed Development will be built to order by the pen manufacturer. All construction activities will take place at their land-based construction facility. As a result, no pen related construction activity is anticipated to occur at the development location or the Gravir shorebase. Therefore, activities onsite at the development location will be limited to the installation of the pens within the grid and mooring system, as described in **Sub-Section 3.6.1.3.**

##### 3.6.1.1.3 Feed Barge

The feed barge will be constructed by Scale, the barge design is a ScaleAQ Aasgard 600T (HS5,99 Bow) with 8 silos. The barge will be built in accordance with the NYTEK regulations and certified according to NS9415:2021, which was implemented through the NYTEK regulations in December 2003. The barge will be specifically designed to withstand a significant wave height of 6 m. Due to all construction taking place off-site, activities onsite will be limited to feed barge installation, as described in **Sub-Section 3.6.1.4**.

#### 3.6.1.1.4 Minor Construction Works

There is the potential that small scale construction works may take place at the existing Gravir shorebase e.g. cutting sections of feed pipe to the correct size for installation at the Proposed Development. These small scale construction operations may result in emissions of dust and noise. However, it is anticipated that these impacts will be constrained to the shorebase and therefore have a negligible spatial extent. Whilst these activities are likely to be low impact in nature, every effort will be made to reduce potential for impact.

### 3.6.1.2 Installation of the New Grid and Moorings

All materials required for the installation process will be transported to the development location by boat from multiple locations. BFS approved specialist contractors will be used to carry out the grid and mooring installation. It is anticipated that the process of grid and mooring installation will take between 14 and 21 days, depending on weather and tidal conditions experienced. It is anticipated that three vessels (two external and one internal) will be present on site to undertake this operation. Based on the detailed mooring analysis completed for the Proposed Development, a total of 27 plough anchor moorings will be required to securely moor the Proposed Development. Once all the equipment is installed, the system will then be tensioned according to the modelled grid and mooring specifications, it is during this tensioning process that the anchors will become embedded in the seabed. A remote operated vehicle (ROV) will be used once all the moorings have been laid and tensioned to check that all anchored have adequately embedded.

### 3.6.1.3 Pen Installation

Pens will be constructed off-site on land at the manufacturer’s operational base. The fully constructed pens will then be towed to the Proposed Development location. Two pens can be towed at any one time, meaning that a maximum of three return trips will be required to install all five pens. During towing operations vessels will not operate at speeds greater than 4 knots. Navigational warnings will be issued in advance of towing operations to the relevant authorities to ensure all maritime users are aware of the potential hazard. The installation of one pen will take approximately half of a day, depending on prevailing weather conditions, meaning that a maximum of 3 days may be required to install all five pens.

### 3.6.1.4 Feed Barge Installation

The feed barge will be constructed off-site by the manufacturer at their base of operations and then be towed to the Proposed Development location. The relevant navigational warnings will be issued to the relevant authorities to ensure that maritime users are made aware of the potential hazard. The installation of the feed barge will involve positioning of the barge, laying of the mooring lines, and tensioning of the mooring lines to modelled specification. It is anticipated that the feed barge installation will take two days and that the positioning and installation of the feed barge moorings will have a low impact on any nearby marine users.

# 4 Alternative Sites and Design Innovation

This section provides an overview of the process of determining the most appropriate farming production system, selecting the development location and finalising the design and layout, in terms of infrastructure. Information is provided on alternatives that were considered, as appropriate, and how environmental and economic costs and benefits have been balanced.

The development selection assessment follows a systematic methodology, to ensure that all aspects of site selection have been adequately considered prior to the final design and location being confirmed, the assessment includes consideration of the below:

1. Farming Production System;
2. Location Selection;
3. Design and Layout; and
4. Embedded Mitigation.

## 4.1 Farming Production System

The first step in the systematic process of development selection involved the determination of the most appropriate farming production system to utilise.

### 4.1.1 Land-Based Recirculating Aquaculture Systems

Throughout the Scottish aquaculture industry, the main marine production system is open pen production. However, recent advances in recirculating aquaculture systems (RAS) have resulted in the potential to grow Atlantic salmon to harvest weight in land-based systems at a commercial scale. In principle there are a number of benefits of marine RAS production, RAS provides a more secure environment for the farmed fish while minimising the risk of environmental stressors such as storms, predators, marine parasites (such as sea lice), algal blooms, and jellyfish blooms. RAS can also provide greater biosecurity, which can result in reduced mortality and improved fish welfare[22]. However, RAS technology still faces a number of constraints, which are detailed below.

#### 4.1.1.1 Operational Reliability and Health Management

Marine RAS is a relatively novel technology. However, it has the potential to provide a more secure environment than traditional open net production and therefore provide multiple benefits through a reduction in environmental stressors. However, in practice, there are still initial problems which need to be worked through and improved upon. Due to the intensive production nature of marine RAS with high stocking densities and a high percentage of water recirculation, health issues can be prevalent, with the potential risk of high losses within the production cycle[22].

#### 4.1.1.2 Financial Competitiveness

When comparing the capital cost of open pen aquaculture with that of marine RAS, it is clear that RAS is currently uncompetitive in comparison, with an approximate 2 to 3 times higher cost per tonne of production[22]. This is supported by a study that suggests, through financial analysis, that marine RAS production would not be profitable unless a 30 % price premium could be placed on the final product. However, several studies suggest that on direct operating cost alone marine RAS is competitive in comparison to open net production. This competitiveness is mainly attributed to the reduction in cost associated with disease treatment, reduced mortality and improved fish welfare in combination with

[22] Bostock, J., Fletcher, D., Badiola, M. and Murray, F., 2018. An update on the 2014 report:" Review of Recirculation Aquaculture System Technologies and their Commercial Application". [Online] Available at: https://www.hie.co.uk/media/6167/ras-study-2018-update.pdf

lower FCRs, with one study assuming an Economic FCR of 1.09 for RAS, in comparison to 1.27 for open net production[23].

#### 4.1.1.3 Access to Experienced Marine RAS Operators

Within the international employment market, the candidate pool of experienced RAS operators, especially with experience of marine RAS operation, is extremely small, with operators with adequate experience in short supply. Previous experience in open net production, flow-through systems, or freshwater RAS does not translate across to marine RAS operation. Therefore, without staff of adequate experience working with RAS, and specifically marine RAS technology at commercial scale, significant risk is introduced, which may result in operational problems, with the potential to cause complete or almost complete loss of a production cycle[22].

#### 4.1.1.4 Energy and Water Demand

By operating in the natural environment, open pen production ensures that the seawater flowing through the production pens is of appropriate temperature, salinity, and oxygenation for fish growth. The farmed fish are also exposed to natural currents which provides swimming resistance, resulting in healthier and leaner salmon. These same currents also disperse organic waste throughout the wider environment to low levels.

RAS must replicate these processes. This involves the use of water pumps for water circulation, oxygenation of production water, filtration, storage, and removal of solid waste, filtration and removal of wastewater sludge, and the removal of compounds such as ammonia, nitrite, and carbon dioxide from the production water[24]. Based on data on water usage rates for marine RAS systems it is possible to estimate the volume of water required per day to farm the proposed biomass of 4,680 T. The estimated daily water usage for a biomass of 4,680 T, assuming a 5 and 10 % daily replacement rate, is calculated to be 2,886.63.00 $m^3$ (5 %) or 5,771.25 $m^3$ (10 %). This range of replicated processes combine to produce an elevated energy demand. Various studies state direct energy usage that ranges from 4.6 to 8.1 kWh/kg[25, 26, 27, 23, 28]. When assessing the energy requirements of RAS, it is important to assess the electricity consumption and consequently the means of electricity generation and the associated carbon dioxide output. One study found the carbon footprint for open pen production to be 3.73 kg $CO^2$/kg (live weight) compared to a carbon footprint of 7.01 kg $CO^2$/kg (live weight) in RAS[23].

#### 4.1.1.5 Land Requirements

The Proposed Development will consist of five 200 m pens, with a net depth of 15 m, resulting in a total production volume of 238,732.59 $m^3$. The surface area of the pens of the Proposed Development covers 1.59 ha. Based on marine RAS land use data[22], for the 4,680 T maximum biomass of the Proposed

[23] Liu, Y., Rosten, T. W., Henriksen, K., Hognes, E. S., Summerfelt, S., & Vinci, B. (2016). Comparative economic performance and carbon footprint of two farming models for producing Atlantic salmon (Salmo salar): Land-based closed containment system in freshwater and open net pen in seawater. Aquacultural Engineering, 71, 1–12. [Online] Available at: http://doi.org/10.1016/J.AQUAENG.2016.01.001

[24] Badiola, M., Basurko, O.C., Piedrahita, R., Hundley, P. and Mendiola, D., 2018. Energy use in recirculating aquaculture systems (RAS): a review. Aquacultural engineering, 81, pp.57-70. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/S0144860917302327

[25] Robinson, G. (2017). Costs and returns for a modelled 3000 mt RAS salmon farm. Freshwater Institute. Aquaculture Innovation Workshop, 29-30 November 2017 [Online] Available at: https://www.conservationfund.org/our-work/freshwater-institute/aquaculture-innovation-workshop

[26] Bjørndal, T., & Tusvik, A. (2017). Land Based Farming of Salmon: Economic Analysis. Working Paper Series No. 1/2017. Norwegian University of Science and Technology, Alesund. Retrieved from [Online] Available at: https://brage.bibsys.no/xmlui/handle/11250/2465608

[27] Vinci, B., Summerfelt, S., Rosten, T.W., Henriksen, K., Hognes, E.S. (2015). Land Based RAS and Open Pen Salmon Aquaculture: Comparative Economic and Environmental Assessment. Workshop presentation. [Online] Available at: http://www.ccb.se/wp-content/uploads/2015/11/Freshwater-Institute_BrianVinci_day2.pdf

[28] Dekamin, M., Veisi, H., Safari, E., Liaghati, H., Khoshbakht, K., & Dekamin, M. G. (2015). Life cycle assessment for rainbow trout (Oncorhynchus mykiss) production systems: a case study for Iran. Journal of Cleaner Production, 91, 43–55. [Online] Available at: http://doi.org/10.1016/J.JCLEPRO.2014.12.006

Development, a marine RAS facility would require an estimated 3.11 ha of building area, with a tank volume of 57,712 $m^3$ housed within the building area.

Due to the scale of land required for RAS facilities, the development of such a system will inevitably put increased pressure on land resources. Any development of a land-based facility would also be required to align with both national and local planning policy, which may further limit suitable development options. Moreover, RAS facilities are likely to be developed in more built-up areas, such as the central belt of Scotland, due to the improved access to infrastructure and labour. This would therefore result in the loss of economic input to the rural and fragile communities of the Outer Hebrides, which our current operations provide and to which the Proposed Development would contribute.

#### 4.1.1.6 Summary

Marine RAS production involves significantly higher capital costs than traditional open net production systems. Due to the relatively novel technology involved, especially in marine RAS, and the combined lack of experienced marine RAS operatives within the UK there is a significant risk to operational reliability. RAS production is significantly more energy intensive than open net production, which results in an associated higher carbon footprint. Furthermore, the land requirements of RAS, and the need to have sufficient infrastructure readily available, could exclude marine RAS production from the remote coastal areas of the Outer Hebrides. As a result of the above factors, land-based marine RAS is not considered to be a feasible alternative.

### 4.1.2 Marine Closed/Semi Closed Containment Production Systems

Closed or semi-closed containment production systems utilise an impervious barrier to separate the stocked salmon from the external environment. The main benefits of this type of production system include the collection and removal of waste (therefore minimising the release of waste into the surrounding environment), prevention of parasite infestation, reduction in the costs associated with sea lice intervention, and improved control of water quality parameters. However, there are a number of constraints that must be considered.

#### 4.1.2.1 Environmental Exposure

Closed containment is considered a developing technology, which has yet to become an established production method within the Scottish aquaculture industry, despite utilisation in countries such as Norway. One of the major constraints of closed containment systems is that they are more vulnerable to wave exposure, with the majority of commercially available systems only able to withstand a significant wave height of 1.8 to 2.0 m[29]. This limits the application of this production system to more sheltered areas in the lower energy coastal environment.

Wave climate assessment (WCA) for the Proposed Development has been undertaken by a specialist contractor, this indicates a significant wave height ($H_s$) of 3.74 m for a 1 in 1-year event and a significant wave height of 6.00 m for a 1 in 50-year event. Therefore, closed containment production is not considered suitable for the predicted wave climate at the development location, due to the location's high energy characteristics.

#### 4.1.2.2 Energy Demand

By operating in the natural environment, open pen production ensures that the seawater flowing through the production pens is of appropriate temperature, salinity, and oxygenation for fish growth. The farmed fish are also exposed to natural currents which provides swimming resistance, resulting in healthier and

[29] Clarke R, Maitland D & Bostock J, 2018. Technical Considerations of closed containment sea pen production for some life stages of salmonids. Scottish Aquaculture Research Forum (SARF) SARF Research Project Reports, SARFSP011. Stirling. [Online] Available at: https://dspace.stir.ac.uk/handle/1893/29642#.YnppoujMI2w

leaner salmon. These same currents also disperse organic waste throughout the wider environment to low levels.

Closed containment production systems have to replicate these natural processes. In order to do this a larger amount of energy is required. Water pumps must continuously pump water from deeper within the water column, which is then treated and filtered prior to entry into the production system. Organic waste is also collected at the base of the production unit and pumped via a filter to the surface for removal. Closed containment systems rely on advanced monitoring systems to ensure that water quality is maintained at optimal levels, as part of this a supply of oxygen must be readily available. All of these processes require large amounts of energy in comparison to open pen production, which may increase the carbon footprint of the production system.

One notable lifecycle analysis observed that:

***"while the use of closed-containment systems may reduce the local ecological impacts typically associated with net-pen salmon farming, the increase in material and energy demands associated with their use may result in significantly increased contributions to several environmental impacts of global concern, including global warming, non-renewable resource depletion, and acidification[30]."***

#### 4.1.2.3 Summary

Closed containment systems are a relatively novel technology with limited application within the Scottish environment. This, in combination with the exposure limitations and the greater energy demand of the system in comparison to the traditional open pen production system, suggests that closed containment is not a feasible option for the Proposed Development.

### 4.1.3 Open Pen Production Systems

Open pen production is the main system of production that is implemented across the global commercial salmonid production industry. It is also the main production system within the Scottish salmonid industry. The increased carbon and land footprint associated with onshore aquaculture at scale, and the unproven nature of marine closed containment systems, particularly in exposed locations mean that both alternative farming methods were ruled out as being feasible for the Proposed Development. As such BFS has progressed the Proposed Development based on an open pen farming production system.

## 4.2 Site Location

With open pen farming being progressed as the production system of choice for the Proposed Development, the following section outlines the criteria used to determine the spatial location of the Proposed Development.

The location of the Proposed Development has been influenced by, and represents a balancing of, a number of factors:

- BFS's objectives for sustainable growth;
- Regulation and guidance for the aquaculture industry; and
- Environmental considerations.

[30] Ayer, N. W., & Tyedmers, P. H. (2009). Assessing alternative aquaculture technologies: life cycle assessment of salmonid culture systems in Canada. Journal of Cleaner Production, 17(3), 362–373. [Online] Available at: http://doi.org/10.1016/J.JCLEPRO.2008.08.002

### 4.2.1 Bakkafrost Scotland Sustainable Growth Strategy

BFS is investigating potential farms to support its sustainable growth across the west coast of Scotland and the Outer Hebrides. Particularly, BFS is looking to balance its production both spatially and by volume capacity in order to best utilise existing infrastructure and to offer a consistent supply of high-quality final product to customers. The Proposed Development, off the east coast of the Isle of Lewis contributes to the balancing of BFS's portfolio for the following reason:

- The Proposed Development will be serviced from the existing Gravir shorebase, thereby making use of existing BFS infrastructure, and avoiding the need for additional land-based development.

### 4.2.2 Regulation and Guidance for the Aquaculture Industry

The Rural Economy and Connectivity Committee (RECC) Salmon Farming in Scotland Report 2018[31], outlines a number of recommendations aimed at improving the environmental performance of the Scottish salmonid aquaculture industry. In particular, **Recommendation 54**, is most relevant from a location determination point of view:

***"The Committee recommends that work to examine the scope for siting salmon farms in suitable offshore and other locations where there are higher energy water flows should also be treated as a high priority by the industry. It acknowledges that there are significant technological challenges associated with locating farms in these areas, as well as risks in terms of workforce health and safety. However, it also notes the benefits this could bring in terms of addressing fish health issues, reducing the environmental impact of waste and providing scope for the industry to develop higher capacity sites".***

Within the report[31] several benefits of locating salmon farms in more offshore, higher energy environments are stated:

- Improving fish health and welfare;
- Reducing the environmental impact of waste; and
- Providing scope for the industry to develop higher capacity sites.

The approach of locating farms in higher energy locations is also supported by SEPA, through the Finfish Aquaculture Sector Plan[32]. Higher energy locations also align with the MD Locational Guidelines for the Authorisation of Marine Fish Farms in Scottish Waters[33], as many sheltered locations within sea lochs are categorised as less suitable for development. Conversely, the more exposed, higher energy locations, such as that of the Proposed Development, are uncategorised by these guidelines, suggesting that these locations have a higher capacity to absorb potential nutrient enhancement and benthic impacts.

### 4.2.3 Environmental Considerations

The minimisation of potential impacts on receptors including land, water, air, populations and infrastructure is a key objective of the Proposed Development and, therefore, a development location selection process was undertaken. This process focused on the identification of potential development locations that aligned with specific selection criteria, designed to balance the key parameters needed

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[31] Scottish Parliament (2018) Salmon Farming in Scotland [Online] Available at: https://sp-bpr-en-prod-cdnep.azureedge.net/published/REC/2018/11/27/Salmon-farming-in-Scotland/REC-S5-18-09.pdf

[32] Scottish Government: SEPA: Finfish Aquaculture Sector Plan 2018. [Online] Available at: https://sectors.sepa.org.uk/media/1155/finfish-aquaculture-sector-plan.pdf

[33] Scottish Government: Marine Directorate: Locational Guidelines for the Authorisation of Marine Fish Farms in Scottish Waters. [Online] Available at: https://www.gov.scot/publications/authorisation-of-marine-fish-farms-in-scottish-waters-locational-guidelines/

for fish farm development with the potential for environmental impacts. **Table 4.1** shows an outline of the selection criteria used.

A number of locations within the wider spatial search area were systematically examined against each of the search criterion, outlined within **Table 4.1**. The selected development location was identified as the preferred option for development due to a high level of overall compliance to the identified location selection criterion. A summary, outlining the reasons for selection of the finalised development location, is provided for each of the selection criterion in **Table 4.1**.

As a result of the findings of the location selection process, the development location, off the east coast of the Isle of Lewis, was selected as the final development location for the Proposed Development.

**Table 4.1: Summary of development location selection criteria.**

| Selection Criteria | Details | Rationale | North Gravir Summary |
|---|---|---|---|
| Wave Exposure Index (WEI) and Significant Wave Height ($H_s$) | Wave exposure and $H_s$ for potential development locations were assessed. The Scottish Association for Marine Science (SAMS) have developed a model that calculates the sum of the wave fetch in 32 directions for points on a 200 m grid.<br><br>A wave climate assessment (WCA) was also undertaken to better understand the likely $H_s$ at the development location. | As wave exposure increases, it becomes more difficult to service farms. The cost of initial expenditure also increases, due to the requirement to install sufficiently robust infrastructure (pens, moorings, grid, feed barge). If the wave exposure and $H_s$ are too extreme, the upper limits of the infrastructure may become a limiting factor for development.<br><br>However, potential development locations with lower wave exposure and $H_s$ may not be energetic enough to sufficiently dispersal waste from the Proposed Development.<br><br>Therefore, the selection process focused on locations with relatively high wave exposure and $H_s$, whilst being within known operational limits of farming infrastructure. | The development location off the east coast of the Isle of Lewis fell within the infrastructure threshold, whilst also being sufficiently energetic to ensure very high dispersion potential[34] and therefore the minimisation of potential benthic impacts. |
| Mean Current Velocity (m/s) | Consideration of the suitability of mean current velocity at the development location. | Increased current velocity is advantageous for waste dispersal and fish health. However, extreme velocities can affect fish health and | The proposed location has a mean current velocity that is sufficient to ensure a very high dispersion potential, whilst also being within the |

[34] Scottish Environment Protection Agency (SEPA): Modelling Screening and Risk Identification Report – North Gravir. [Online] Available at: https://www.sepa.org.uk/regulations/water/aquaculture/screening-modelling-and-risk-identification-report/

| Selection Criteria | Details | Rationale | North Gravir Summary |
|---|---|---|---|
| | | welfare and lead to excessive strain on infrastructure. | applied thresholds for fish health and welfare, and infrastructure integrity. |
| Locational Guidelines for Marine Fish Farms | Marine Directorate (MD) have undertaken predictive modelling to estimate nutrient enhancement and benthic impact in sea lochs or similar water bodies that support aquaculture. These predictive models have been used to assign each water body an index of nutrient enhancement and benthic impact.<br><br>There are three categories of classification:<br><br>Category 1: There will be a presumption against further fish farm development in Category 1 areas.<br><br>Category 2: A degree of precaution should be applied to consideration of further fish farm development in Category 2 areas.<br><br>Category 3: Fish farm development is likely to be acceptable in Category 3 areas, subject to other criteria being satisfied. | The spatial selection process sought to avoid Category 1 and 2 locations.<br><br>Category 3 and uncategorised locations were preferentially searched for.<br><br>The selection of a Category 3 or uncategorised development location would result in the Proposed Development fully according to Aquaculture Policy 3, within the National Marine Plan (NMP). | The proposed location is uncategorised and, therefore, the development of a fish farm at this location would be supported by the NMP, subject to other criteria being satisfied. |
| Inshore Sub-Sea Cables | No sub-sea inshore cables, either active and historic are known to be | The selection process sought to avoid locations with either active or historic sub-sea cables, to avoid and reduce | The proposed location is not located within close proximity to either active or historic sub-sea cables. The |

| Selection Criteria | Details | Rationale | North Gravir Summary |
|---|---|---|---|
| | present within the wider marine environment. | the potential for interaction with other marine users. | nearest active cable is located approximately 10 km to the south of the proposed location. |
| Landscape Designation - National Scenic Area (NSA) | Consideration of whether the Proposed Development would be located within or directly overlooked by an NSA.<br><br>Within the wider environment to the south of the Proposed Development there are two NSAs, South Lewis, Harris and North Uist, and South Uist Machair. | The selection process sought to avoid development within NSAs, or to locate development within lower sensitivity areas within NSAs, to avoid and reduce potential landscape and visual impacts on the special features of the NSAs. | The proposed location is approximately 13 km from the northeast boundary of the South Lewis, Harris and North Uist NSA. The development location is separated from the NSA by an open and expensive section of marine environment.<br><br>As a result, it is determined that the development location will not impact on the special features of either NSA. |
| Landscape Designation | Consideration of whether the Proposed Development would be located within an area designated as wildlands.<br><br>Within the wider environment of the of the Western Isles are South Uist Hills, Harris – Uig Hills and Eisgean wildland. | The selection process sought to avoid development within wildlands, or to locate development within lower sensitivity areas within wildlands, to avoid and reduce potential landscape and visual impacts on the wildlands. | The development location is not within or directly adjacent to a wildland area.<br><br>As a result, no potential impacts on the identified wildland are considered likely as a result of development at the selected location. expansive section of the marine environment. |
| Natural Heritage Designations | Consideration of whether the development location is close to, or within a site designated for the conservation of natural heritage features? (Special Protection Area (SPA), Special Area of Conservation | This is to ensure that adverse impacts on natural heritage features are avoided and reduced. | The proposed location is located within the Sound of Inner Hebrides and the Minches SAC and 4.5 km from the North East Lewis MPA. |

| Selection Criteria | Details | Rationale | North Gravir Summary |
|---|---|---|---|
| | (SAC), Site of Special Scientific Interest (SSSI) etc.)<br><br>If so, consideration of whether potential impacts could be sufficiently avoided and reduced to ensure no significant effects? | | There are records of the following PMFs within 3km of the fish farm: Tall Sea Pen, Basking shark, Grey seal, Harbour seal, Risso's dolphin and Sandeels. |
| Seal Haul Out Sites (HOS) | HOSs are designated under Section 117 of the Marine (Scotland) Act 2010. The Protection of Seals (Designated Sea Haul-out Sites) (Scotland) Order 2014 introduced additional protection for seals at 194 designated haul-out sites: locations on land where seals come ashore to rest, moult or breed. Harassing a seal (intentionally or recklessly) at a haul-out site is an offence. | The selection process sought to maximise the distance from designated HOSs and therefore avoid and reduce the potential for connectivity with HOSs. | The proposed location is approximately 14.46 km from the closest HOS (Eilean Glas Cheann Chrionaig). |
| Marine Cultural Heritage | Some of Scotland's shipwrecks are protected, whilst others are simply listed and may be an important artefact for divers. | The selection process sought to avoid locations where shipwrecks are known to be present. | No known features of importance within the proposed location. |
| Scheduled Ancient Monuments (SAM) | SAMs are monuments of national importance that Scottish Ministers have afforded special protection under the Ancient Monuments and Archaeological Areas Act 1979. | The site selection process sought to avoid locations in close proximity to SAMs. | The proposed location is not located immediately adjacent to a SAM.<br><br>Consultation with Historic Environment Scotland (HES), has scoped out potential impacts on this SAM (**Section 5**). |

| Selection Criteria | Details | Rationale | North Gravir Summary |
|---|---|---|---|
| Water Depth | Sufficient water depth is required, ideally a minimum depth of 35 m. | To ensure sufficient depth to operate pens with 15 m deep sidewall netting, 15 m deep nets enable the required production volume to be farmed whilst limiting the number of pens required. | The mean depth within the proposed location is 54.7 m, which is sufficient for the deployment of 15 m sidewall nets. |
| Residential Properties | Consideration of whether the development location has a direct line of sight to residential properties within close proximity (<= 750 m)? | The selection process sought to avoid and reduce the potential for impact on residential properties. | Seven residential properties are located within two km of the proposed location.<br><br>Residential properties have been identified at Calbost, with the closest property being 0.94 km from the location. There is no direct line of sight between these properties and the proposed location. |
| Distance from Suitable Land Base. | Consideration of whether the development location is within serviceable distance from an existing shorebase? | The selection process sought to locate the Proposed Development within suitable distance from an existing shorebase, to allow the Proposed Development to be serviced from the existing infrastructure, thereby avoiding the need for further land-based development.<br><br>The siting of the development location close to an existing shorebase will optimise operational efficiency as transit time will be kept to a minimum. | The proposed location is positioned to make use of the existing Gravir shorebase infrastructure on the Isle of Lewis, meaning that there is no need to develop an additional onshore facility. |

| Selection Criteria | Details | Rationale | North Gravir Summary |
|---|---|---|---|
| ACommercial Sea Fishing Activity | Consideration of whether the development location is associated with fishing ground with high levels of fishing effort and landings? | This aims to avoid the potential for conflict with other marine users. | The proposed location does not appear to represent unique, high importance fishing ground. |

## 4.3 Site Layout

Following the identification of the most appropriate farming production system, and the selection of the development location, the third stage in the site design process relates to the site layout selection, in terms of the infrastructure that will be installed at the Proposed Development. Different site layout options were modelled within NewDEPOMOD[35], see **Table 4.2**.

**Table 4.2: Summary of the site layout options modelled for the Proposed Development.**

| Option Number | Pen Number | Pen Circumference (m) | Grid Size (m) | Group Layout | Net Depth (m) |
|---|---|---|---|---|---|
| Option 1 | 5 | 160 | 120 | 1 group (1 x 5) | 15 |
| Option 2 | 6 | 160 | 120 | 1 group (2 x 3) | 15 |
| Option 3 | 4 | 200 | 120 | 1 group (2 x 2) | 15 |
| Option 4 | 4 | 200 | 120 | 1 group (1 x 4) | 15 |
| Option 5 | 5 | 200 | 120 | 1 group (1 x 5) | 15 |
| Option 6 | 8 | 120 | 80 | 1 group (2 x 4) | 15 |

The NewDEPOMOD model outputs identified the best location, size, number and spacing of pens to enable the most sustainable operation of the Proposed Development, considering the target biomass. Through this modelling iteration process, Option 5 in the table above was identified as the optimal site layout.

Specific consideration to the individual components of the Proposed Development are detailed below.

### 4.3.1 Pen Size

Due to the high levels of exposure predicted at the development location, larger, more robust pens have been selected. These larger pens are designed and specified to perform effectively with the increased environmental loading associated with the most exposed conditions. Specific design details include large floatation collars with thicker, more robust HPDE used in the construction, these HPDE pipes are also filled with a highly buoyant material.

From an operational perspective, the utilisation of larger pens means that fewer pens are required to hold the same total biomass for the Proposed Development. This, therefore, helps to improve operational efficiencies across husbandry operations, such as feeding, health interventions, and grading.

### 4.3.2 Net Depth and Pen Volume

Depths at the Proposed Development location will allow for 15 m deep pen nets to be used. This allows for reduced surface equipment to be used to produce the required production volume. Each pen net has a volume of 47,746.52 $m^3$, with a total production volume for the Proposed Development of 238,732.59 $m^3$.

This production volume allows the maximum biomass of 4,680 T to be held at a stocking density of 19.60 $kg/m^3$. In comparison, if 10 m nets were used, eight 200 m pens would be required to achieve an equivalent total production volume, which would increase the surface footprint of the Proposed Development significantly.

[35] www.sams.ac.uk. (n.d.). *DEPOMOD — Scottish Association for Marine Science, Oban UK*. [online] Available at: https://www.sams.ac.uk/science/projects/depomod/

### 4.3.3 Feed Barge

Several considerations were applied when selecting the feed barge for the Proposed Development. Due to the exposed nature of the development location, the feed barge must be designed to withstand the predicted exposure and significant wave height. The feed barge must also be able to be remotely operated from the existing shorebase so that during periods of inclement weather, operations can run as normal without adverse impact on fish health and welfare. The selected feed barge must also have an adequate feed storage capacity to ensure that daily feeding operations can be maintained for extended periods when resupply is not an option.

### 4.3.4 Conclusions

The scale of the selected 200 m pens allows the required biomass (4,680 T) to be accommodated in only five pens. The use of fewer pens is beneficial in terms of reduced visual impact, reduced overall farm footprint, and optimised efficiencies in farm servicing and health interventions. This is of critical importance at exposed offshore locations such as the Proposed Development. The selected 200 m pens are considered more resilient to the expected weather conditions at site. For these reasons, 200 m circumference pens were selected for the Proposed Development.

## 4.4 Embedded Mitigation Through Site Design

Through the systematic and iterative EIA process, the design of the Proposed Development has been informed to achieve a 'best fit' design in relation to the environment. When the EIA identifies significant effects, mitigation measures will be implemented to avoid, reduce, or offset these effects. The most effective mitigation measures are those which avoid significant effects. These 'embedded mitigation' measures are built into the design of the Proposed Development. Several embedded mitigation measures have been incorporated into the site selection and design process for the Proposed Development, these are:

- **Development Location:** The development location is in a well flushed and highly energetic marine environment. The high dispersion potential of the development location will allow waste to be dispersed to low levels over a wider area[34]. As a result, it is unlikely that waste material will be consolidated underneath the pens and the proposed site biomass is predicted to be compliant with environmental standards in this location;
- **SEPA NewDEPOMOD modelling:** The Proposed Development has been modelled using NewDEPOMOD and the outputs have been approved by SEPA. The model output for the Proposed Development predicts that a maximum biomass of 4,680 T will be compliant with the relevant environmental quality standards (EQS), outlined in SEPA's Regulatory Modelling Guidance[36]. This mitigates the potential effects of the Proposed Development on the marine environment;
- **Pen Size:** The 200 m pens selected for the Proposed Development are specifically designed to deal with the increased loading associated with exposed locations. The pens have been designed and built using thicker, more robust HDPE pipes, the inner section of the HDPE pipework is also filled with a high buoyancy material. These pens are better suited to dealing with significant exposure and, as a result, risk to containment is minimised;
- **Feed Barge:** The utilisation of a feed barge at the Proposed Development will allow for more controlled and efficient feeding operations. High-definition camera systems will be utilised to detect feed falling below the position of the salmon within the pens, allowing feed rate and amount to be adjusted accordingly and helping to reduce feed waste to insignificant levels. The selection of a larger capacity feed barge will reduce the dependency on regular feed deliveries.

[36] Scottish Government: SEPA - Regulatory Modelling Process and Reporting Guidance for the Aquaculture Sector. [Online] Available at: https://www.sepa.org.uk/media/450278/regulatory-modelling-process-and-reporting-guidance-for-the-aquaculture-sector.pdf

This will have the added benefit of reducing transportation related energy requirements and associated greenhouse gas (GHG) emissions;

- **Low Profile Farm Infrastructure:** All surface pen infrastructure selected for installation at the Proposed Development has a low profile. Pole mounted top nets will be used at the Proposed Development, which removes the need for the ‘hamster wheel’ structures traditionally used to support bird netting. This will reduce the potential visual impact from the surface. All infrastructure will be designed and coloured in dark muted tones to further reduce potential visual impact; and
- **High Rigidity Pen Netting:** The Proposed Development will utilise high rigidity netting (Sapphire Seal Pro netting or similar). This netting provides high bite and cut resistance, which helps to reduce potential interactions with predators e.g., local seal populations. This in turn reduces the risk of potential interactions with wild salmonid populations through reduced likelihood of containment breaches.

## 4.5 Conclusions

The assessment of alternatives for the Proposed Development was conducted hierarchically and in sequential order, starting with the assessment of the most appropriate farming production system, followed by the spatial selection of the development location, and finally the assessment and selection of the infrastructure design and layout. The environmental effects associated with alternative farming production systems and the key environmental considerations in terms of the development location have been discussed. Finally, consideration was given to the specific infrastructure design and layout, alongside a justification for the chosen design and layout. The Proposed Development constitutes the optimum technology, location, and layout for the selected development location.

# 5 Consultation and GAP Analysis

## 5.1 Consultation

Stakeholder consultation has been undertaken throughout the development and planning process. BFS has sought to obtain stakeholder support at key stages and to ensure stakeholders have an opportunity to comment.

Although consultation throughout the development phase has been continuous it can be split into four discrete phases:

- **Phase 1**: Pre-application consultation;
- **Phase 2**: Screening and Scoping consultation;
- **Phase 3**: Ongoing consultation; and
- **Phase 4**: Planning and EIA results and conclusions.

Consultation approaches have varied depending on the matters for discussion and stakeholder requirements. As such, several techniques have been adopted including, but not limited to:

- Meetings and conference calls;
- Community consultation events;
- Local updates in the form of advertisements in the local newsletter; and
- Correspondence.

Phase 2 included consultation with the Local Authority and statutory consultees and agreement on the specification and methodology of surveys and studies as well as consultation on certain technical aspects.

Through discussion with stakeholders, BFS's approach was introduced. Where relevant, the scope and methodology for surveys/studies and the approach to the EIA was agreed. The meetings also provided an opportunity to establish key concerns and issues that have been dealt with as part of the EIA process.

**Table 5.1** details the consultees that provided Scoping advice as a result of the Screening and Scoping Request submitted by BFS in June 2022, as with an outline of the topics on which the Scoping advice focused.

**Table 5.1: Stakeholder Scoping Summary**

| Stakeholder | Stakeholder Issues | Date(s) |
|---|---|---|
| CnES | Consideration of Alternatives and Site Selection, Cumulative Impacts, Benthic Habitats and Species, Water Environment, Wild Salmonids, Nature Conservation and Interactions, Priority Marine Features, Landscape, Seascape, and Visual Impact, Conflict with Other Marine Users, Economic Considerations, Operational Measures, Impacts upon Population and Human Health, Impacts upon Marine and Terrestrial Cultural Heritage, Structure of the Document, Mitigation and Monitoring, and Habitats Regulations Appraisal (HRA) and Information needed to support HRA. | 02 December 2022 |
| MD | Benthic Impacts, Water Column Impacts, Interactions with Wild Salmonids, and Aquaculture Animal Health. | 08 July 2022 (Scoping response) |

| Stakeholder | Stakeholder Issues | Date(s) |
| --- | --- | --- |
| NS | Benthic Impacts, Interactions with Predators, Interactions with Wild Salmonids, Impacts upon Species and Habitats of Conservation Importance, including Sensitive Sites, and Landscape and Visual Impacts. | 18 October 2022 (Scoping response); |
| SEPA | Benthic Impacts, Water Column Impacts. | 06 July 2022 (Scoping response) |
| RSPB | Impact on protected species | 06 July 2022 |
| Northern Lighthouse Board (NLB) | Navigation, Anchorage, Commercial Fisheries, other non-recreational maritime uses (MOD). | 06 July 2022 (Scoping response) |
| Royal Yachting Association (RYA) | Socio-Economic, Access and Recreation. | 30 June 2022 (Scoping response) |
| Historic Environment Scotland (HES) | Marine Cultural Heritage | 06 July 2022 (Scoping response) |
| Western Isles and District Salmon Fisheries Board (WIDSFB) | Interactions with Wild Salmonids | 06 July 2022 |
| Mallaig and Northwest Fishermen's Association (MNFA) | Commercial Fisheries | 27 June 2022 (Scoping response) |
| Scottish White Fish Producers Association (SWPA) | Commercial Fisheries | 06 July 2022 (meeting) |
| Outer Hebrides Regional Inshore Fisheries Group (OHRIFG) | Commercial Fisheries | 06 July 2022 (meeting) |

## 5.2 GAP Analysis

This section of the EIAR collates and summarises the scoping advice received and highlights the issues raised. The tables below cover the following areas:

- **Table 5.2: Non-Statutory Consultees;**
- **Table 5.3: Benthic Impacts – Consultee Scoping Summary;**
- **Table 5.4: Water Column Impacts – Consultee Scoping Summary;**
- **Table 5.5: Interaction with Predators – Consultee Scoping Summary;**
- **Table 5.6: Interactions with Wild Salmonids – Consultee Scoping Summary;**
- **Table 5.7: Impacts upon Species or Habitats of Conservation Importance, including Sensitive Sites – Consultee Scoping Summary;**

- **Table 5.8: Navigation, Anchorage, Commercial Fisheries, other non-recreational maritime uses (MOD) – Consultee Scoping;**
- **Table 5.9: Landscape and Visual Impacts – Consultee Scoping Summary;**
- **Table 5.10: Noise – Consultee Scoping Summary;**
- **Table 5.11: Marine Cultural Heritage – Consultee Scoping Summary;**
- **Table 5.12: Waste Management (non-fish) – Consultee Scoping Summary;**
- **Table 5.13: Socio-economic, Access, and Recreation – Consultee Scoping Summary; and**
- **Table 5.14: Any Other Issues – Consultee Scoping Summary.**

The GAP analysis illustrates where the stakeholder comments have been dealt with and closed out or where the issues will be dealt with via existing legislation or codes of good practice.

**Table 5.2: Non-Statutory Consultees**

| Stakeholder | Stage | Response Date | Area of Interest/ Summary of Main Comments/Issues | Summary of Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|---|
| Ministry of Defence (MOD) | Pre-application | No response | Navigation | No response to pre-application consultation attempts. As such, it is taken that the organisation has no points of concern or objection to raise. | N/A | None |
| NLB | Pre-application | 06 July 2022 | Navigation – no objection | None required | N/A | None |
| RYA | Pre-application | 22 June 2022 | Recreational navigation – no objection | None required | N/A | None |
| MNWFA | Pre-application | 27 June 2022 | Commercial fisheries – concern about the potential loss of productive fishing areas for small vessels | A meeting was held to discuss the potential impacts.<br><br>Alternative site locations were offered for consideration, none were deemed acceptable.<br><br>Potential impacts are assessed in **Section 12**. | **Section 12.** | None |
| SWFPA | Pre-application | 27 June 2022 | Commercial fisheries – concern about the potential loss of | A meeting was held to discuss the potential impacts. | **Section 12.** | None |

| Stakeholder | Stage | Response Date | Area of Interest/ Summary of Main Comments/Issues | Summary of Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|---|
| | | | sheltered fishing areas for small vessels | Alternative site locations were offered for consideration, none were deemed acceptable.<br><br>Potential impacts are assessed in **Section 12**. | | |
| OHRIFG | Pre-application | 13 July 2022 | Commercial fisheries – concern about the potential loss of sheltered fishing areas for small vessels to haul gear safely, as well as the loss of fishing ground for prawn, scallops and brown crab.<br><br>Impact of chemical treatments on survival of shellfish | Alternative site locations were offered for consideration, none were deemed acceptable.<br><br>Potential impacts are assessed in **Section 12.**. | **Section 12** | None |

**Table 5.3: Benthic Impacts – Consultee Scoping Summary**

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| MD | Scoping Opinion | The MD note that as the Proposed Development is a new site, benthic impacts should be assessed.<br><br>The MD also note that the modelling report submitted through the screening and scoping request indicates that the pen arrangement and maximum biomass may be acceptable.<br><br>Confirmation of the proposed equipment and biomass should be submitted with the final application and EIAR, along with appropriate modelling demonstrating the acceptability of the proposal. | SEPA have assessed and approved all NewDEPOMOD modelling.<br><br>As requested, the modelling report have been re-submitted as supporting information for the EIAR and planning application.<br><br>Detailed three dimensional marine modelling has also been undertaken and has been provided as supporting information for the EIAR. | **Section 7; Section 11; Appendix K (NewDEPOMOD Modelling Report); and Appendix L (Marine Modelling Report).** | None |
| NS | Scoping Opinion | NS state that there are a number of Priority Marine Features (PMF) habitats present around the Isle of Lewis. However, there is currently no benthic survey data within the proposed mooring area. Therefore, NS require a benthic visual survey to be conducted, to establish whether there are likely to be significant effects on any benthic habitats or species of conservation importance. | A Drop-Down Camera (DDC) survey has been designed and undertaken following recognised guidance (SEPA Baseline survey & seabed and water quality monitoring plan design[37]).<br><br>NewDEPOMOD modelling has been undertaken for solids (feed, faeces and in-feed | **Section 7; Section 11; Appendix A (Figures); Appendix I (Benthic Survey Report); Appendix J (Hydrographic Report); Appendix K** | None |

[37] Scottish Government: Scottish Environment Protection Agency (SEPA) Baseline Survey and Seabed and Water Quality Monitoring Plan Design. [Online] Available at: https://www.sepa.org.uk/media/433428/baseline-survey-and-monitoring-plan-design.pdf

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | The visual survey should be in accordance with SEPA's interim guidance on baseline survey & seabed and water quality monitoring plan design.<br><br>NS also note that the modelling of the depositional and chemical footprints should be provided for the Proposal site.<br><br>In addition, NS state that if any PMF habitats or species are identified by the visual survey their locations should be overlaid on to the depositional footprint diagram to help enable an assessment of the likelihood / severity of impacts.<br><br>NS request that the final EIAR includes an accompanying survey report and an assessment of the significance of any impacts upon PMF habitats and species / protected features that the visual survey identifies.<br><br>In addition, NS request that they are sent a copy of the footage when the final application is due for submission. | treatment) release from the Proposed Development.<br><br>Detailed marine modelling for solids and bath treatments has been undertaken and provided as supporting information for the EIAR.<br><br>All previously identified PMFs and PMFs identified through the visual survey have been plotted against the depositional footprint of the Proposed Development and provided as supporting information for the EIAR.<br><br>The Benthic Survey Report has been provided as supporting information for the EIAR. | **(NewDEPOMOD Modelling Report); and Appendix L (Marine Modelling Report).** | |
| CnES (LPA) | Scoping Opinion | The applicant is requested to submit the full final modelling (benthic, pollution, | The Modelling and HG Reports have been provided as | **Section 7; Section 11; Appendix J** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | chemical & HG) reports in support of any planning application. | supporting information for the EIAR. | **(Hydrographic Report); Appendix K (NewDEPOMOD Modelling Report); and Appendix L (Marine Modelling Report).** | |
| SEPA | Scoping Opinion | SEPA request that seabed surveys (visual and benthic) are undertaken. To assess the suitability of the location.<br><br>SEPA request that marine modelling is undertaken, including modelling of potential cumulative effects with neighbouring fish farms.<br><br>SEPA request NewDEPOMOD modelling be undertaken, to determine biomass and quantities of in-feed sea lice medicine.<br><br>BathAuto modelling to determine the quantities of bath sea lice medicines<br><br>An ECE calculation to determine potential for nutrient enrichment. | Both DDC and grab sample surveys have been conducted following SEPA guidance and are provided in support of this application.<br><br>Benthic habitats are assessed in **Section 7** and **Section 11**, where an assessment on the presence/absence of PMFs within the depositional footprint is made.<br><br>Three dimensional marine modelling has been conducted for the Proposed Development, assessing the discharge of organic solids and bath treatments. Cumulative impacts have also been modelled. | **Section 7; Section 11; Appendix I (Benthic Survey Report); Appendix M (Nutrient Calculations Report); Appendix K (NewDEPOMOD Modelling Report); and Appendix L (Marine Modelling Report).** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | | An Equilibrium Concentration Enhancement (ECE) calculation has been conducted and provided in support of the application. | | |

**Table 5.4: Water Column Impacts – Consultee Scoping Summary**

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| MD | Scoping Opinion | The MD note that the Proposed Development is located out-with any Locational Guidelines categorised areas.<br><br>The MD note that BFS has submitted a nutrient assessment based on the proposed biomass of 4,680 tonnes, which shows that the resulting impacts should not be unacceptable.<br><br>The MD also note the cumulative assessment has taken into account the biomass from 2 additional sites in the vicinity of the proposed site and indicate that the resulting impact should not be unacceptable. | An Equilibrium Concentration Enhancement (ECE) calculation has been undertaken and full details of calculations are provided with the application.<br><br>The ECE calculation indicates that the degree of enhancement likely to result from the Proposed Development would be insignificant, with limited potential for nutrient enhancement. A full assessment in provided within **Section 8.**<br><br>No cumulative assessment has been conducted due to the large separation distances between the | **Section 8; and Appendix M (Nutrient Calculations Report).** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
| --- | --- | --- | --- | --- | --- |
| | | The nutrient assessment should be submitted with the final planning application/EIAR. | existing fish farms in the waters to the northeast of the Isle of Lewis and the Proposed Development.<br><br>The full ECE calculation and report have been submitted in support of the application. | | |
| SEPA | Scoping Opinion | SEPA also request that modelling to determine the quantities of bath sea lice medicines is undertaken.<br><br>SEPA note that the Equilibrium Concentration Enhancement (ECE) calculation was submitted as part of the screening and scoping request. However, they state that this will be reviewed as part of the final application/EIAR. | An ECE calculation has been undertaken for the Proposed Development. The results indicate that dissolved inorganic nitrogen (DIN) enhancement as a result of the Proposed Development will be insignificant. A full assessment is provided within **Section 8.**<br><br>The ECE calculations and report have been provided in support of the application. | **Section 8; Appendix L (Marine Modelling Report); and Appendix M (Nutrient Calculations Report).** | None |

**Table 5.5: Interaction with Predators – Consultee Scoping Summary**

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
| --- | --- | --- | --- | --- | --- |
| NS | Scoping Opinion | NS state that should Acoustic Deterrent Devices (ADDs) be required at the Proposed Development, an EPS licence will be needed. | BFS has committed to not using ADDs as standard practice at the Proposed Development. In circumstances of exceptional welfare concern for stocked fish, BFS will consult with NS, the LPA, | **Section 9; and Appendix E (EMP (Predator Control Plan)).** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | MD-LOT, as the licencing authority, will be required to carry out a Habitats Regulations Appraisal.<br><br>Include information on top net systems to ensure risk of Gannet entanglement is reduced, as this is considered a LSE of all marine fish farms in Scotland | and the MD-LOT to discuss how best to proceed and to obtain relevant approvals for any ADD use. It is likely that an EPS licence will be required, and this can be applied for via the MD-LOT who will consult with NS on any applications.<br><br>The implementation of a number of passive anti-predator measures, including best practice husbandry, and the deployment of rigid primary netting will help minimise predator interactions onsite without the need for active predator deterrence.<br><br>The detailed site-specific Predator Control Plan (PCP) includes an assessment of potential predatory species and control measures available.<br><br>Potential interactions with identified predatory IEF have been assessed within **Section 9**. These assessments indicate that no significant effects are likely as a result of the Proposed Development. | | |
| CnES (LPA) | Scoping Opinion | CnES note that BFS has submitted a site-specific Predator Control Plan and Escapes Contingency Plan, together with the draft EMP, detailing the sequential steps and triggers for | The decision has been made that ADDs will not be deployed at the Proposed Development. The PCP outlines all the control measures available; these | **Section 9; and Appendix E** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | specific control measures. CnES require that the final PCP is submitted with the planning application.<br><br>CnES state that as part of the planning application, BFS should provide specific details on the proposed use of ADDs as specified by NS in the ADD Deployment Plan.<br><br>CnES request that if ADDs are proposed for use, information on the type and proposed use of the device and likely interaction with seals/cetaceans should be provided in the ADD Deployment Plan.<br><br>CnES state that an EPS licence must be obtained for the use of ADDs.<br><br>CnES advises BFS to mitigate ADD interactions further by undertaking a full review of current ADD use at the Gravir Outer and Gravir West fish farms, to establish whether ADD use could constitute an offence under Regulation 39 of the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).<br><br>CnES state that the use of ADDs should be conditioned to allow their use only with prior | measures are passive and therefore have reduced potential for interaction with predatory species.<br><br>If ADDs are not being deployed, it is not necessary to apply for an EPS licence.<br><br>CnES state that a review of ADD usage at the two existing sites should be made. However, the existing sites do not have ADDs installed, therefore, there is no potential for disturbance to EPS under Regulation 39 of the Conservation (Natural Habitats, &c.) 1994 Regulations.<br><br>An assessment of the potential impacts on predatory IEFs as a result of the Proposed Development was undertaken in **Section 9**. This assessment indicates that no significant effects are likely. | **(EMP (Predator Control Plan)).** | |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | written approval from the MD in consultation with NS and the LPA.<br><br>Finally, CnES state that subject to advice from NS, it is envisaged that the Proposed Development is unlikely to significantly interact with predators. | | | |

**Table 5.6: Interactions with Wild Salmonids – Consultee Scoping Summary**

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| MD | Scoping Opinion | The MD provided data and links to research, which they recommend is reviewed.<br><br>The MD note that there are four other farms within 15 km of the Proposed Development, therefore cumulative impacts should be considered.<br><br>The MD state that the Proposed Development has the potential to increase the risks to wild salmonids.<br><br>MD note that the Proposed Development is adjacent to the Eishken Estate which has a grading of 3 meaning it has a <60% chance of meeting its conservation limit | An assessment of the potential impacts of the Proposed Development on wild salmonids has been undertaken within **Section 10**. No significant effects have been predicted. The embedded mitigation outlined within **Sub-Section 10.3**, is anticipated to sufficiently reduce the overall magnitude of any impact.<br><br>A Sea Lice Intervention Efficacy Statement has been provided as supporting information for this application. | **Section 10; and Appendix F (Sea Lice Management)** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | The MD also state that sea trout are present in the inshore waters throughout the year. Therefore, strict sea lice control should be practiced throughout the year.<br><br>It is also mentioned that adherence to the criteria for treatment within the CoGP may not prevent the release of substantial numbers of sea lice from aquaculture installations.<br><br>The MD state that the EMP should include; a monitoring scheme able to report on the level of sea lice released into the environment, identification of the likely areas of sea lice dispersal, details on how and what monitoring data will be collected, and details on how monitoring information will feedback into management practices.<br><br>The MD request that details of amounts of treatment chemicals, and the maximum biomass that can be treated, along with the time taken to treat with bath chemicals, be provided within a Sea Lice Efficacy Statement, submitted in support of the final application/EIAR. | | | |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| NS | Scoping Opinion | NS welcome the multiple non-chemical steps being taken to control lice with the Sea lice Management Plan at the Proposed Development and the measures being taken within the Escape and Containment Plan.<br><br>NS do not require any further information to what has been provided. | An assessment of the potential impacts of the Proposed Development on wild salmonids has been undertaken within **Section 10**. No significant effects have been predicted. The embedded mitigation outlined within **Sub-Section 10.3**, is anticipated to sufficiently reduce the overall magnitude of any impact. | **Section 10**. | None |
| CnES | Scoping Opinion | Demonstration that stock containment is effective is also required.<br><br>CnES state more information will be required in order to fully assess the impacts on wild salmonids, which includes; an FMS, Sea Lice Efficacy Statement, operational details on sea lice management measures (cleanerfish, mechanical, freshwater treatments), and evidence of effectiveness of sea lice management measures (cleanerfish, mechanical, freshwater). | **Section 10** summarises the sea lice management over the last production cycles for both the Gravir Outer and Gravir West fish farms.<br><br>A draft Farm Management Statement has been provided as supporting information.<br><br>**Sub-Section 3.3.2** outlines fish health and welfare principles and procedures, including intervention options available to the Proposed Development.<br><br>The assessment of potential impacts of wild salmonids populations covers the following three impacts:<br>• Potential sea lice transfer from farmed to wild salmonids; | **Section 10**. | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | | • Potential disease transfer from farmed to wild salmonids; and<br>• Potential genetic introgression and competition between farmed and wild salmonids.<br><br>The conclusions of the assessments indicate that no significant effects are likely as a result of the Proposed Development. | | |

**Table 5.7: Impacts upon Species or Habitats of Conservation Importance, including Sensitive Sites – Consultee Scoping Summary**

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| NS | Scoping Opinion | NS have provided the following information regarding the Proposed Development's potential to interact with species and habitats of conservation importance:<br><br>• **Inner Hebrides and the Minches SAC and EPS cetaceans:** NS state that the Proposed Development is within the Inner Hebrides and the Minches SAC, the waters of The Minch are also frequently used by other EPS cetaceans including minke whale, bottlenose dolphin, risso's | **Inner Hebrides and the Minches SAC:** An assessment of the potential impacts of the Proposed Development on the harbour porpoise qualifying feature of the SAC has been undertaken in relation to the EIA Regulations. The conclusions of this assessment indicate that no significant effects on the qualifying feature are likely as a result of either the construction, operation or decommissioning of the Proposed Development.<br><br>Since the submission of the Screening and Scoping Request (22/00290/FFSCSC) to CnES, BFS have committed to not utilising | **Section 11** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | dolphin, and common dolphin, therefore, consideration of the interaction with these marine mammal species is required. The deployment of ADDs has potential for LSE. Therefore, consideration will be required in the EIAR.<br><br>• CnES is required to consider the effect of the proposal on the SAC before it can be consented.<br><br>• NS state that due to the large foraging ranges of gannets, it is likely the Proposed Development would result in LSE due to potential for entanglement in top nets, especially in sites where 200 m mesh is being used. NS further state that entanglement is likely reduced with the use of 100m but cannot be ruled out. In areas where regular foraging occurs by gannets and other marine birds an appropriate assessment is required. | ADDs as a standard predator control measure at the Proposed Development. Instead, proactive, passive control measures will be used, such as best practice husbandry procedures and the deployment of high rigidity pen nets.<br><br>Appendix O of the EIAR assesses the potential impact of the Proposed Development on the SAC under the Habitat Regulations. The conclusions indicate that there would be no adverse effect on site integrity (AEOSI) as a result of the construction, operation or decommissioning of the Proposed Development. | | |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| CES | Scoping Opinion | CnES state that the Proposed Development lies within the Inner Hebrides and the Minches SAC, which is designated for harbour porpoise.<br><br>CnES state that the use of ADDs has the potential to disturb all cetacean species, and therefore an EPS licence must be applied for.<br><br>CnES also note that at a greater distance from the Proposed Development lie the boundaries of the St Kilda SPA, the North Rona and Sula Sgeir SPA, and the Sule Skerry and Sule Stack SPA. Each of which is designated for breeding seabirds, including the northern gannet. CnES also note that due to the foraging range of the northern gannet, there is potential for connectivity with the Proposed Development.<br><br>As such, CnES require details on the mitigation measures for LSE to northern gannet in line with NS guidance. | BFS does not intend to use ADDs at the Proposed Development, which is detailed within the PCP (**Appendix E**).<br><br>Both harbour and grey seals have been identified as IEFs in the baseline assessment. An assessment of the potential impacts on both seal species has been undertaken within the EIAR. The conclusions indicate that no significant effect is likely as a result of the Proposed Development.<br><br>Benthic DDC and grab sample surveys were conducted for the Proposed Development. The DDC survey identified the benthic habitats within the footprint of the Proposed Development (**Sub-Section 7.4**). Protected habitats identified within this survey are further detailed within **Sub-Section 11.4.3**.<br><br>An assessment of the Proposed Development's potential impacts on protected habitat features is provided within **Section 11**. Conclusions indicate that no significant effects are likely. | **Section 7; Section 9; Section 11; Appendix E (EMP); and Appendix O (Report to Inform Appropriate Assessment (RIAA)).** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | CnES state that harbour seals are protected under the Marine (Scotland) Act 2010. Harbour seals are known to use haul-out sites in the vicinity of the Proposed Development, this raises concern under the Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014. Consideration will therefore be required in the EIAR and final application.<br><br>CnES HOSs could interact with the Proposed Development.<br><br>As such, CnES require details on the mitigation measures for disturbance or interaction with harbour seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*) from HOSs within foraging range.<br><br>CnES note there are records of the following Priority Marine Features (PMFs) within 3km of the fish farm:<br>• Tall Sea Pen<br>• Basking shark<br>• Grey seal<br>• Harbour seal | | | |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | • Risso's dolphin and<br>• Sandeels.<br>Survey work should be carried out as per SEPA guidance | | | |
| SEPA | Scoping Opinion | SEPA state that the proposed farm would lie within The Inner Hebrides and the Minches SAC, the protected features of which are Harbour porpoise, as well as 4.5 km from the North East Lewis MPA where the protected features of which are Marine Geomorphology of the Scottish Shelf Seabed, Quaternary of Scotland, Risso's dolphin & Sandeels. There are records of the following PMFs within 3km of the fish farm: Tall Sea Pen, Basking shark, Grey seal, Harbour seal, Risso's dolphin and Sandeels.<br><br>Mobile features not considered to be at significant risk from discharges from fish farm. | An assessment of the Proposed Development's potential impacts on protected habitat features is provided within **Section 11**. Conclusions indicate that no significant effects are likely. | **Section 7; Section 9; Section 11; and Appendix O (Report to Inform Appropriate Assessment (RIAA)).** | None |

**Table 5.8: Navigation, Anchorage, Commercial Fisheries, other non-recreational maritime uses (MOD) – Consultee Scoping**

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| CnES | Scoping Opinion | CnES indicate that the surrounding marine area to the Proposed Development is utilised to varying degrees for commercial fishing. They therefore state that BFS should consult with RYA, NLB and Western Isles Fishermen's Association (WIFA) and the OHRIFG<br><br>CnES state that BFS should seek to locate and design the Proposed Development in a way that minimises impacts on local inshore commercial fishing.<br><br>CnES state that due to the exposed location, BFS should demonstrate appropriate adaptive measures in the event that pens break free from moorings.<br><br>CnES require that equipment attestations and specifications are submitted with the final planning application.<br><br>Maps detailing pen group, and details of underwater and navigational lighting should also be submitted with the final application. | Consultation with both the OHRIFG, WIFA and MNFWA have been undertaken by BFS.<br><br>In line with the '*Scotland's Fishing Industry – Guidance for Decision Makers and Developers'* document, BFS undertook to engage in meaningful consultation and information sharing to allow for a thorough and objective assessment of potential impacts. However, BFS has received limited response from WIFA and no information directly relevant to the Proposed Development.<br><br>BFS has received limited communication from the OHRIFG. However, the east coast of the Isle of Lewis was identified as being commercially fished for scallop, nephrops and crab and lobster.<br><br>A Commercial Fisheries Impact Assessment (CFIA) has been undertaken within **Section 12**. As it was not possible to gain detailed information from WIFA or OHRIFG, BFS has used | **Section 3; Section 12; Appendix A (Figures); and Appendix B (Equipment).** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | | publicly available records to inform this impact assessment. The conclusions indicate that no significant effects are likely as a result of the Proposed Development.<br><br>Equipment specifications and attestations are provided within **Appendix B**.<br><br>**Section 3** outlines the details of the proposed infrastructure, including; underwater lighting, navigational lighting, pens, pen netting, top netting, and the feed barge. Charts of the Proposed Development are provided in **Appendix A**. | | |
| NLB | Scoping Opinion | NLB were formally consulted through the Screening and Scoping Request. They noted that they had no objection and would respond with lighting and markings requirements once the final planning application has been submitted. | Navigational lighting for the Proposed Development will comply with the requirements of the NLB and will be detailed on the Marine Licence. | **Section 3.** | None |
| RYA | Scoping Opinion | RYA has no comment to make on the development. | No response required; recreational boating scoped out of EIA. | **N/A** | None |

**Table 5.9: Landscape and Visual Impacts – Consultee Scoping Summary**

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| NS | Scoping Opinion | NS advise that this proposal is likely to have significant effects on the surrounding landscape. We recommend that a full landscape and visual impact assessment (LVIA) is carried out with representative viewpoints | A LVIA has been carried out, see **Appendix N** | N/A | N/one |
| CnES | Scoping Opinion | CnES state that the Proposed Development likely to have a significant effect on landscape, seascape, and visual resource of the local area.<br><br>CnES request that a full LVIA (Landscape and Visual Impact Assessment) is carried out, including the preparation of a Zone of Theoretical Visibility (ZTV) to inform the selection of viewpoints.<br><br>Impacts on the Wild Land area to the west should be carefully considered as part of the LVIA. | A full SLVIA for the Proposed Development has been undertaken and is provided as supporting information to this application.<br><br>**Section 13** assessed the seascape, landscape and visual impact of the Proposed Development in relation to the baseline seascape, landscape and visual receptors. There would be no significant landscape effects arising as a result of the Proposed Development and no significant seascape effects given the medium - large scale of the receiving seascape in this location. | **Section 13; Appendix A (Figures); and Appendix N (SLVIA).** | |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | | Significant visual effects would be limited to the visual effect on views for sea / water based recreational receptors 0.5 km of the Proposed Development, due to the distance of the nearest visual receptors in this remote landscape and seascape.<br><br>Charts and plans of the Proposed Development are provided in **Appendix A**. | | |

**Table 5.10: Noise – Consultee Scoping Summary**

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| N/A | N/A | N/A | No direction over the potential impacts associated with noise was provided through the Scoping Opinion or Scoping Advice from consultees. As such, the impacts associated with noise generation and propagation have been scoped out of further assessment within this EIA. | **Section 14 (Noise)** | N/A |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | | However, to allow CnES to make a determination in relation to Development Policy 4 of the Outer Hebrides LDP a qualitative assessment, following the same assessment methodology as outlined in Sub-Section 2.4.1 was undertaken in **Section 14.** The assessment determined noise related impacts would be of negligible magnitude and therefore not significant. | | |

**Table 5.11: Marine Cultural Heritage – Consultee Scoping Summary**

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| HES | Scoping Opinion | HES state within their Scoping Advice that there are no heritage assets within their remit, within the development area or its vicinity.<br><br>HES are therefore content for impacts on cultural heritage assets within their remit to be scoped out of further assessment within the EIA. | Potential impacts of identified cultural heritage receptors have been scoped out of further assessment. | N/A | None |
| CnES | Scoping Opinion | CnES note that they agree with the conclusions of the Screening and Scoping Report. Therefore, impacts | BFS note that CnES agree with the findings of the Screening and Scoping Report, which scopes out | **Section 5** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | on marine and terrestrial cultural heritage can be scoped out of further assessment. | impacts on marine and terrestrial cultural heritage from further assessment within the EIA. | | |

**Table 5.12: Waste Management (non-fish) – Consultee Scoping Summary**

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| CnES | Scoping Opinion | CnES note that Site-specific waste management is covered with the internal and external EMS audits, for operational sites and it is agreed therefore this element will be scoped out of the final assessment<br><br>CnES recommend that a Waste Management Strategy Plan (WMSP) is submitted in support of the final application.<br><br>The WMSP should include; detail of how any waste arising from the operation of the Proposed Development will be dealt with, what procedures will be implemented to ensure collection/retrieval/disposal of any infrastructure which becomes separated. | A waste management plan specific for the Proposed Development has been provided as supporting information to the application.<br><br>Details of the grid and mooring system are provided within **Sub-Section 3.6**. | **Section 3; and Appendix P (Waste Management Plan).** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | Fish Waste disposal sites should be listed in hierarchical order of use and include those that are options for use in the event of mortalities from a major disease outbreak. | | | |

**Table 5.13: Socio-economic, Access, and Recreation – Consultee Scoping Summary**

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| CnES | Scoping Opinion | CnES note that the socio-economic assessment should identify both the direct and indirect benefits associated with procurement, construction and operation of the Proposed Development including consequences for the viability of the business and the maintenance of employment and the creation of new job opportunities. | A socio-economic impact assessment has been carried out for the Proposed Development, detailed in **Section 14**. The conclusions of the assessment indicate that the Proposed Development would result in moderate positive significant effects. | **Section 14.** | None |

**Table 5.14: Any Other Issues – Consultee Scoping Summary**

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| CnES | Scoping Opinion | **Other operations:** CnES state that details of stocking, fallowing, working procedures and practices and contingencies should | **Sub-Section 3.3** of the EIAR outlines the relevant husbandry practices and procedures that will | **Section 3;**<br><br>**Appendix B (Equipment);** and | CnES |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | be documented, to demonstrate how effects upon the receiving environment will be minimised.<br><br>An escapes prevention and contingency plan and predator control plan should be submitted along with details of containment measures tailored to site-specific conditions, including appropriate manufacturer and moorings attestations. | be implemented at the Proposed Development.<br><br>An Escapes Contingency Plan (ECP) is provided in **Appendix E**. This document provides detail on the equipment to be deployed, staff training and competency, the inspection and maintenance schedule, the predator risk assessment, and actions to be taken in the event of an escape.<br><br>A Predator Control Plan (PCP) is also provided within **Appendix E**. This document provides detail on the locally abundant wildlife and the potential primary predatory species within the marine environment along with detail of the predator control measures proposed for implementation at the Proposed Development.<br><br>Infrastructure to be installed at the Proposed Development has been designed to withstand the environmental conditions likely to be experienced at the location. | **Appendix E (ECP)**. | |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | | Equipment attestations and specifications are provided within **Appendix B**. | | |
| CnES | Scoping Opinion | **Impacts on population and human health:**<br>CnES state that they agree with the conclusions of the Scoping Report, in that the Proposed Development will have no significant negative impacts on human health and therefore the topic can be scoped out of further assessment. | Impacts on population and human health scoped out of further assessment within this EIAR. | **Section 5**. | N/A |
| CnES | Scoping Opinion | **Structure of the document:**<br>CnES state that the EIAR is to focus on elements likely to have 'significant' consequences for the receiving environment. It should make passing reference to other issues of lesser importance to indicate that they have been considered. Short-term and long-term consequences should be identified with an indication of expected degree of magnitude and any mitigation measures advanced along with the degree of confidence as to the efficacy of such measures. In accordance with the requirements of the Regulations, the EIA should | The EIA has followed guidance as outlined within **Section 2** and the EIAR includes the required details as listed in **Sub-Section 2.5**. As indicated the EIA has focused on those elements where the potential for significant effects was identified. The scoping process was utilised to scope out elements that were considered unlikely to result in significant effects.<br><br>**Sub-Section 2.4**, details the EIA assessment methodology used to determine whether identified impacts are likely to result in significant effects. | **Section 2;** and<br><br>**NTS**. | No |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | be accompanied by a NTS of the issues addressed in the main document. | A NTS of the EIAR have been written and is provided with this planning application. | | |
| CnES | Scoping Opinion | **Mitigation and Monitoring:**<br>CnES state that the EIA should conclude with a schedule of mitigation measures arising from the analysis of the various topics reviewed. This should also indicate the means by which the delivery of that mitigation is to be assured, including any management or monitoring required to ensure that will be the case. | Within each technical assessment Section of the EIAR embedded mitigation measures are identified that are anticipated to avoid or reduce potential impacts.<br><br>Additionally, the EIAR is concluded with a summary of all mitigation measures identified to sufficiently avoid and reduce the magnitude of identified impacts to levels that are determined to result in non-significant effects. | | No |
| MD | Scoping Opinion | **Authorisation:**<br>The MD note that BFS already possess authorisation to farm at existing fish farms. However, an amendment to this authorisation must be sought to include any newly approved fish farm prior to commencement of farming operations. | If the Proposed Development is granted planning permission, BFS will obtain relevant authorisation from FHI. | N/A | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | The MD state that the FHI must be contacted should permission for the Proposed Development be granted. | | | |
| MD | Scoping Opinion | **Disease Management Areas (DMAs):**<br>The MD note that the Proposed Development is located within DMA 5a, and as such will impact and be impacted by the existing fish farms within the East Lewis disease management area.<br><br>The MD recommend that a management agreement with all other operators of the DMA be put in place.<br><br>The MD recommend that all fish farms within the same DMA should be stocked with a single year class and follow synchronous fallowing patterns. | DMA 5a currently has two existing marine salmon fish farms, both of which are owned and operated by BFS.<br><br>The Proposed Development, if consented, will form part of this DMA. BFS will operate the Proposed Development following best practice procedures that are already in place at the two existing fish farms.<br><br>The Proposed Development and the two existing fish farms will be covered under a collective FMS. This document covers:<br>• General health and stocking approach;<br>• Sea lice management strategy;<br>• Movement of fish and harvesting;<br>• Escapes; and<br>• Predator exclusion and control. | **Appendix H (Farm Management Statement).** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| MD | Scoping Opinion | **Stocking Density:**<br>The MD note that at a maximum biomass of 4,680 T, the stocking density will be below 22kg/$m^3$.<br><br>However, the MD require confirmation of the maximum biomass and stocking density within the EIAR and final planning application. | **Sub-Section 3.1** outlines the development proposal, including confirmation of the maximum stocking density (4,680 T) and stocking density (19.60 kg/$m^3$). | **Section 3**. | None |
| MD | Scoping Opinion | **Husbandry:**<br>The MD require detail on the method and frequency of removing mortalities onsite and their disposal method, this should be submitted with the EIAR and final planning application.<br><br>The MD note that difficulties may be encountered conducting husbandry operations in such large pens (200 m). Operational details should be provided. | **Sub-Section 3.3.3** details the best practice mortality removal procedures that will be implemented at the Proposed Development.<br><br>**An** FMP has been provided as supporting information, detailing the procedures which ensure efficient mortality removal during a mass mortality event. | **Section 3**; **and Appendix G (FMP).** | |
| MD | Scoping Opinion | **Sea Lice:**<br>The MD state that further detail is needed on the stocking strategy for the Proposed Development and the Farm Management Area (FMA), confirming if all sites in the FMA will | The Proposed Development will operate under an FMS, which includes the two existing marine salmon fish farms within DMA 5a. This document covers the general stocking approach that will be | **Section 3**; **Appendix F (Sea Lice Management); and Appendix H (Farm Management** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | operate with a single year class and follow synchronous stocking and fallowing.<br><br>The MD also require confirmation as to whether cleanerfish will be stocked at the Proposed Development. If so, further detail is requested by the MD on the proposed species, source and stocking strategy for their effective use as a biological sea lice control measure.<br><br>The MD note that freshwater treatments are a key component of BFS's sea lice treatment strategy. As such, they require detail on the freshwater sources, procedure for application, and detail on how cleanerfish welfare will be maintained during freshwater treatments.<br><br>The MD require further detail on the availability and time taken to treat with hydrolicers and thermolicers. | taken across all the fish farms covered by the FMS.<br><br>**Sub-Section 3.3.2** details the available lice intervention options. This includes the stocking of cleanerfish as a biological control measure.<br><br>Specific details of the cleanerfish strategy that will be implemented at the Proposed Development are outlined within **Sub-Section 3.3.2.1**.<br><br>Details of the mechanical intervention options are provided within **Sub-Section 3.3.2.3**.<br><br>A Sea Lice Management Statement has been produced for the Proposed Development and provided in **Appendix F**. | **Statement).** | |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | The MD also require a Sea Lice Efficacy Statement outlining the treatment quantities approved for the Proposed Development, the timeframe for conducting bath treatments and the method of application. | | | |
| MD | Scoping Opinion | **Containment:**<br>The MD note that the ECP and PCP are both satisfactory.<br><br>The MD state that environmental conditions likely to be encountered at the site should be considered in conjunction with equipment specifications, to ensure the equipment is designed to withstand the anticipated conditions. Therefore, equipment attestations and specifications are required in support of the final planning application.<br><br>The MD note that whilst the implementation process for 'A Technical Standard for Scottish Finfish Aquaculture' (STS) is still being delivered, aquaculture developments should be working | A Predator Control Plan (PCP) and Escapes Contingency Plan (ECP) have been provided as supporting information.<br><br>The proposed equipment has been selected specifically to ensure that the Proposed Development will withstand the environmental conditions expected at the development location. Equipment specifications and attestations from the manufacturers have been provided in support this planning application.<br><br>Details of husbandry and operational procedures in relation to the larger 200 m pens is provided within **Section 3**. | **Section 3**; **Appendix B (Equipment Specifications); and Appendix E (EMP).** | None |

| Consultee | Stage | Identified Actions | Project Response | Cross Reference | Any Outstanding Issues |
|---|---|---|---|---|---|
| | | towards meeting the requirements of the STS, to ensure compliance when implementation occurs.<br><br>The MD also note that since 200 m pens are larger than any pens currently in use in the Scottish aquaculture industry further information should be provided; considering the potential impacts on procedures, infrastructure in place, and the availability of suitable equipment (boats, winches, tarpaulins, and staff) to allow husbandry operations and treatments to take place efficaciously without increased risk to the success of these procedures or containment integrity.<br><br>Detail of the knowledge and experience of staff working with the proposed 200m m pens, or proposed training plans should also be provided. | | | |

## 5.3 Summary of Assessment of Requirements

A Screening and Scoping Request was submitted to CnES on 16 June 2022 and returned on 2 December 2022. The scoping responses from the statutory consultees provided detail of what was specifically required to be covered within the EIAR, including details of survey and data requirements. In line with the EIA Regulations, the EIAR focuses on the effects identified through the scoping process as having the potential to give rise to a significant effect. This EIAR presents an assessment of the potential effects of the Proposed Development upon the environment and the mitigation measures proposed to avoid, reduce and offset these effects.

Following completion of the gap analysis, the following assessments are included within the EIAR:

- Benthic Impacts;
- Water Column Impacts;
- Interactions with Predators;
- Interactions with Wild Salmonids;
- Impacts upon Species or Habitats of Conservation Importance, including Sensitive Sites;
- Navigation, Anchorage, Commercial Fisheries, Other Non-Recreational Maritime Uses;
- Landscape and Visual Impacts;
- Noise;
- Waste Management (Non-Fish);
- Socio-economic, Access and Recreation; and
- Operational measurements.

**Table 5.15** highlights specific technical areas which have been scoped out of further assessment, as they are unlikely to result in potentially significant effects.

**Table 5.15: Technical Areas Not Requiring Further Assessment (Scoped Out)**

| Technical Area | Elements Not Likely to Cause Significant Effect |
| --- | --- |
| Marine Cultural Heritage | HES state that they agree with the conclusions of the Scoping Report, that the Proposed Development is unlikely to result in significant effects.<br><br>HES specifically state that they can confirm that there are no heritage assets within their remit within the development area or its vicinity. They are therefore content for impacts on cultural heritage assets within their remit to be scoped out of the assessment. |
| Traffic and Transport | Through the formal screening and scoping process no comments were raised by the CnES or any statutory consultee over traffic and transport considerations. However, marine vessel activity associated with the Proposed Development is considered within the assessment on the impacts upon species or habitats of conservation importance. |
| Impacts on / Resilience to Climate Change | Aquaculture, including finfish culture, is considered one of the most efficient sources of animal protein production. Finfish production requires less feed inputs than terrestrial protein sources due to low feed conversion ratios that can be attained in salmon farming. Finfish farming also has a lower greenhouse gas emission footprint per kg of food production than terrestrial livestock farming including chicken which is |

| Technical Area | Elements Not Likely to Cause Significant Effect |
|---|---|
| | widely seen as the most efficient terrestrial animal-source food [38,39]. Aquaculture is also not a direct emitter of methane unlike terrestrial farming which contributes substantial levels of methane into the atmosphere through enteric fermentation in ruminant animals[40]. Methane has a much higher global warming potential, estimated to be 28-36 times that of carbon dioxide.<br><br>In regard to the Proposed Development's resilience to climate change, marine aquaculture including finfish farming is widely seen as a possible solution to global food shortage that is predicted to increase as a result of climate change. This does not mean that finfish farming is immune to impacts of climate change but there are several ways the industry will be able to adapt to it which gives it resilience as an industry[41]. The main elements of climate change that could potentially impact on aquaculture production are:<br>• Temperature rise;<br>• Storm events; and<br>• Sea-level rise.<br><br>Temperature rise could result in faster growth rates for some aquatic species such as Atlantic salmon, but extended periods of warmer summer temperatures may result in thermal stress, especially to cold water and temperate water species e.g., cod and halibut. Thermal stress may also cause cultured species to become more susceptible to disease, and sea lice are likely to remain an issue with rising temperatures extending their season.<br><br>Whilst storm events are predicted to increase, the pens are designed to withstand significant storm events. A comprehensive Wave Climate Assessment has been undertaken and is provided with the final planning application. All pens, nets and moorings will be checked routinely. These checks are outlined in the site-specific Escapes Contingency Plan (provided in **Appendix E**).<br><br>Sea-level rise is unlikely to have a significant impact on marine aquaculture. UK Climate Projections Science Report: Marine and Coastal Projections 2018[42] estimates that sea level rise will most likely impact the south of the UK with minimal changes in Scotland. |
| Vulnerability to Disasters and Major Accidents | The main risk in terms of a marine fish farm's vulnerability to disasters and major accidents is the release or escape of a large number of Atlantic salmon and the potential negative effects both genetically and |

[38] FAIRR A COLLER INITIATIVE: The Coller FAIRR Protein Producer Index for 2021. [Online] Available at: https://www.fairr.org/index/key-findings/protein-types/aquaculture/
[39] Gephart, J.A., Henriksson, P.J., Parker, R.W., Shepon, A., Gorospe, K.D., Bergman, K., Eshel, G., Golden, C.D., Halpern, B.S., Hornborg, S. and Jonell, M., 2021. Environmental performance of blue foods. Nature, 597(7876), pp.360-365. [Online] Available at: https://www.nature.com/articles/s41586-021-03889-2
[40] Silver and Sota (2009) Climate change and aquaculture: potential impacts, adaptation and mitigation [Online] Available at: http://www.fao.org/docrep/012/i0994e/i0994e04.pdf
[41] Reid et al. (2019) Climate change and aquaculture: considering adaptation potential. Aquaculture Environment Interactions. https://doi.org/10.3354/aei00333
[42] Lowe *et al.,* (2018) UK Climate Projections Science Report: Marine and Coastal Projections. Met Office Hadley Centre, Exeter, UK. [Online] Available at: https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Overview-report.pdf

| Technical Area | Elements Not Likely to Cause Significant Effect |
|---|---|
| | ecologically on local wild fish populations. This is discussed further within the assessment of interactions with wild salmonids (**Section 10**).<br><br>BFS employs site specific escapes prevention and containment policies as recommended by Salmon Scotland, SEERAD Escapes Working Group and the Industry Code of Good Practice.<br>No other potential effects have been identified in terms of vulnerability to major accidents or disasters. |
| Population and Human Health | Through the formal Screening and Scoping process, CnES have agreed with the conclusions of the Scoping Report, that impacts on population and human health can be scoped out of further assessment.<br><br>However, throughout this EIAR impacts on population and human health are considered indirectly through assessment of various scoped in topics:<br>• Navigation, Anchorage, Commercial Fisheries, Other Non-Recreational Maritime Uses;<br>• Landscape and Visual Impacts;<br>• Waste Management (Fish);<br>• Socio-economic, Access and Recreation; and<br>Operational measures. |

# 6 Summary of Designations

## 6.1 Landscape and Natural Heritage Designations

A DBA was undertaken to identify statutory landscape and natural heritage designations that have potential for connectivity with the Proposed Development. The search distances applied varied depending on the ecology of the qualifying features for which each site has been designated. The following designated sites were searched for (including candidate, proposed, and emergency designated sites):

- **Special Area of Conservation (SAC (including candidate SACs)):** Within 10 km of the Proposed Development, extended to 50 km for pinniped and cetacean species;
- **Special Protection Area (SPA (including proposed SPAs)):** Within qualifying feature mean foraging range[43] of the Proposed Development;
- **Sites of Special Scientific Interest (SSSI):** Within 5 km of the Proposed Development, extended to 20 km for pinniped and cetacean species;
- **Nature Conservation Marine Protected Areas (NCMPA):** Within 10 km of the Proposed Development, extended to 50 km for cetacean species and within mean foraging range for ornithological features;
- **Designated Seal Haul-Out Sites (HOS):** Within 50 km (common seals) and 100 km (grey seals) of the Proposed Development;
- **Breeding Colony (BC):** Within 50 km (common seals) and 100 km (grey seals) of the Proposed Development;
- **Wild Land Areas (WLA):** Within 10 km of the Proposed Development;
- **National Scenic Areas (NSA):** Within 10 km of the Proposed Development;
- **Areas of Panoramic Quality (APQ):** Within 10 km of the Proposed Development;

The DBA was limited to designations of relevance to the Proposed Development, for example, any nature conservation sites designated for wholly terrestrial or geological features were excluded, due to an absence of potential connectivity with the Proposed Development.

The results of the DBA are presented below in **Table 6.1** and in **Appendix A**. Assessments of potential for impact from the Proposed Development are provided in **Sections 7** to **16**.

Where relevant, Habitats Regulations Appraisals (HRA) have been undertaken, this has been supplied as a standalone report as **Appendix O**. The conservation objectives of the scoped in designated sites are fully detailed within **Appendix O**.

**Table 6.1: Landscape and Natural Heritage Designations with Potential Connectivity with the Proposed Development.**

| Site Name | Designation Type | Qualifying Feature (with potential connectivity to the Proposed Development) | Approximate Proximity to the Proposed Development |
|---|---|---|---|
| Inner Hebrides and the Minches | SAC | Harbour porpoise (*Phocoena phocoena*) | Within SAC |
| North east Lewis | MPA | Risso's Dolphins (*Grampus griseus*) | 4.7 km north |

[43] Woodward, I., Thaxter, C.B., Owen, E and Cook, A.S.C.P. (2019). Desk-based revision of seabird foraging ranges used for HRA screening. Report of work carried out by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate. BTO Research Report No. 724. [Online] Available at: https://www.marinedataexchange.co.uk/

| Site Name | Designation Type | Qualifying Feature (with potential connectivity to the Proposed Development) | Approximate Proximity to the Proposed Development |
|---|---|---|---|
| Eilean Glas Cheann Chrionaig (WI-017) | HOS | Common seal (*Phoca vitulina*) | 15.27 km |
| Aird Dubh (WI-012) | HOS | Common seal (*Phoca vitulina*) | 15.62 km |
| Bhalamus (WI-016) | HOS | Common seal (*Phoca vitulina*) | 18.48 km |
| Sgeir Leathann (Broad Bay) (WI-004) | HOS | Grey seal (*Halichoerus grypus*) and common seal (*Phoca vitulina*) | 24.63 km |
| An Acarsaid a Deas (WI-015) | HOS | Common seal (*Phoca vitulina*) | 28.22 km |
| Sgeir nam Maol (WSC-010) | HOS | Grey seal (*Halichoerus grypus*) | 33.32km |
| Fladda-chuain (WSC-008) | HOS | Grey seal (*Halichoerus grypus*) and common seal (*Phoca vitulina*) | 33.81 km |
| Trodday (BC-005) | HOS | Grey seal (*Halichoerus grypus*) | 35.86 km |
| Glas-Leac Beag (BC-006) | BC/HOS | Grey seal (*Halichoerus grypus*) | 49.92 km |
| Glas-Leac Mor (WSN-005) | HOS | Grey seal (*Halichoerus grypus*) | 51.62 km |
| Sound of Harris Islands (BC-009) | BC/HOS | Grey seal (*Halichoerus grypus*) | 52.63 km |
| Coppay (BC-012) | BC/HOS | Grey seal (*Halichoerus grypus*) | 53.53 km |
| Gasker (WI-018) | HOS | Grey seal (*Halichoerus grypus*) | 53.60 km |
| Shillay (BC-007) | BC/HOS | Grey seal (*Halichoerus grypus*) | 59.10 km |
| Iolla Mhor (WSN-007) | HOS | Grey seal (*Halichoerus grypus*) | 59.90 km |
| Eilean Chrona (WSN-004) | HOS | Grey seal (*Halichoerus grypus*) | 65.25 km |
| Haskeir (BC-014) | BC/HOS | Grey seal (*Halichoerus grypus*) | 87.31 km |
| Causamul (BC-015) | BC/HOS | Grey seal (*Halichoerus grypus*) | 88.26 km |
| Am Balg (WSN-006) | HOS | Grey seal (*Halichoerus grypus*) | 89.65 km |
| St Kilda | SPA | **Northern fulmar** (*Fulmarus glacialis*) breeding, **northern gannet** (*Morus bassanus*) breeding, common guillemot (*Uria aalge*) breeding, Atlantic puffin (*Fratercula arctica*) breeding, seabird | 123.36 km (straight-line), west-northwest |

| Site Name | Designation Type | Qualifying Feature (with potential connectivity to the Proposed Development) | Approximate Proximity to the Proposed Development |
|---|---|---|---|
| | | assemblages breeding, storm petrel (*Hydrobates pelagicus*) | |
| North Rona and Sula Sgeir | SPA | Northern gannet (*Morus bassanus*), northern fulmar (*Fulmarus glacialis*) common guillemot (*Uria aalge*), black-legged kittiwake (*Rissa tridactyla*), great black-backed gull (*Larus marinus*), Atlantic puffin (*Fratercula arctica*), Leach's petrel (*Hydrobates leucorhous*), razorbill (*Alca torda*), storm petrel (*Hydrobates pelagicus*) | 112.17 km north-north-east |
| Sule Skerry and Sule Stack | SPA | Northern gannet (*Morus bassanus*), common guillemot (*Uria aalge*), and black-legged kittiwake (*Rissa tridactyla*) | 148.64 km north-east |

## 6.2 Natural Heritage Designations Scoped Out of the Assessment

The following natural heritage designations have been scoped out of the assessment:

- Lewis Peatland SAC
- Lewis Peatlands SPA
- Shiant Isles SPA
- Shiant Isles SSSI

Justification and rationale for scoping out these designated sites is presented in **Sections 11** and **Appendix O**. Where a particular feature is not mentioned, it is assumed that there is no connectivity between the designation and the Proposed Development, largely due to either the terrestrial or geological nature of the qualifying feature. However, the ecology and life history of the qualifying feature will also be considered in order to determine connectivity.

# 7 Benthic Habitats

## 7.1 Introduction

This technical assessment considers the potential impacts of the Proposed Development as a result of organic (carbon) deposition and in-feed residue deposition on the benthos. Whilst this Section provides an assessment on the impact of the Proposed Development on the benthic environment it is focused on the general predicted impacts with reference to SEPA NewDEPOMOD modelling and compliance criteria. This assessment is undertaken in line with the methodology outlined within **Sub-Section 2.4.1**.

**Section 11** of this EIAR provides a detailed assessment of the potential impacts of the Proposed Development in relation to benthic habitats of conservation importance following the EcIA methodology, as detailed within **Sub-Section 2.4.2**.

## 7.2 Scoping

The potential for significant effects on benthic habitats was raised by consultees in their specific Scoping advice, in response to the Screening and Scoping Request submitted to CnES. A brief summary of the requirements of the consultees is provided below in **Table 7.1**. However, for a full review of the Scoping information requirements please see **Section 5**.

**Table 7.1: Summary of required information relevant to Benthic Impacts.**

| Consultee | Information Requirement | Cross Reference |
|---|---|---|
| Marine Directorate | • Request confirmation of the proposed infrastructure and biomass; and<br>• Request that the appropriate modelling is submitted with the final application. | Section 7;<br><br>Section 11;<br><br>Appendix K (NewDEPOMOD Modelling Report); and<br><br>Appendix L (Marine Modelling Report). |
| NatureScot | • Request that a benthic visual survey is undertaken;<br>• Request modelling of the depositional and chemical footprints;<br>• Request that a benthic survey report is submitted with the planning application; and<br>• Request a copy of the visual survey footage. | Section 7;<br><br>Section 11;<br><br>Appendix I (Benthic Survey Report);<br><br>Appendix J (Hydrographic Report);<br><br>Appendix K (NewDEPOMOD Modelling Report); and<br><br>Appendix L (Marine Modelling Report). |
| SEPA | • Request benthic visual and seabed surveys; | Section 7;<br><br>Section 11; |

| Consultee | Information Requirement | Cross Reference |
|---|---|---|
| | • Request that consideration be given to the presence of PMFs within the footprint of the Proposed Development;<br>• Request that marine modelling is undertaken; and<br>• Request that NewDEPOMOD modelling is undertaken. | Appendix I (Benthic Survey Report);<br><br>Appendix K (NewDEPOMOD Modelling Report); and<br><br>Appendix L (Marine Modelling Report). |

# 7.3 Study Area

The study area has been refined to reflect the predicted ZoI for organic and in-feed residue deposition, which relate directly to SEPA CAR compliance criteria. The following information has been utilised to develop the study area:

- Imagery and reports from the baseline and visual surveys of the Proposed Development;
- NewDEPOMOD model outputs for organic deposition;
- NewDEPOMOD model outputs for in-feed residue deposition;
- NewDEPOMOD Modelling Report (**Appendix K**); and
- Marine modelling outputs (**Appendix L**).

Based on the outputs of the NewDEPOMOD modelling, a detailed study area was identified through application of the SEPA Baseline Survey Design Guidance[44]. This detailed study area also represents the spatial extent of the benthic survey area.

# 7.4 Embedded Mitigation

Embedded mitigation measures are presented below. These measures are proposed to avoid, reduce and, where possible, offset any impacts arising from the Proposed Development.

## 7.4.1 Design Mitigation

Detailed below is an outline of the key design aspects of the Proposed Development anticipated to mitigate the magnitude of impacts on the benthic environment.

### 7.4.1.1 Development Location

The development location was selected based on HG data indicating that the location is a well flushed and highly energetic site. These conclusions were supported by SEPA, who stated in the Modelling Screening and Risk Identification Report[45] that the Proposed Development:

***"Is in an area of very high dispersion and has a very high capacity for erosion of material on the seabed".***

This dispersion potential of the development location will allow for waste discharges to be dispersed to low levels over a wider area. As a result, it is unlikely that sediments will be consolidated underneath the pens. Therefore, the intensity of sediment deposition will be significantly reduced within the defined Mixing Zone.

[44] Scottish Environment Protection Agency (SEPA): Finfish Aquaculture Sector: Baseline Survey Design – Version 2, May 2022. [Online] Available at: https://www.sepa.org.uk/media/594232/baseline-survey-design.pdf
[45] Scottish Environment Protection Agency (SEPA): Modelling Screening and Risk Identification Report – North Gravir. [Online] Available at: https://www.sepa.org.uk/regulations/water/aquaculture/screening-modelling-and-risk-identification-report/

#### 7.4.1.2 Farm Design and Layout

As detailed within **Section 3**, the Proposed Development will make use of fewer, but larger pens. This will help limit the spatial extent of the Proposed Development in relation to the seabed and benthic environment. The use of fewer pens will also help ensure the effectiveness of other embedded mitigation measures such as; Feed Control and Monitoring and the Integrated Sea Lice Management (ISLM) Plan (see below).

#### 7.4.1.3 NewDEPOMOD Modelling

The NewDEPOMOD standard default method (SDM) is a risk assessment tool and is considered to be conservative in nature. As required for new sites, the SDM approach has been used for the Proposed Development. NewDEPOMOD modelling for the Proposed Development has been undertaken for both organic (carbon) deposition and in-feed residue deposition. NewDEPOMOD organic deposition model runs were iterated up in biomass in order to calculate the maximum passing biomass in relation to SEPA Mixing Zone criteria. NewDEPOMOD model outputs and the accompanying NewDEPOMOD Modelling Report (**Appendix K**) for a maximum passing biomass of 4,680 T have been submitted to and approved by SEPA. The NewDEPOMOD outputs indicate that at a biomass of 4,680 T the average depositional intensity within the Mixing Zone will be 360.2 $g/m^2/yr^{-1}$, significantly below the 4,000 $g/m^2/yr^{-1}$ threshold and the Mixing Zone will cover 117.2 % of the permissible 120 %.

### 7.4.2 Operational Mitigation

Detailed below is an outline of the key operational aspects of the Proposed Development anticipated to mitigate the magnitude of impacts on the benthic environment.

#### 7.4.2.1 Feed Control and Monitoring

Fish feed used by BFS across all marine farming operations has been developed to mimic the natural diet of Atlantic salmon, and is highly digestible, helping to improve FCR. This optimised feed ensures efficient nutrient conversion, meaning that the amount of soluble nutrients released as waste is minimised.

Feeding will be in accordance with established guides and staff will be able to adapt the feeding regime as necessary, for example, if weather conditions are temporarily affecting feeding behaviour.

Feeding operations will be conducted from the feed barge or a shorebase (via remote link) where feed input can be adjusted as required and high-definition cameras, within each pen, allow for close monitoring of the feed response. This allows for real-time adjustments and cessation of feeding when required and, in so doing, reduces feed wastage and minimises the potential for organic deposition beneath the pens.

Site staff will also receive specific in-house training as part of the bespoke Marine Competency Framework.

#### 7.4.2.2 Pellet Detection Software

BFS is implementing ‘Observe’ pellet detection software across all marine farms, including the Proposed Development. This software is intended to improve the efficiency of feeding operations, with the aim of reducing the amount of feed pellets used allowing BFS to be more sustainable both economically and environmentally.

#### 7.4.2.3 SEPA CAR Licencing (The Water Environment (Controlled Activities) (Scotland) Regulations 2011)

Potential benthic impacts are regulated by SEPA under the Water Environment (Controlled Activities) (Scotland) Regulations 2011.

SEPA is continuing to implement a new regulatory framework that seeks to strengthen the protection of the marine environment. Key aspects of the new regulatory framework include:

- A new tighter standard for the organic waste deposited by fish farms;
- More powerful modelling, using best available science;
- Enhanced environmental monitoring and a new enforcement unit;
- New interim approach for controlling the use of EmBz;
- New approach to sustainable siting of farms;
- Improved management of waste inputs; and
- Listening to communities and stakeholders.

The Proposed Development will be regulated by SEPA under this new regulatory framework.

#### 7.4.2.4 Environmental Monitoring Plan

A site-specific monitoring plan will be implemented to monitor seabed impacts from the Proposed Development in order to assess compliance with the seabed standards specified in Schedule 4 of the SEPA CAR licence (**Appendix T**). Samples will be taken along four specific transects at specific sampling stations. All samples taken from along the transects will be analysed for benthic infauna, particle size analysis (PSA), organic carbon and medicinal residue (EmBz). Survey work, to collect the required samples, will be undertaken in accordance with CAR requirements, with the survey beginning no earlier than ten days before the weight of the fish is reduced to 75 % of the final peak biomass and finishing no later than seven days after the weight of the fish is reduced to 75 % of the final peak biomass.

#### 7.4.2.5 Environmental Quality Standards (EQS)

SEPA regulate the quantity of discharges of medicants by imposing conditions on the use of these products such that either the area or time over which they may have an impact is restricted.

EQSs are safe concentrations for medicants and have been set to be protective of all species in the environmental matrix where exposure is likely to be highest.

Discharge limits for the Proposed Development represent discharge quantities that have been modelled and show full compliance to the relevant EQSs.

#### 7.4.2.6 Fallowing

Fallowing between production cycles is best practice within the Scottish finfish aquaculture industry and provides an opportunity for benthic communities within the Mixing Zone of a fish farm to recover. Impacts on benthic faunal communities within the Mixing Zone as a result of organic deposition during a production cycle are anticipated to be temporary and reversible in nature. Furthermore, residues from in-feed treatments also have the opportunity to degrade during the fallow period. At present, SEPA require that there is a minimum period of 28 consecutive days between every production cycle during which no commercial species shall be kept on site (**Appendix T**).

The output from the organic depositional model runs indicates that the Proposed Development will comply with SEPA Mixing Zone criteria and therefore the predicted magnitude of impact on the benthos will be acceptable.

#### 7.4.2.7 Enforcement

Existing regulation, in place through the Water Environment (Controlled Activities) (Scotland) Regulations 2011, provides an effective method of controlling the use of sea lice medicines, whilst promoting the use of biological and mechanical treatment methods.

SEPA require benthic monitoring to take place on all operational fish farms, at specific time periods, as defined in the relevant CAR Licence. This monitoring regime is designed to ensure that the fish farm's operational Mixing Zone complies with SEPA criteria and does not exceed the modelled Mixing Zone extent.

In the worst-case scenario, SEPA has enforcement powers to decrease the maximum biomass, if a fish farm is deemed to continuously not comply with benthic EQS.

#### 7.4.2.8 Integrated Sea Lice Management Plan

The Integrated Sea Lice Management Plan (ISLM) plan has been developed to provide guidance on how the sea lice management strategy (SLMS) measures will be implemented across BFS marine farms. The aim of the ISLM plan is to actively reduce the use of medicinal products (which will reduce the amount potentially discharged from the Proposed Development), prioritising the use of biological controls and systems that physically remove sea lice.

## 7.5 Baseline Condition

### 7.5.1 Designated sites

Within the defined study area (detailed in **Appendix I**), there are no designated sites for benthic habitat features. The nearest designated site for benthic features is the Shiant East Bank NCMPA. This site is located 10.69 km to the east of the Proposed Development, well outside the identified study area, and ZoI. As such it has been determined that there will be no connectivity with the Shiant East Bank NCMPA.

### 7.5.2 Benthic Habitat Character

#### 7.5.2.1 Benthic Baseline Survey

##### 7.5.2.1.1 Benthic Sediment Composition

Benthic sediment composition was assessed by grab sampling at a number of sample stations on defined transects, agreed with SEPA and NS. Survey details are provided in **Appendix I**. Sediments across the survey area ranged from very coarse silt to fine sand, being overall very poorly sorted. The highest proportion of gravel (> 2 mm) was measured at station S5 (11 %), while the highest proportion of fines (< 63 µm) was recorded at station S13 (46 %).

##### 7.5.2.1.2 Benthic Macrofauna

A total of 1,213 specimens were identified. Station S15 had the highest number of taxa (richness) with 48 taxa identified and the highest number of individuals (173 specimens). Only one enrichment polychaete species was identified: *Capitella sp.* (n = 2) at station S5. There was a relatively high ITI and IQI scores across the survey area. ITI scores were indicative of a normal community (ITI > 60) at all stations excluding S7, S8, S9, S13 and S14 which were of a changed community with ITI scores of 59, 59,49,59 and 55, respectively. IQI scores were overall suggestive of 'good' to 'high' environmental quality status at all stations.

There were no notable taxa recorded at the site in terms of economically important species, invasive non-native species, or taxa under conservation designation status.

### 7.5.2.2 Benthic Visual Survey

BFS commissioned Ocean Ecology Limited (OEL) to conduct a visual benthic survey (using a Drop Down Camera (DDC)) for the Proposed Development. This survey was undertaken as part of the SEPA pre-application process and aligned with the requirements of the Baseline Survey Design[44] document produced by SEPA. The survey was undertaken on 23rd – 27th February 2023.

The survey area for the visual survey (**Appendix I**) was defined following the guidance within the Baseline Survey Design[37] document and therefore represents an area that exceeds the modelled Mixing Zone extent for the Proposed Development. In total the visual survey area covered 1.13 $km^2$.

**Table 7.2** illustrates the benthic biotope types identified within the survey area. As can be seen SS.SMu.CFiMu.SpnMeg[46] (Seapens and burrowing megafauna in circalittoral fine mud) was the most widespread habitat type identified, accounting for 70.91 % of the total area surveyed.

[46] JNCC. Marine Habitat Classification for Britain and Ireland. [Online] Available at: https://mhc.jncc.gov.uk/

**Table 7.2: Benthic habitat types identified within the visual survey area.**

| EUNIS Code | Marine Habitat Classification for Britain and Ireland Code | Biotope Description | Area Covered ($m^2$) | Percentage of Total Survey Area (%) |
|---|---|---|---|---|
| A4.1 | CR.HCR | Atlantic and Mediterranean high energy circalittoral rock | 201.81 | 0.02 |
| A4.211 | CR.MCR.EcCr.CarSwi | *Caryophyllia smithii* and *Swiftia pallida* on circalittoral rock | 86.00 | 0.01 |
| A5.35 | SS.SMu.CSaMu | Circalittoral sandy mud | 13,893.07 | 1.23 |
| A5.36 | SS.SMu.CFiMu | Circalittoral fine mud | 48,860.68 | 4.31 |
| A5.361 | SS.SMu.CFiMu.SpnMeg | Seapens and burrowing megafauna in circalittoral fine mud | 804,075.36 | 70.91 |
| A5.3611 | SS.SMu.CFiMu.SpnMeg.Fun | Seapens, including *Funiculina quadrangularis*, and burrowing megafauna in undisturbed circalittoral fine mud | 3,707.66 | 0.33 |
| A5.44 | SS.SMx.CMx | Circalittoral mixed sediments | 263,146.56 | 23.21 |
| **TOTAL** | | | 1,133,971.14 | 100.00 |

**Figure 7.1** over leaf shows the habitat map for the survey area along with the locations of the seven transects over which the visual survey was conducted.

The dominant broadscale habitat (BSH) was identified as 'A5.361 - Seapens, including *Funiculina quadrangularis*, and burrowing megafauna in undisturbed circalittoral fine mud', representing 70.91 % of still images analysed, whilst the remaining BSHs were identified as 'A5.44 - Circalittoral mixed sediments' (23.21 %), 'A5.36 - Circalittoral fine mud' (4.31 %) and 'A5.35 – Circalittoral sandy mud' (1.23 %). In addition, very low levels of 'A5.3611 - Seapens, including *Funiculina quadrangularis*, and burrowing megafauna in undisturbed circalittoral fine mud' (0.33 %), 'A4.1 - Atlantic and Mediterranean high energy circalittoral rock' (0.02 %) and 'A4.211 - *Swiftia pallida* on circalittoral rock' (0.01%) were present in survey area. The EUNIS habitats and biotopes recorded across the survey area are presented in **Table 7.2.**

The habitat is largely made up of subtidal mud (A5.3) with Seapens, including *Funiculina quadrangularis*, and burrowing megafauna in undisturbed circalittoral fine mud which represented the majority of the area survey and was identified along all transects. The visual quality of the samples that contained Subtidal Mud (A5.3) were analysed, these samples represented 440 out of the total 711 records.

Evidence of Annex I bedrock and medium stony reef was observed at T04A, situated to the east of the historical potential Annex I reef identified through the GeMS dataset. The mapped Annex I bedrock and medium stony reef corresponded to EUNIS classification 'A4.211 – *Caryophyllia smithii* and *Swiftia pallida* on circalittoral rock''. It should be noted that the confidence in defining the extent of these reef locations was recorded as low as the bathymetry data available did not allow for an accurate assessment of topographic highs which would normally be used to delineate the extent bedrock or stony features. It is possible that there is a greater extent of reef present than observed from stills and video analysis alone. Further to this, it is likely that a sediment veneer covering the bedrock features hindered their identification based on the still and video analysis alone. This could potentially explain the discrepancy between the EMODnet[47] predictive mapping for the area and the current efforts or alternatively, this could be due to a lack of ground truth data in the predictive mapping.

Only two specimens of *Capitella* sp., an enrichment polychaete species, were recorded at station 15 across the North Gravir survey area. This was reflected in the relatively high ITI and IQI scores across the survey area, ITI scores were indicative of a normal community (ITI > 60) at all stations excluding S7, S8, S9, S13 and S14 which were of a changed community. IQI scores were overall indicative of 'good' to 'high' environmental quality status.

There were no notable taxa recorded at the site in terms of economically important species, invasive non-native species, or conservation designation status.

[47] emodnet.ec.europa.eu. (n.d.). *European Marine Observation and Data Network (EMODnet)*. [online] Available at: https://emodnet.ec.europa.eu/en

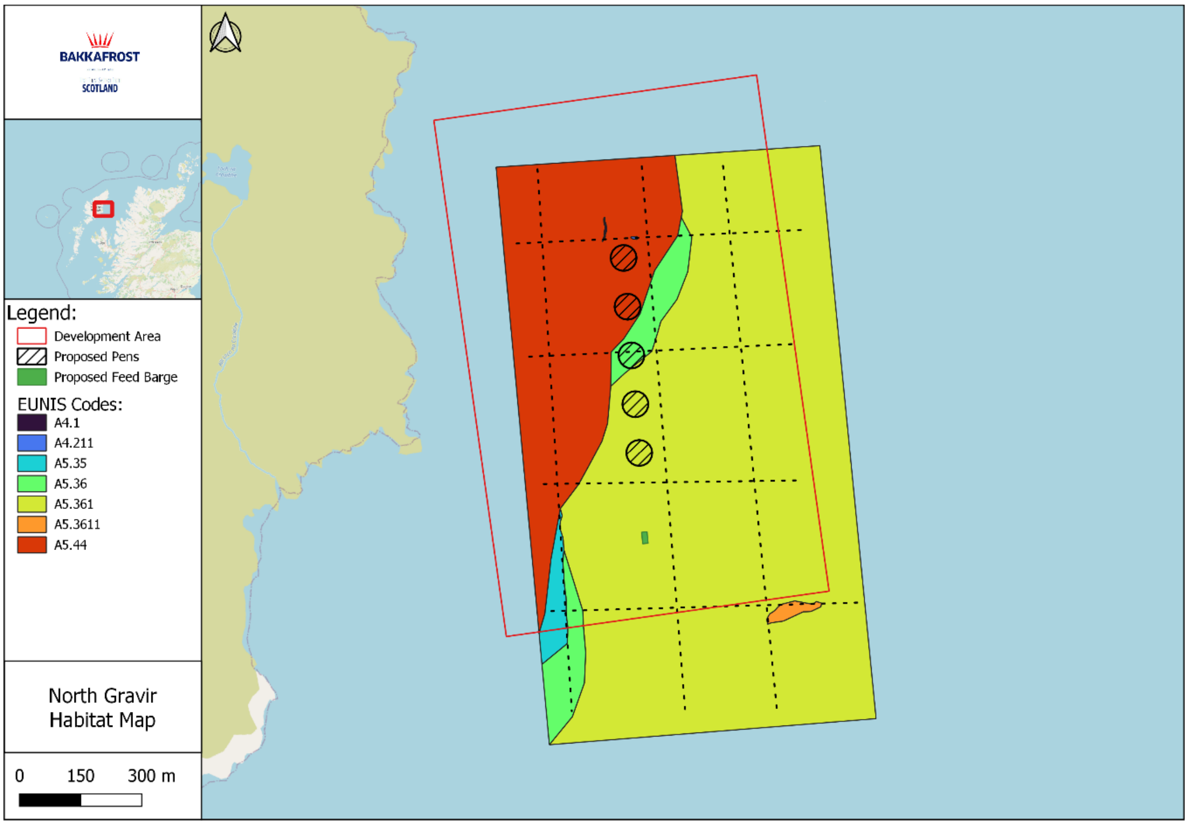


**Figure 7.1: Habitat map for the visual survey area[17].**

An assessment of the potential impacts, as a result of the Proposed Development on the biotopes of conservation importance (PMFs and Annex I features) identified through the visual benthic survey, has been undertaken and outlined in **Section 11**, following the methodology outlined in **Sub-Section 2.4.2**.

This Section of the EIAR has assessed the Proposed Development's potential impact on the general benthic environment, with direct reference to SEPA NewDEPOMOD modelling and EQS criteria.

### 7.5.3 Priority Marine Features (PMFs)

To avoid duplication, PMFs identified within the baseline condition are described and assessed in **Section 11**, in line with the methodology outlined within **Sub-Section 2.4.2**.

### 7.5.4 92/43/EEC Annex I Habitat Features

To avoid duplication, Annex I features identified within the baseline condition are described and assessed in **Section 11**, in line with the methodology outlined within **Sub-Section 2.4.2**.

### 7.5.5 Evolution of the Baseline Condition

The EIA Regulations require that; ***"A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge"*** (EIA Regulations, Schedule 4, Paragraph 3), is included within the EIAR. Therefore, this Sub-Section of the EIAR, provides a qualitative description of the evolution of the baseline condition, on the assumption that the installation and subsequent long-term operation of the Proposed Development does not take place. The description is based on available information and scientific knowledge of the ecology of the IEFs identified within the baseline condition.

Benthic habitats and communities are known to experience significant natural variation. However, the potential impacts of climate change on these benthic features must also be considered. Variability and longer-term changes of physical processes and influences may bring both direct and indirect changes to benthic habitats and communities over the medium to long-term[48]. Current scientific literature presents a strong case indicating that long-term changes to the ecology of the benthic environment may be related to long-term trends in the climate and trends in nutrient availability[48]. There is also evidence indicating that climate change is driving shifts in the abundance and composition of benthic communities[49]. Literature relating to benthic ecology and communities indicates that, over the previous three decades, benthic biomass has increased by at least 250 %. This increase in benthic biomass has coincided with the increase in short-lived, opportunistic r-selected species, and the decline in long-lived, sessile k-selected species[50, 51].

Sea surface temperature modelling has shown that over the last 50 years, the rate of temperature increase has been lower in waters on the west of the UK in comparison to the east coast, this trend is predicted to continue over the next 50 year period[52]. Within Scottish waters, sea temperatures have risen in line with the global trend. Scottish coastal and oceanic water have warmed by between 0.05 and 0.07 °C per decade, across the long-term period from 1870 to 2016. However, temperature increases have not been constant across this period, with spatial variation also noted across Scottish waters. Within Scottish waters natural variability in sea temperature over decadal and multi-decadal temporal periods has been observed, but the warming trend in Scottish sea temperatures over the most recent 30 year period has been greater than the long-term period (1870 to 2016). The warming in the last 30 year period has been about 0.2 °C per decade. The warming has been greatest in the region of the Faroe-Shetland Channel and further northwards, with trends here reaching 0.4 °C per decade[53].

In addition, whilst the majority of climate change literature has focused on the potential impacts of temperature change, and sea temperature rise, climate change also causes deoxygenation of the water column. The oxygen content of marine waters is believed to have decreased by 0.06 to 0.43 % over the previous 50 years[54], and this is expected to reduce by a further 7 % by the year 2100[55]. The long-term monitoring of a benthic community, within the Firth of Clyde, illustrated that the community had been

[48] UK Offshore Energy Strategic Environmental Assessment 3 (OESEA3) (2016) Environmental Report. Appendix 1a.2 – Benthos. [Online] Available at: https://www.gov.uk/government/consultations/uk-offshore-energy-strategic-environmental-assessment-3-oesea3
[49] Marine Climate Change Impacts Partnership (2015) Marine climate change impacts; implications for the implementation of marine biodiversity legislation. (Ed.) Frost M, Bayliss-Brown G, Buckley P, Cox M, Stoker B and Withers Harvey N. Summary Report. MCCIP, Lowestoft, p. 16. [Online] Available at: https://www.researchgate.net/publication/284176733_Marine_climate_change_impacts_implications_for_the_implementation_of_marine_biodiversity_legislation
[50] Kröncke I (1995) Long-term changes in North Sea benthos. Senckenberg Marit, 26, p.73-80.
[51] Kröncke I (2011) Changes in Dogger Bank macrofauna communities in the 20th century caused by fishing and climate. Estuarine, Coastal and Shelf Science, 94, p.234-245.
[52] Marine Climate Change Impacts Partnership (2013) Marine Climate Change Impacts Report Card.
[53] Marine Directorate Assessment. Climate Change, Changes in the Ocean Climate, Sea temperature. [Online] Available at: https://marine.gov.scot/sma/assessment/sea-temperature
[54] Stramma, L., Schmidtko, S., Levin, L.A. and Johnson, G.C., 2010. Ocean oxygen minima expansions and their biological impacts. Deep Sea Research Part I: Oceanographic Research Papers, 57(4), pp.587-595. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/S0967063710000294
[55] Stocker, T. ed., 2014. Climate change 2013: the physical science basis: Working Group I contribution to the Fifth assessment report of the Intergovernmental Panel on Climate Change. Cambridge university press. [Online] Available at: https://books.google.co.uk/books?hl=en&lr=&id=o4gaBQAAQBAJ&oi=fnd&pg=PR1&dq=IPCC+(2013)+Climate+change+2013:+the+physical+science+basis.+In:+Working+Group+I+Contribution+to+the+IPCC+Fifth+Assessment+Report+of+the+Intergovernmental+Panel+on+Climate+Change,+UK+and+New+York,+p.+1535.&ots=WhrvbKDuTj&sig=XzbIBz_gBF4R_koL7df3SzC5Z1k&redir_esc=y#v=onepage&q&f=false

adversely affected by decreasing oxygen levels through time. This finding correlates with a number of studies conducted over shorter temporal periods[56, 57].

Based on the above, the baseline condition described for the Proposed Development should be viewed as a snapshot in time of the present benthic ecosystem and character, within a marine environment that displays natural and anthropogenically induced change. Therefore, any changes that may occur to benthic ecosystems during the construction (and decommissioning) and the operation of the Proposed Development should be considered and assessed in the context of variability and sustained trends occurring at a national and international scale, and the changes that would be expected to occur naturally in the absence of the Proposed Development.

## 7.6 Identified Potential Impacts

A full technical assessment of the potential impacts of the Proposed Development of benthic habitats of conservation importance is provided within **Section 11**. The potential impacts assessed in this Section relate to the general predicted impacts on the benthic environment in relation to SEPA regulatory criteria.

The impacts considered further within this Section include:

- Potential impacts arising from organic (carbon) deposition directly changing benthic habitats and reducing species richness and abundance; and
- Potential impacts arising from in-feed residue deposition directly changing benthic habitats and reducing species richness and abundance.

## 7.7 Impact Assessment

### 7.7.1 Construction Impacts

As stated within **Sub-Section 3.6**, the installation of the Proposed Development, will take place over a 26 day window (worst-case scenario), with 14 to 21 days needed for the installation of the grid, 3 days needed for the installation of the pens and a further 2 days required to install the feed barge. As such, any impact arising from the construction and installation phase of the Proposed Development will only occur over the short-term.

Moreover, the technical assessment considered the benthic impacts in relation to the SEPA compliance criteria. As such, construction and installation related impacts have been scoped out of further assessment.

### 7.7.2 Operational Impacts

This Sub-Section assesses the potential impacts arising from the operation of the Proposed Development in relation to the SEPA compliance criteria for benthic impacts.

#### 7.7.2.1 Potential Impacts arising from Organic (Carbon) Deposition Directly Altering Benthic Habitats and Reducing Species Richness and Abundance

##### 7.7.2.1.1 Nature of Impact

Throughout a production cycle, the principal source of organic material from the Proposed Development will come from the release of uneaten feed and faecal material produced by the stocked Atlantic salmon. Whilst the deposition of organic material at low levels can represent an increased food supply for both epifauna and infauna, more intense deposition has the potential to negatively impact the local benthic

[56] Breitburg, D., Levin, L.A., Oschlies, A., Grégoire, M., Chavez, F.P., Conley, D.J., Garçon, V., Gilbert, D., Gutiérrez, D., Isensee, K. and Jacinto, G.S., 2018. Declining oxygen in the global ocean and coastal waters. Science, 359(6371), p.eaam7240. [Online] Available at: https://www.science.org/doi/abs/10.1126/science.aam7240
[57] Levin, L.A., Ekau, W., Gooday, A.J., Jorissen, F., Middelburg, J.J., Naqvi, S.W.A., Neira, C., Rabalais, N.N. and Zhang, J., 2009. Effects of natural and human-induced hypoxia on coastal benthos. Biogeosciences, 6(10), pp.2063-2098. [Online] Available at: https://bg.copernicus.org/articles/6/2063/2009/

environment and can reduce species richness and abundance. Intense organic material deposition can cause smothering in low energy environments and lead to anoxia, eutrophication, growth of bacterial mats and can also lead to changes in the faunal community within the impacted area. Larger, more mobile benthic macrofauna may be excluded from the impact area. These impacted communities tend to be dominated by a low richness of specialist re-worker polychaete worm species.

#### 7.7.2.1.1 Duration of Impact

The impact has been determined to be **long-term** but **temporary**. It is considered **long-term** as, throughout each production cycle, when fish are held onsite, there is the potential for organic material (faeces and uneaten feed) to be discharged into the environment over a continuous temporal period. However, it is considered to be **temporary** as, between each production cycle, the Proposed Development will undergo a fallow period lasting at least 28 consecutive days. During this time there will be no discharge of organic material. Therefore, for periods of tme the potential impact is avoided entirely.

#### 7.7.2.1.2 Sensitivity of Receptor

The benthic environment within the survey area was characterised by subtidal mud and mixed sediments of varying particle size (Seapens and burrowing megafauna in circalittoral fine mud (SS.SMu.CFiMu.SpnMeg), Circalittoral fine mud (SS.SMu.CFiMu) Circalittoral sandy mud (SS.Smu.CsaMu), Seapens, including *Funiculina quadrangularis*, and burrowing megafauna in undisturbed circalittoral fine mud (SS.SMu.CFiMu.SpnMeg.Fun), and Circalittoral mixed sediments (SS.SMx.CMx)). Throughout these biotopes a range of benthic macrofauna were identified, however these species were generally of low conservation importance, with the exception of one PMF species, tall sea pen (*Funiculina quadrangularis*).

Due to the characterising species identified in association with the subtidal mud biotopes classification identification to level 5 was possible. Due to the relatively high level of biotope classification, and the presence of characterising species the benthic environment is determined to be of **high** sensitivity.

#### 7.7.2.1.3 Magnitude of Unmitigated Impact

The Proposed Development is located in an area of very high dispersion potential[45]. This dispersive characteristic of the development location means that the organic material discharged is unlikely to be consolidated beneath the pens but rather exported over a wider area to low levels. As a result of the development location and predicted environmental conditions, the Proposed Development is likely to have a low influence[45].

SEPA's regulatory framework limits the maximum area of the Mixing Zone, this limit is equivalent to an area encompassed by 100 m from the pen edge in all directions. As detailed within the NewDEPOMOD Modelling Report (**Appendix K**) the Mixing Zone for the Proposed Development is 177,000 $m^2$. Within the Mixing Zone the average depositional intensity threshold for organic material is normally 2,000 $g/m^2/yr^{-1}$ and the Mixing Zone extent must normally not exceed 100 % of the defined Mixing Zone area. However, as the development location has a WEI of 3.80 to 3.83, as derived from the Scottish Association of Marine Science (SAMS) WEI[58], the average depositional intensity threshold is increased to 4,000 $g/m^2/yr^{-1}$ and the permitted Mixing Zone extent is increased to 120 % of the Mixing Zone area. **Figure 7.2** illustrates the predicted organic deposition Mixing Zone in relation to benthic environment beneath the Proposed Development.

[58] Marine Directorate: National Marine Plan interactive: Wave Exposure Index (Contains information from the Scottish Association for Marine Science). [Online] Available at: https://marine.gov.scot/maps/780

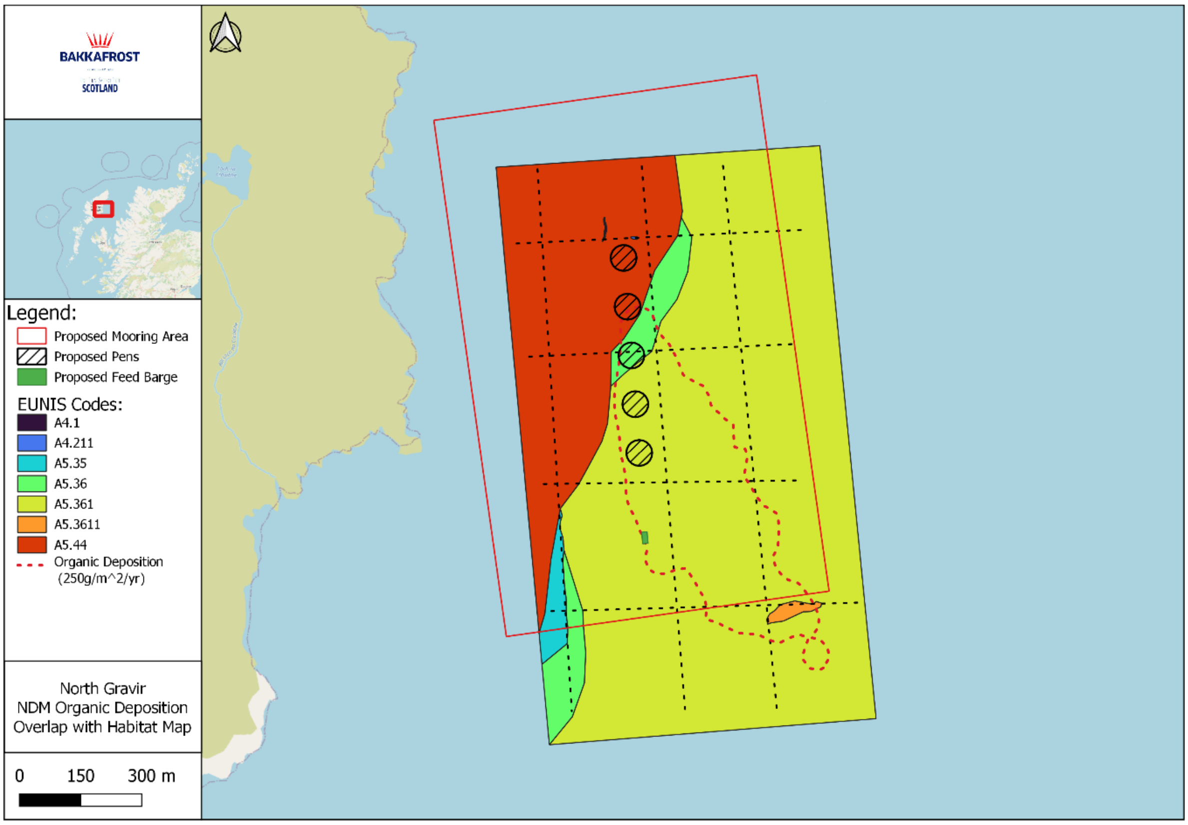


**Figure 7.2: Spatial extent of the NDM modelled organic deposition Mixing Zone[17].**

The modelled average depositional intensity within the Mixing Zone for the Proposed Development was 360.2 g/m$^2$/yr$^{-1}$, with the average maximum depositional intensity across the model runs peaking at 369.8 g/m$^2$/yr$^{-1}$. This is significantly lower than the average depositional intensity threshold of 4,000 g/m$^2$/yr$^{-1}$. The modelled Mixing Zone extent, where average depositional intensity was > 250 g/m$^2$/yr$^{-1}$ was 117.17 % of the permissible 120 %, which equates to an area of 0.25 km$^2$. SEPA considers 250 g/m$^2$ to be comparable to 0.64 on the Infaunal Quality Index (IQI). This 0.64 IQI value represents the benthos quality threshold between Moderate and Good status under the Water Framework Directive (2000/60/EC). Due to the small area over which average depositional intensity is modelled to be > 250 g/m$^2$/yr$^{-1}$ the spatial extent of this impact is determined to be **negligible**.

In addition, to the NewDEPOMOD model outputs, the Modelling Screening and Risk Identification Report[45], produced by SEPA, estimated the average depositional intensity of organic material to be < 1.96 g/m$^2$. Due to the low depositional intensity, SEPA concluded that the Proposed Development would have an area of influence of 1.54 km$^2$, in relation to sediment deposition.

Furthermore, due to the highly dispersive nature of the development location, NewDEPOMOD model outputs indicated that very little sediment would be consolidated under the pens, but rather it would be exported out-with the model domain. Therefore, to ensure that discharged organic material from the Proposed Development was not being consolidated on the benthos outside of the NewDEPOMOD defined Mixing Zone, BFS undertook detailed three-dimensional marine modelling for the Proposed Development to estimate the degree of organic material deposition over the medium (0.5 – 5.0 km) and far field (<10 km). The model outputs indicate that deposition covers a wide area but rarely exceeds 0.5 g/m$^2$/yr$^{-1}$. The primary area of deposition is parallel to the North Gravir shoreline and aligned with dominant flow vectors. The model simulated small-scale localised exceedances of 2 g/m$^2$/yr$^{-1}$ next to the shoreline or within shallow bays where velocities are reduced, and sediment is retained by the shoreline. Within these areas of higher depositional intensity, deposition is still several orders of magnitude below SEPA's Mixing Zone threshold (250 $g/m^2/yr^{-1}$).

Embedded mitigation, as detailed within **Sub-Section 7.4**, is also anticipated to help reduce the overall magnitude of the impact.

As a result, it is determined that the impact is of **negligible magnitude**.

#### 7.7.2.1.4 Significance of Effect Without Mitigation

In light of the assigned **high** sensitivity of the benthic habitat and the **negligible magnitude** of the impact, the effect is determined to be of **minor significance** and therefore **not significant** in terms of the EIA Regulations.

#### 7.7.2.1.5 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

#### 7.7.2.1.6 Significance of Residual Effect Post Mitigation

No mitigation is required, as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

### 7.7.2.2 Potential Impacts arising from In-Feed Residue Deposition Directly Altering Benthic Habitats and Reducing Species Richness and Abundance.

#### 7.7.2.2.1 Nature of Impact

SLICE (EmBz) is an in-feed sea lice treatment, which is administered to the stock via medicated feed pellets. Post-treatment, SLICE may be deposited on the seabed via excretion of both faeces from the treated stock or via settlement of uneaten medicated feed pellets. The active ingredient, EmBz, inhibits the nerve function in arthropods (including sea lice), which may lead to paralysis of the neuromuscular system[59]. It also has low water solubility and therefore displays a high affinity with organic matter. As a result, there is the potential for interaction with non-target arthropod crustaceans.

#### 7.7.2.2.1 Duration of Impact

The impact of in-feed residue deposition is assessed as **short-term** and **temporary**. It is assessed as **short-term**, as the SLICE will only be fed for short discrete temporal periods within the production cycle, meaning that for large portions of time, SLICE will not be actively discharged into the environment. It is assessed as **temporary**, as SLICE discharge will not be continuous and permanent, but limited to discrete events.

#### 7.7.2.2.2 Sensitivity of Receptor

The benthic environment within the survey area was characterised by subtidal mud and mixed sediments of varying particle size (seapens and burrowing megafauna in circalittoral fine mud (SS.SMu.CFiMu.SpnMeg), circalittoral fine mud (SS.SMu.CFiMu) circalittoral sandy mud (SS.Smu.CsaMu), seapens, including *Funiculina quadrangularis*, and burrowing megafauna in undisturbed circalittoral fine mud (SS.SMu.CFiMu.SpnMeg.Fun), and circalittoral mixed sediments (SS.SMx.CMx)). Throughout these biotopes a range of benthic macrofauna were identified, however these species were generally of low conservation importance.

[59] Daoud, D., McCarthy, A., Dubetz, C. and Barker, D.E., 2018. The effects of emamectin benzoate or ivermectin spiked sediment on juvenile American lobsters (Homarus americanus). Ecotoxicology and Environmental Safety, 163, pp.636-645. [Online] Available at: https://www.sciencedirect.com/science/article/pii/S0147651318305657

Due to the characterising species identified in association with the subtidal mud biotopes classification identification to level 5 was possible. Due to the relatively high level of biotope classification, and the presence of characterising species the benthic environment is determined to be of **high** sensitivity.

### 7.7.2.2.3 Magnitude of Unmitigated Impact

NewDEPOMOD modelling is used to determine the permissible quantity of SLICE, through the application of a Mixing Zone. The Mixing Zone is defined by the total area within which deposition of EmBz exceeds the interim EQS of 272 ng/kg (dry weight) (136 ng/kg (wet weight)[60]. The extent of the EmBz Mixing Zone shall not exceed an area of 100 m from the pen edge, in the case of the Proposed Development this is an area of 177,000 m$^2$. NewDEPOMOD modelling for the Proposed Development predicts a Maximum Modelled Quantity (MMQ) of 37 g EmBz. This MMQ has been approved by SEPA, with a Maximum Environmental Quantity value of 26.70 g (**Appendix T**). As a result of the NewDEPOMOD model outputs indicating compliance with the Mixing Zone criteria, the spatial extent of the impact is determined to be **negligible**. **Figure 7.3** illustrates the spatial extent of the in-feed deposition Mixing Zone in relation to the benthic environment beneath the Proposed Development.

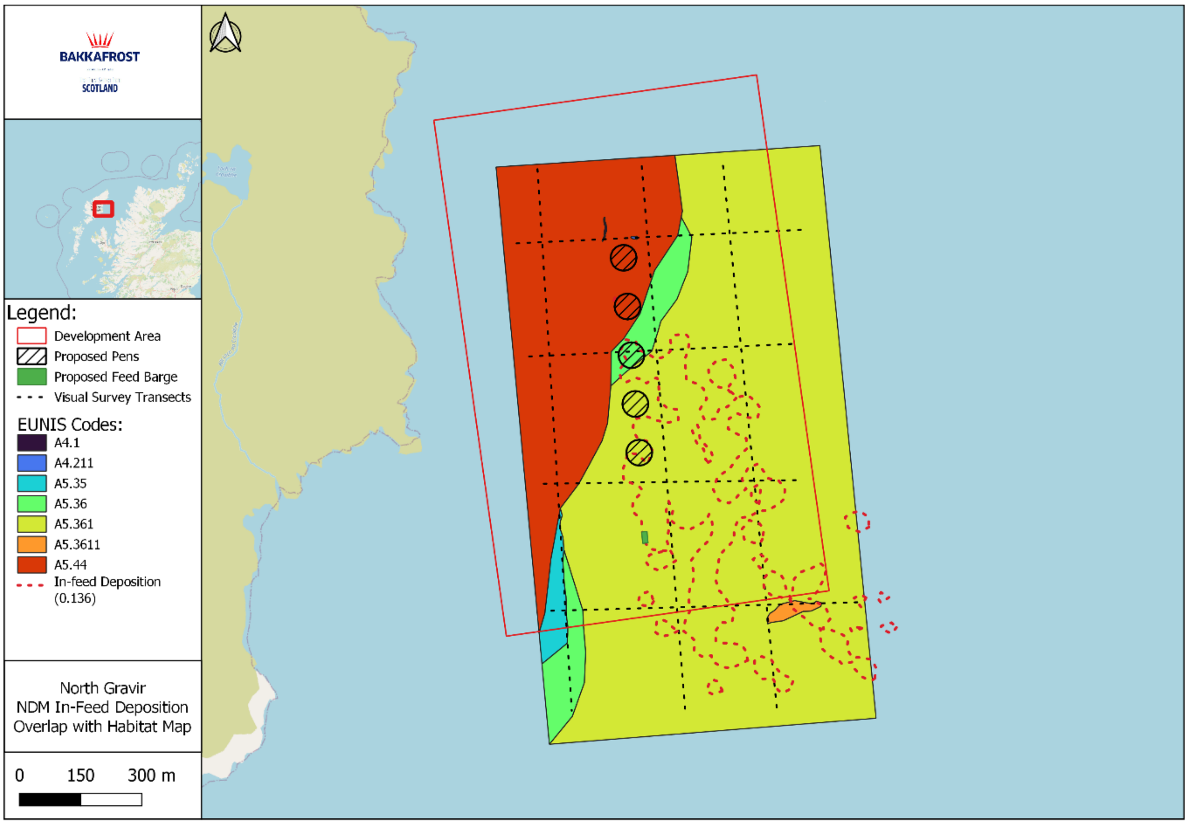


**Figure 7.3: Spatial extent of the NDM modelled in-feed deposition Mixing Zone[17].**

As outlined within **Sub-Section 7.4**, the ISLM plan will be implemented at the Proposed Development. One of the main aims of the ISLM plan is to actively reduce the use of medicinal (bath and in-feed) interventions, instead prioritising the use of biological and mechanical interventions. This will help reduce the overall volume of EmBz used throughout a production cycle and therefore help reduce the overall magnitude of the potential impact. Effective feed control and monitoring, as outlined within **Sub-Section**

[60] SEPA. Emamectin Benzoate. Interim Position Statement. March 2023. [Online] Available at: https://www.sepa.org.uk/media/594684/position_statement_embz-march-2023-approved.pdf

**7.4**, is anticipated to limit the potential for uneaten medicated feed pellets to fall out of suspension and settle on the benthos, thereby helping to reduce the magnitude of the potential impact.

As a result, the overall magnitude of the impact of SLICE (EmBz) is determined to be of **negligible magnitude**.

##### 7.7.2.2.4 Significance of Effect without Mitigation

In light of the assigned **high** sensitivity of the benthic habitat and the **negligible magnitude** of the impact, the effect is determined to be of **minor significance** and therefore **not significant** in terms of the EIA Regulations.

##### 7.7.2.2.5 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures beyond the embedded mitigation measures are required.

##### 7.7.2.2.6 Significance of Residual Effect Post Mitigation

No mitigation is required, as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

## 7.8 Cumulative Impacts

### 7.8.1 Potential Impacts arising from Organic (Carbon) Deposition Directly Altering Benthic Habitats and Reducing Species Richness and Abundance.

Within the vicinity of the Proposed Development BFS operate one other active fish farm called Gravir (FS0242). Whilst the Gravir fish farm is operated as a single fish farm it is comprised of two separate CAR licenses, Gravir West (CAR/L/1166445) and Gravir Outer (CAR/L/1003879). The cumulative organic material deposition from Gravir and the Proposed Development must be assessed to determine the spatial distribution and extent of cumulative organic material deposition.

Detailed three-dimensional marine modelling has been undertaken for the Proposed Development in-combination with the existing Gravir fish farm. This in-combination model simulation was undertaken with each of the fish farms at peak biomass with default feed rates for 365 days. The ultimate accumulation of feed and faeces was averaged over the final 90-days of the simulation. In-combination model outputs indicate a higher degree of deposition to the east of the Isle of Lewis, which is expected due to the locations of both of the existing farms. However, the model simulations indicate in-combination depositional intensity is significantly lower than the 250 $g/m^2/yr^{-1}$ threshold set by SEPA.

As a result of the marine modelling indicating that there would be no organic material deposition exceeding the 250 $g/m^2/yr^{-1}$ threshold, the impact of in-combination organic material deposition is determined to be of **negligible magnitude**.

In light of the assigned **high** sensitivity of the benthic habitat and the **negligible magnitude** of the impact, the cumulative effect is determined to be of **minor significance** and therefore **not significant** in terms of the EIA Regulations.

### 7.8.2 Potential Impacts arising from In-Feed Residue Deposition Directly Altering Benthic Habitats and Reducing Species Richness and Abundance.

The Gravir fish farm is licenced to discharge EmBz, as detailed within the individual CAR licences. As a result, the cumulative impact of EmBz discharges from Gravir and the Proposed Development need to be considered.

The two CAR licence for the Gravir fish farm sets a maximum environmental quantity of 1,641.99 g for and 136.41 g for EmBz respectively. These values stated within the CAR licences for Gravir have been set based on the relevant EQS at the time of the licence being issued. As a result, EmBz discharge from Gravir is determined to be within acceptable limits.

In March 2023, following a period of public consultation and an independent scientific peer review, the UK Technical Advisory Group (UKTAG) published its revised recommendations on the EQS for EmBz. The Scottish Ministers, after considering the UKTAG recommendations, are expected to update their directions on environmental standards to SEPA, specifically to incorporate a new revised EmBz EQS. Until such time, SEPA have updated their interim EQS for EmBz, which has been in place since March 2023[60]. This new EQS sets a Mixing Zone limit of 272 ng/kg, dry weight (136 ng/kg (wet weight)). Based on this EQS, NewDEPOMOD simulations have been run to determine the permissible quantity whilst ensuring the Mixing Zone criteria is complied with. EmBz model outputs for the Proposed Development have been reviewed and approved by SEPA. As a result, the discharge of EmBz from the Proposed Development is considered to be within acceptable environmental limits.

Furthermore, the ISLM plan is implemented at the existing two farms and will be implemented at the Proposed Development. This plan aims to actively reduce medicinal interventions (bath and in-feed) whilst promoting the use of biological and mechanical intervention options. This strategy, implemented across the three farms will help significantly reduce the frequency of in-feed interventions, and thus reduce the frequency of EmBz discharge. Effective feed control and monitoring, as outlined within **Sub-Section 7.4**, is anticipated to limit the potential for uneaten medicated feed pellets to fall out of suspension and settle on the benthos, thereby helping to reduce the magnitude of the potential impact.

As a result, the cumulative impact of EmBz discharge is of a **negligible magnitude**.

In light of the assigned **high** sensitivity of the benthic habitat and the **negligible magnitude** of the impact, the cumulative effect is determined to be of **minor significance** and therefore **not significant** in terms of the EIA Regulations.

## 7.9 Statement of Significance

The findings of the impact assessment on benthic habitats are summarised below, with the full assessment provided in **Section 7** of the EIAR.

The EIA has considered the impacts and subsequent effects on the benthic environment as a result of both organic material and in-feed residue deposition dispersed from the Proposed Development in both isolation and in-combination with the existing Gravir fish farm. This assessment has focused on the general impacts on the benthic environment in relation to the SEPA criteria. This assessment was undertaken in line with the assessment methodology detailed within **Sub-Section 2.4.1**.

The development location is considered to be a key embedded mitigation measure, as it is a high energy, well flushed location with very high dispersion potential. Dispersing any discharged waste to low levels over a wider area will reduce the magnitude of any potential effects. Other important embedded mitigation measures include:

- Farm Design and Layout (design);
- NewDEPOMOD modelling (design);
- Feed control and monitoring (operational);
- Pellet Detection Software (operational);
- SEPA CAR Licensing (operational);
- Environmental Monitoring Plan (operational);

- Environmental Quality Standards (operational);
- Fallowing (operational);
- Enforcement (operational); and
- Integrated Sea Lice Management Plan (ISLM) (operational).

In isolation, the Proposed Development is anticipated to meet the SEPA Mixing Zone criteria for both organic material and EmBz deposition. NewDEPOMOD model outputs have been reviewed and approved by SEPA. These outputs indicate that the Proposed Development's organic material Mixing Zone is 117.17 % of the permissible 120 %. Furthermore, average depositional intensity within the Mixing Zone was simulated to be 360.2 $g/m^2/yr^{-1}$, which is considerably lower than the 4,000 $g/m^2/yr^{-1}$ threshold set by SEPA. NewDEPOMOD model simulations indicate that EmBz deposition complies with the current interim Environmental Quality Standard (EQS). In light of the overall **negligible magnitude** of the impact of both organic material and in-feed residue deposition from the Proposed Development, the effect is determined to be of **minor significance** and therefore **not significant** in terms of the EIA Regulations.

In combination, the Proposed Development and Gravir were assessed via detailed three dimensional marine modelling to determine the cumulative impact of organic material deposition. The model simulations indicate that no medium to far field deposition, above the 250 $g/m^2$ threshold, is likely to occur as a result of both fish farms operating at maximum biomass for a 365 day period. As a result, the overall magnitude of the cumulative impact is determined to be **negligible**. In light of the overall **negligible magnitude** of the cumulative impact, the cumulative effect is determined to be of **minor significance** and therefore **not significant** in terms of the EIA Regulations.

Cumulative impacts as a result of EmBz discharge from both fish farms were also assessed. Both fish farms have approved EmBz discharge limits, based on the Mixing Zone criteria, which ensure that any environmental impacts are within acceptable levels, through compliance with the relevant EQSs. As a result, the overall magnitude of the cumulative impact of in-feed residue deposition from the Proposed Development, in combination, is determined to be **negligible**. In light of the overall **negligible magnitude** of the cumulative impact, the cumulative effect is determined to be of **minor significance** and therefore **not significant** in terms of the EIA Regulations.

## 7.10 Data Limitations and Uncertainties

There are a number of limitations and uncertainties associated with the overall evaluation of impact and effect on the benthic environment. However, it is determined that these limitations do not undermine the robustness of the assessment. These include aspects such as:

- **NewDEPOMOD model outputs:** SEPA NewDEPOMOD guidance state that proposed fish farms shall be modelled using the SDM. This method makes a number of assumptions. SDM also stipulates that a uniform bathymetry shall be applied to the model domain. As a result, the modelled deposition is not influenced by the heterogeneity of the seabed. NewDEPOMOD SDM outputs are considered a risk assessment of the potential benthic impacts and are believed to be highly conservative in nature; and
- **Benthic auditing:** As the Proposed Development is not operational, there are no observed benthic datasets available for use in this impact assessment. As such the NewDEPOMOD SDM model outputs have been used to provide a worst-case scenario of potential benthic impact.

# 8 Water Column Impacts

## 8.1 Introduction

Salmon aquaculture can potentially increase nutrient levels within the marine environment above baseline conditions. The majority of uneaten feed pellets and faeces will fall out of suspension and settle on the benthos below the pens. However, a small proportion will either be held in suspension or dissolved within the water column and then transported throughout the wider marine environment. Carbon, nitrogen and phosphorus are the main nutrient components of discharged material. The nitrogenous component is of particular importance in the marine environment, as it is predominately nitrogen levels that limit primary productivity. Therefore, an increase in primary productivity and an associated increase in phytoplankton biomass, as a result of nitrogen enrichment, has the potential to cause cultural eutrophication in the marine environment, assuming HG conditions are suitable.

## 8.2 Scoping

The potential for significant effects on the water column was raised by consultees in their specific Scoping advice, in response to the Screening and Scoping Request submitted to CES. A brief summary of the requirements of the consultees is provided below in **Table 8.1** and a full review of the Scoping information requirements is provided in **Section 5**.

**Table 8.1: Summary of required information relevant to water column impacts.**

| Consultee | Information Requirement | Cross Reference |
|---|---|---|
| MD | • Request that the ECE report be re-submitted with the planning application. | Section 8; and<br>Appendix M (Nutrient Calculations). |
| SEPA | • Request that modelling is undertaken to determine the quantities of bath medicines;<br>• Request that the ECE report be re-submitted with the planning application. | Section 8;<br>Appendix L (Marine Modelling); and<br><br>Appendix M (Nutrient Calculations). |

## 8.3 Embedded Mitigation

### 8.3.1 Design Mitigation

Detailed below is an outline of the key design aspects of the Proposed Development anticipated to mitigate the magnitude of impacts on the surrounding water environment.

#### 8.3.1.1 Development Location

The development location was selected based on hydrographic data indicating that the location is a well flushed and highly energetic site. These conclusions were supported by SEPA, who stated in the Modelling Screening and Risk Identification Report[61] that;

***"Due to the relatively high dispersion nature of the waters surrounding the site, nutrient discharges from Gravir North are unlikely to have a strong influence on the surrounding sea area."***

[61] Scottish Environment Protection Agency (SEPA): Modelling Screening and Risk Identification Report – North Gravir. [Online] Available at: https://www.sepa.org.uk/regulations/water/aquaculture/screening-modelling-and-risk-identification-report/

### 8.3.2 Operational Mitigation

Detailed below is an outline of the key operational aspects of the Proposed Development anticipated to mitigate the magnitude of impacts on the surrounding water environment.

#### 8.3.2.1 Optimised Feed Composition

Fish feed used by BFS across all marine farming operations has been developed to mimic the natural diet of salmon and is highly digestible, reducing the potential for nutrient release into the water column. Bakkafrost focuses on ensuring an optimal diet is produced and provided to the stocked fish. This optimised feed ensures efficient nutrient conversion, meaning that the amount of soluble nutrients released into the water column is minimised.

#### 8.3.2.2 Staff Training Programme

Site staff will receive specific in-house training on feed, feeding, fish growth and development as part of the Marine Competency Framework.

#### 8.3.2.3 Feeding Strategy

Feeding will be in accordance with established guides and staff will be able to adapt the feeding regime as necessary, for example, if weather conditions are temporarily affecting feeding behaviour. This will reduce the potential for feed to be wasted due to feeding inappropriately to appetite.

#### 8.3.2.4 Feed Monitoring and Control

Feeding operations will be conducted from the feed barge or a shorebase where feed input can be adjusted as required and high-definition cameras, within each pen, allow for close monitoring of the feed response. This will allow real-time adjustments and cessation of feeding when required, reducing feed wastage and minimising the potential for nutrient enrichment.

## 8.4 Baseline Condition

The Proposed Development is located to the east of the Isle of Lewis and is influenced by a semi-diurnal microtidal regime with a mean spring range of 4.1 m. The Proposed Development is considered exposed to significant sea swell to the northeast, where a significant fetch exists through the North Minch to the Northeast Atlantic. The Proposed Development is located approximately 550 m east of the Isle of Lewis coastline with mean water depths between 48 and - 64 mCD. In the absence of any significant freshwater discharge in the vicinity of the Proposed Development, the development location is considered well mixed and flushed by tidal and frictional wave related currents.

Hydrographic data, obtained through two consecutive ADCP deployments, indicates that the development location is highly flushed, with a high dispersion potential, resulting in a very high capacity for erosion of material from the benthos. The recorded mean near-bed velocity was 0.131 m/s, with a maximum near-bed velocity of 0.460 m/s. The recorded 90-day near-bed hydrographic dataset exceeded the critical resuspension threshold of 0.095 m/s 63.0 % of the time. As a result, it is anticipated that few sediments will become consolidated within the benthos beneath the Proposed Development, allowing for rapid re-suspension and dispersion across the wider marine environment.

The Proposed Development is located within the Scotland River Basin District, specifically within the ‘Rubha na Creige More to Gob Rubh Uisinis’, coastal waterbody (ID: 200179). This waterbody covers a surface area of 12.7 $km^2$. The Water Framework Directive (WFD) classification scheme assigned an overall status and overall ecological status of ‘Good’ in 2023. **Table 8.2**, details the specific parameter scores for the waterbody over time from 2007 to 2023, inclusive. **Table 8.2** indicates that the DIN status of the waterbody has been classified as ‘High’ from 2008 to 2023, which indicates that the waterbody has conditions that are associated with no, or very low, anthropogenic pressure. Therefore, the ‘Rubha na Creige More to Gob Rubh Uisinis’ waterbody is determined to be a ‘High’ sensitivity receptor.

**Table 8.2: Scotland river basin management – Rubha na Creige More to Gob Rubh Uisinis parameter scores, 2007 to 2023.**

| ID | Name | Parameter | 2023 | 2022 | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 | 2009 | 2008 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 200179 | Rubha na Creige More to Gob Rubh Uisinis | 1: Overall status | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | High | High |
| | | 1-1: Pre-HMWB status | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | High | - |
| | | 1-3: Overall ecology | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | High | High |
| | | 1-3-1: Physico-Chem | High | High | High | High | High | High | High | High | High | High | High | High | High | High | High | High | - |
| | | 1-3-1-4: Dissolved Oxygen | High | High | High | High | High | High | High | High | High | High | High | High | High | High | High | High | - |
| | | 1-3-1-8: Dissolved inorganic nitrogen | High | High | High | High | High | High | High | High | High | High | High | High | High | High | High | High | - |
| | | 1-3-2: Biological elements | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | High | High |
| | | 1-3-2-3: Invertebrate animals | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | High | High |
| | | 1-3-2-3-4: Benthic invertebrates (IQI) | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | High | High |
| | | 1-3-2-9-1: Phytoplankton | High | High | High | High | High | High | High | High | High | Good | Good | - | - | - | - | High | High |
| | | 1-3-3: Specific pollutants | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass |
| | | 1-3-3-15: Unionised ammonia | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass |

| ID | Name | Parameter | 2023 | 2022 | 2021 | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 | 2009 | 2008 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1-3-4: Hydro-morphology | High | High | High | High | High | High | High | High | High | High | High | High | High | High | High | High | High |
| | | 1-3-4-1: Morphology | High | High | High | High | High | High | High | High | High | High | High | High | High | High | High | High | High |
| | | 4-1: Water quality | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | Good | - | - | - | - | - | - |

The 'Locational Guidelines for the Authorisation of Marine Fish Farms in Scottish Water', published by the MD, categorise coastal waterbodies based on model calculated indices to predict nutrient enrichment and percentage areas of seabed degraded by organic carbon deposition. Based on the outputs of both the nutrient and benthic models, an index from 0 to 5 is assigned to each water body for both modelled variables (nutrient enhancement and benthic impact). The two indices for each waterbody are then added together to give a simple combined index for each waterbody. The resultant single index, scaled from 0 to 10, therefore provides an indication of the relative sensitivity of a waterbody for further fish farm development. Waterbodies with the highest combined index value are considered most sensitive to the expansion of fish farming operations and as such are classified as Category 1 areas. **Table 8.3**, below provides a summary of the three categories in relation to fish farm development.

**Table 8.3: Summary of the three categories defined under the Locational Guidelines.**

| Category | Combined Index Score | Definition |
|---|---|---|
| 1 | 7 – 10 | Areas where the most precautionary approach to further fish farming development should be adopted. |
| 2 | 5 – 6 | Areas where the new development or expansion of existing sites would not result in areas being re-categorised as Category 1. |
| 3 | 0 – 4 | Areas where there appears to be better prospects of satisfying nutrient loading and benthic impact requirements. |

The 'Rubha na Creige More to Gob Rubh Uisinis' waterbody is uncategorised for both nutrient enhancement and benthic impact indices, by the Locational Guidelines, and is considered to be open and unrestricted in nature. This indicates that the waterbody has a low sensitivity to further aquaculture development.

### 8.4.1 Evolution of the Baseline Condition

The EIA Regulations require that; ***"A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge"*** (EIA Regulations, Schedule 4, Paragraph 3), is included within the EIAR. Therefore, this Sub-Section of the EIAR, provides a qualitative description of the evolution of the baseline condition, on the assumption that the installation and subsequent long-term operation of the Proposed Development does not take place. The description is based on available information and scientific knowledge of the features identified within the baseline condition.

The water environment is currently faced with a number of potential pressures, including diffuse pollution and discharges of wastewater. These pressures have the potential to negatively impact water quality and result in the decline of waterbody status[62].

[62] SEPA. Environment, Water. [Online] Available at: https://www.sepa.org.uk/environment/water/

Eutrophication is a major problem for water quality on a global scale. Whilst eutrophication is well documented within coastal water bodies, it is also a phenomenon that impacts the open sea environment. Eutrophication has been linked to numerous anthropogenic, climatic and hydrospheric drivers worldwide. The scientific literature indicates that within well flushed coastal water bodies eutrophication is primarily related to nitrogen concentrations, whilst in more sheltered locations phosphorus concentrations appear to be the primary driver of eutrophication. In the open sea environment, eutrophication appears to correlate to climatic and hydrospheric trends, such as wind speed and salinity. Within coastal water bodies, anthropogenic land-based nutrient loading has considerable influence on water quality[63].

Within Scotland, the River Basin Management Plan (RBMP) sets out the framework for protecting and improving the water environment. The current RBMP builds on previous RBMPs published in 2009 and 2015 and sets revised objectives for the period from 2021 to the end of 2027, whilst also providing a programme of actions for achieving the objectives of improving water quality across Scotland[64].

Water quality is now in good or better condition in 87 % of Scotland's water environment. This has increased from 82 % at the time of the publication of the second RBMP in 2015. This improvement in national water quality reflects improvements made through Scottish Water's investment programme and the sustained efforts of a number of stakeholders to improve rural land management practices and reduce diffuse pollution[64].

The Rubha na Creige More to Gob Rubh Uisinis (ID: 200179) waterbody, in which the Proposed Development will be located, has displayed a stable trend in key water quality parameters throughout the period 2007 to 2020 (last year of assessment data). During this period the overall status of the water body has remained stable with Good status since 2009 (previously High status in 2008 and 2007). The overall ecological status of the waterbody has mirrored the trend in overall status, being stable with Good status. With regard to DIN, the water body has recorded a High status throughout the duration of the assessment period (2008 to 2020)[65]. As a result, it is concluded that the receiving water body represents a stable water environment with limited significant variation in water quality over time.

Therefore, in the absence of Proposed Development, no alterations to the evolving baseline condition of the water environment, in respect of water quality, are anticipated to occur.

## 8.5 Methodology

Nutrient enhancement budgets have been calculated, which give a representation of the amount of nutrient waste released from salmon farming. These budgets consider the expected total production from the consented biomass and use the intended FCR to determine the total feed input throughout the production cycle. By using the feed manufacturer's value for nutrient content of the feed and the relative nutrient content in the fish, the amount of particulate and soluble nutrient waste released to the receiving marine environment can be determined. Most of these nutrients are in the bio-available form of ammonium ($NH_4^+$).

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[63] Vigouroux, G., Kari, E., Beltrán-Abaunza, J.M., Uotila, P., Yuan, D. and Destouni, G., 2021. Trend correlations for coastal eutrophication and its main local and whole-sea drivers–Application to the Baltic Sea. Science of the Total Environment, 779, p.146367. [Online] Available at: https://www.sciencedirect.com/science/article/pii/S0048969721014352

[64] SEPA. The River Basin Management Plan (RBMP) for Scotland 2021 to 2027. [Online] Available at: https://www.sepa.org.uk/media/594088/211222-final-rbmp3-scotland.pdf

[65] SEPA. Water Classification Hub. Flodaigh Beag to Rubha Roiseal (ID: 200479). [Online] Available at: https://www.sepa.org.uk/data-visualisation/water-classification-hub/

The ECE equation has been used to assess the impact of nitrogen loading of the surrounding marine environment and the potential for nutrient enrichment as a result of the Proposed Development. The ECE equation was developed by the MD for the 'Locational Guidelines for the Authorisation of Marine Fish Farms in Scottish Waters'. These guidelines classify waterbodies in terms of environmental sensitivity (category 1,2, and 3) and are designated on the basis of the MD predictive models, which estimate nutrient enhancement and benthic impact.

The equation estimates the enhancement of nitrogen above background levels, which occurs as a result of salmon aquaculture, assuming that all the released nitrogen is conserved in the environment and only removed by tidal flushing. The ECE model considers dissolved nitrogen, but also emissions of particulate nitrogen and nitrogen which has re-dissolved into the water column from the benthos.

$$ECE = S * M / Q$$

Where:

S = Source Rate (kg N / Tproduction$^{-1}$))

M = Total Consented Biomass (T)

Q = Flushing Rate ($m^3$ $yr^{-1}$)

Source rate is calculated through the budgets discussed above and the proposed biomass is 4,680 T. To assess site specific nutrient enhancement, the hydrographic conditions of the marine environment must also be considered. In enclosed loch systems, the flushing rate is determined using the volume of the loch and the flushing time, which is defined as the number of days it takes for 60 % of the water in a well-mixed system to exchange with open seawater outside the loch.

The Proposed Development is in an open water location. For the purposes of the calculation, the flushing rate has been calculated using the mean low water volume and the flushing time, both calculated from UKHO bathymetry data, and based on the box model method. The low water volume is calculated for a 10 $km^2$ box area, based on the SEPA definition in NewDEPOMOD depositional modelling that unconstrained water systems should be limited to a 10 $km^2$ box. This is detailed in **Appendix M**.

The estimates of enhancement of nitrogen concentration should be assessed against recognised quality standards. The SEPA EQS for dissolved available inorganic nitrogen is 168 µg/L (Working Arrangement Requirements of Statutory Consultees (SEPA, NS, MD, and the District Salmon Fisheries Board) and consultation protocol for marine aquaculture planning applications, July 2010). Calculated ECE values should be assessed against this SEPA EQS. In addition, the Oslo & Paris Commission (OSPAR) and UKTAG recommends that cumulative enhancement values should be added to the locally relevant worst case (winter) background concentrations to assess the risk of potential enrichment. OSPAR sets a quality standard criterion for nutrients at 50 % above background, therefore, the calculated cumulative ECE, added to background levels, should not exceed 50 % of the locally relevant background winter concentrations.

## 8.6 Identified Potential Impacts

Potential impacts, as a result of nutrient enhancement, have been identified during the operational phase of the Proposed Development. As detailed within **Sub-Section 8.1** uneaten feed pellets and faecal waste from the stocked fish have the potential to contribute to the overall nutrient loading of the receiving waterbody. As nitrogen is the primary limiting factor for primary production within coastal waters, the potential discharge of nitrogenous waste may lead to significant increases in primary productivity within the receiving waterbody which, under suitable HG conditions, may lead to cultural eutrophication where anthropogenic activity accelerates the natural eutrophication cycle in waterbodies.

Potential impacts that will be assessed in detail are outlined below:

- Nutrient enhancement as a result of operation of the proposed development.

# 8.7 Impact Assessment

## 8.7.1 Construction Impacts

It has been determined that the construction (and decommissioning) phase of the Proposed Development is unlikely to result in alterations to the overall nutrient loading of the Rubha na Creige More to Gob Rubh Uisinis waterbody. As such, impacts resulting from the construction (and decommissioning) of the Proposed Development have been scoped out of the EIA.

## 8.7.2 Operational Impacts

This Sub-Section assesses the potential impacts arising from the operation of the Proposed Development in on the receiving waterbody in terms of nutrient enhancement.

### 8.7.2.1 Nutrient Enhancement as a Result of Operation of the Proposed Development.

#### 8.7.2.1.1 Nature of Impact

Uneaten feed released into the water column or onto the benthos in the vicinity of a fish farm can potentially lead to an increase in locally available nutrient levels. This may result in localised changes to faunal assemblages in both the pelagic and benthic zone.

#### 8.7.2.1.2 Duration of Impact

Operational activities of the Proposed Development will result in **long term**, but **temporary,** impacts on the receiving waterbody. They are considered to be long-term as, throughout each production cycle, the Proposed Development will discharge nutrients into the environment. They are considered to be temporary as, between each production cycle, the Proposed Development will undergo a fallow period of at least 28 consecutive days. During this period, no nutrient discharges will occur. Therefore, the impact is avoided for temporary periods.

#### 8.7.2.1.3 Sensitivity of Receptor

The Rubha na Creige More to Gob Rubh Uisinis waterbody (ID: 200179) has been assigned a sensitivity of '**high**'.

#### 8.7.2.1.4 Magnitude of Unmitigated Impact

The ECE for the Proposed Development is 1.53 µg/L (**Table 8.4**), a level which represents just 0.91 % of SEPA EQS for DIN (168 µg/L). This ECE value is also considered to be the worst-case scenario, as it has been assumed that all the nitrogen will be dispersed in the surrounding water column at mean low water springs (MLWS) tidal levels. Furthermore, the source rate used in the calculations includes both dissolved and particulate nitrogen. However, the SEPA EQS is only set for dissolved available nitrogen, meaning that a higher nitrogen loading has been used for comparison against the SEPA EQS.

**Table 8.4: North Gravir Nutrient Enhancement Calculations**

| Site Name | Biomass | Budget | Source Rate (kg N $T^{-1}$ production) | Flush Rate ($m^3/yr^{-1}$) | ECE (kg $m^3$) | ECE (µg/L) | % ECE of SEPA EQS |
|---|---|---|---|---|---|---|---|
| Proposed North Gravir | 4680 | Black | 66.37 | 1.7558E+11 | 0.000001517 | 1.77 | 1.05 |
| | 4680 | OSPAR | 57.63 | 1.7558E+11 | 0.000001317 | 1.54 | 0.91 |
| | 4680 | FRS | 48.20 | 1.7558E+11 | 0.000001102 | 1.28 | 0.76 |
| Average | | | | | | 1.53 | 0.91 |

The calculation indicates that the level of nitrogen released would be minimal and the potential for enrichment would be minimised. As a result, the impact is determined to be of a **negligible magnitude.**

#### 8.7.2.1.5 Significance of Effect without Mitigation

In light of the assigned **high** sensitivity of the Rubha na Creige More to Gob Rubh Uisinis coastal waterbody and the **negligible magnitude** of the impact, the effect is determined to be of **minor significance** and therefore **not significant** in terms of the EIA Regulations.

#### 8.7.2.1.6 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

#### 8.7.2.1.7 Significance of Residual Effect Post Mitigation

No mitigation is required, as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

## 8.8 Cumulative Impacts

In addition to the Proposed Development, BFS also operate the Gravir fish farm. Gravir is located 1.6 km (by sea) southwest of the Proposed Development within the same water body, to the east of the Isle of Lewis. As SEPA state that an unconstrained waterbody should be limited to a 10 $km^2$ box, these sites are partially located within the defined 10 $km^2$ domain for the Proposed Development. As a result, the combined nutrient enhancement of the estimated nitrogen loading in the area will be 2.45 µg/L. This estimated level of the Proposed Development and current operations is 1.46 % of the SEPA EQS (168 µg/L).

## 8.9 Statement of Significance

The findings of the impact assessment on the water column are summarised below, with the full detailed assessment provided in **Section 8** of the EIAR.

The EIA has considered the potential impacts and subsequent effects on the receiving water body as a result of nutrient enhancement through the operation of the Proposed Development. Due to the presence of additional site in the vicinity of the Proposed Development, and the recommendation from SEPA that unconstrained waterbodies should be limited to a 10 $km^2$ domain, the existing fish farm off the east coast of the Isle of Lewis fall within the 10 $km^2$ domain for the Proposed Development, therefore cumulative impacts have been included in this assessment. This assessment was undertaken in line with the assessment methodology detailed within **Sub-Section 2.4.1**.

A DBA was undertaken to inform the baseline condition. The Proposed Development is located within the Scotland River Basin District, specifically within the 'Rubha na Creige More to Gob Rubh Uisinis', coastal waterbody (ID: 200179). This waterbody covers a surface area of 12.7 $km^2$. The Water Framework Directive (WFD) classification scheme assigned an overall status and overall ecological status of 'Good' in 2020. The Dissolved Inorganic Nitrogen (DIN) DIN status of the waterbody has been classified as 'High' from 2008 to 2023, which indicates that the waterbody has conditions that are associated with no, or very low, anthropogenic pressure. Therefore, the 'Rubha na Creige More to Gob Rubh Uisinis' waterbody is determined to be a 'High' sensitivity receptor.

A number of embedded mitigation measures have been incorporated into both the design and operation of the Proposed Development, including:

- Development location (design);

- Optimised feed composition (operational);
- Staff training programme (operational);
- Feeding strategy (operational); and
- Feed monitoring and control (operational).

The Equilibrium Concentration Enhancement (ECE) calculations for the Proposed Development indicate that nutrient concentrations released into the water column will be **negligible**, with a nitrogenous component value of 2.45 µg/L predicted, this value represents just 1.46 % of the SEPA EQS, of 168 µg/L, for DIN loading in coastal waters.

The 2.45 µg/L value of nitrogenous waste predicted to be released from the Proposed Development can be considered a 'worst-case scenario', as it has been assumed that the nitrogenous component will be dispersed into the water column at Mean Low Water Springs (MLWS), and that the released nitrogenous waste will be conserved and only removed by tidal flushing. Additionally, the source rate includes both dissolved and particulate nitrogen; whereas the SEPA EQS is only set for DIN (ammonia, nitrate, and nitrite). As a result, a higher nitrogen loading value, inclusive of both dissolved and particulate nitrogen, has been used for the comparisons against the SEPA EQS to determine significance, resulting in conservative findings.

There has been concern regarding the contribution from fish farms to the total coastal nutrient budget and waterbody carrying capacity, for these reasons the ECE equation has been developed. These data presented here indicate that the total impact of the nitrogenous waste component of the nutrient input from the Proposed Development within the 10 $km^2$ box model domain is of **negligible** overall magnitude. In light of the overall **negligible magnitude** of the impact, the effect is determined to be of **negligible significance** and therefore **not significant** in terms of the EIA Regulations.

## 8.10 Data Limitations and Uncertainties

There are a number of limitations and uncertainties associated with the overall evaluation of impact and effect on the benthic environment. However, it is determined that these limitations do not undermine the robustness of the assessment. These include aspects such as:

- **ECE calculation assumptions:** The ECE calculations make a number of assumptions. These assumptions include:
    - Nutrient discharges into the receiving waterbody will take place at MLWS, when the water volume is at the lowest;
    - The nitrogenous component of the nutrient discharges will be conserved within the water column and not influenced by biotic processes, only being removed by tidal flushing;
- **ECE calculation source rate**: The source rate of nitrogen used to drive the calculations within the ECE model includes both dissolved and particulate nitrogen. Whereas the SEPA EQS, against which the ECE calculation output is compared, is set only for DIN (ammonia, nitrate, and nitrite). As a result, the findings of the ECE calculation, in relation to the SEPA EQS are considered highly conservative and represent the worst-case scenario.

# 9 Interactions with Predatory Species

## 9.1 Introduction

This technical assessment considers the potential impacts of the Proposed Development as a result of interactions with predatory species. This Section follows EcIA methodology and therefore assesses the impact of the Proposed Development on identified IEFs within the baseline condition. Impacts have been limited to direct interactions as a result of predatory behaviour; therefore, this Section presents an assessment of the impact of entanglement and entrapment only.

**Section 11** of this EIAR provides an assessment of the other potential impacts of the Proposed Development on identified IEFs within the baseline. An assessment of designated European sites has also been undertaken in the Report to Inform Appropriate Assessment (RIAA) (**Appendix O**). The scope of the RIAA has been informed by Scoping Advice provided by CnES and NS in response to the formal Screening and Scoping Request (22/00290/FFSCSC). Based on the conclusions of the Scoping Report and the advice received the following designated European Sites were considered within the RIAA:

- St. Kilda SPA;
- Seas off St. Kilda SPA;
- The Inner Hebrides and the Minches SAC; and
- North Rona and Sula Sgeir SPA.

## 9.2 Scoping

The potential for significant effects as a result of interactions with predatory species was raised by consultees in their specific Scoping advice, in response to the Screening and Scoping Request submitted to CnES. A brief summary of the requirements of the consultees is provided below in **Table 9.1** and a full review is provided in **Section 5**.

**Table 9.1: Summary of required information relevant to interactions with predatory species.**

| Consultee | Information Requirement | Cross Reference |
|---|---|---|
| NS | • Request confirmation on the use of ADDs and state the need for an EPS licence application; and<br>• Request detail on the proposed pole-mounted top net system including; numbers of pole supports per pen, supporting pole lengths and height above handrails, side net mesh size, ceiling net mesh size, and net colour. | Section 9;<br><br>Section 11;<br><br>Appendix E (EMP, including PCP and ECP); and<br><br>Appendix O (RIAA). |
| CnES | • Request that the Predator Control Plan be submitted with the planning application; and<br>• Request specific details on the use of ADDs and the potential need for an EPS licence application. | Section 9;<br><br>Section 11;<br><br>Appendix E (EMP, including PCP and ECP); and<br><br>Appendix O (RIAA). |

# 9.3 Embedded Mitigation

## 9.3.1 Design Mitigation

An outline of the key design measures related to mitigating the impact of the Proposed Development on identified predatory IEFs, along with other avian and mammalian predatory species, within the baseline is presented below.

### 9.3.1.1 Containment Net Strategy

BFS will install enhanced, high rigidity primary netting at the Proposed Development. High rigidity netting (Sapphire Seal Pro, or similar) is constructed out of different combinations of polyolefins and co-polymers and, as such, it is highly compact, resulting in a final product that displays greater rigidity than that of regular polyethylene (PE) braided netting. This netting also has a higher bite and cut resistance than traditional containment netting and, therefore, provides an additional level of predator deterrence. High rigidity netting has a knotted mesh, with large rough knots on the outer surface of the netting and a smooth inner surface, presented to the stocked fish. These large rough knots help reduce seal depredation, as the knot structures irritate the sensitive skin on the noses of seals.

An effective net tensioning system (sinker tubes) will ensure that all pen nets are highly tensioned and thereby hold their volume and structure within the water column. It is proposed that a sinker tube system will be deployed to ensure correct tensioning. Correct tensioning of the primary netting will help reduce the impact of predator interactions, as a uniformly taut pen net presents as a ‘wall’ to any underwater predator. As such, there will be no slack areas in the netting for entanglement or purchase through which seal can grab or bite stocked fish.

### 9.3.1.2 Bird Nets

The Proposed Development will deploy pole-mounted top nets, this netting will have a ceiling mesh size of 75 mm and a sidewall mesh size of 75 mm. This pole-mounted system will prevent avian predators from aggregating on the top netting in order to access fish feed or stocked fish. The top netting will be correctly tensioned to ensure maximum effectiveness by minimising the potential for ingress into pen by avian predators and by reducing the risk of both entanglement and entrapment. The deployment of 100 mm (ceiling) and 75 mm (sidewall) mesh for pole-mounted top netting is in line with current guidance from NS[20] and mitigates the potential for entanglement and entrapment.

Top netting will be inspected and re-tensioned on a daily basis as part of the site containment checks and records of this will be held onsite (**Appendix E**). Maintenance will be conducted as and when required, based on the findings of the daily containment checks. The combination of daily containment checks, and maintenance will ensure that the top netting is effective at both deterring avian predator interactions and reducing the likelihood of entanglement and entrapment.

### 9.3.1.3 Feed Storage and Feeding

Feed will be stored in the purpose-built feed silos on the feed-barge, these silos are securely sealed from the external environment. This will help prevent avian attraction to the Proposed Development. Feed will be delivered to the feed barge via feed delivery vessels, where feed will be emptied straight into the silos and no feed bags will be stored on the deck of the feed barge.

Feed will be delivered to each pen through an automated feed system. Feed will be pumped, via a high-pressure air system, from the feed silos to a feed spreader in each pen, through sealed feed pipes. The feed spreaders will face downwards to ensure feed is not sprayed into the air. High-definition cameras will be used to monitor the feeding operations to ensure that the feed spreaders are working correctly.

### 9.3.2 Operational Mitigation

An outline of the key operational measures related to mitigating the impact of the Proposed Development on identified predatory IEFs within the baseline is presented below.

#### 9.3.2.1 Best Practice Husbandry Procedures

Best practice husbandry procedures will be employed at the Proposed Development to ensure fish health and welfare are maintained at a high standard throughout the production cycle. Full details of fish health and welfare husbandry procedures are outlined in **Sub-Section 3.3.2**.

The presence of mortalities building up at the base of pens is a known attractant to seal species. Therefore, an effective mortality removal procedure, such as the one proposed in **Sub-Section 3.3.3**, can reduce the potential for predatory interactions.

#### 9.3.2.2 Pellet Detection Software

BFS is implementing 'Observe' pellet detection software across all marine farms, including the Proposed Development. This software is intended to improve the efficiency of feeding operations, with the aim of reducing the amount of feed pellets used allowing BFS to be more sustainable both economically and environmentally.

#### 9.3.2.3 Acoustic Deterrent Devices (ADDs)

BFS will not use ADDs as standard practice at the Proposed Development. In circumstances of exceptional welfare concern for stocked fish, BFS will consult with NS, the LPA, and the MD-LOT to discuss how best to proceed and to obtain approval for any ADD use. It is likely that an EPS licence will be required for all currently available ADDs and this can be applied for via the MD-LOT who will consult with NS on any applications.

#### 9.3.2.4 Anti-Predator Netting

BFS has committed to not using anti-predator netting at the Proposed Development, in the interests of nature conservation. In circumstances of exceptional welfare concern for stocked fish, BFS will consult with NS and the LPA on the feasibility of alternative options.

#### 9.3.2.5 Predator Control Plan (PCP)

The PCP for the Proposed Development (**Appendix E**) outlines the adaptive management measures in place to mitigate against predatory interactions. The various measures are detailed within the PCP and a summary is provided below:

- Wildlife assessment;
- Wildlife logbook;
- Net tensioning and seal blinds; and
- Effective husbandry.

#### 9.3.2.6 Monitoring and Reporting

BFS will monitor and report any incidences of entanglement and entrapment at the Proposed Development, as is currently undertaken at BFS farms using pole-mounted top nets. The requirements of the monitoring and reporting programme will be in line with those outlined by NS, through the Interim Technical Briefing Note: Pole-mounted Top Nets and Birds at Finfish Farms[66]. A summary of the requirements is presented below:

- Maintain daily records of wildlife entanglements or entrapment at the development and submit six-monthly returns to the LPA and to NS; and

[66] NatureScot: Interim Technical Briefing Note: Pole-mounted Top Nets and Birds at Finfish Farms. [Online] Available at: https://www.nature.scot/doc/interim-technical-briefing-note-pole-mounted-top-nets-and-birds-finfish-farms

- Provide written immediate notification to the LPA and NS of the occurrence of any entrapment or entanglement of any single bird species in the event that in relation to a single bird species:
  - three or more birds become entangled or entrapped on a single day or
  - ten or more birds become entangled or entrapped in any seven-day period or
  - one or more birds become entangled or entrapped on four or more consecutive days.

### 9.3.2.7 Wildlife Logbook Monitoring

The Proposed Development will keep a logbook of all wildlife noted in the vicinity. This will include a comment on the interaction type, e.g., distant sighting, or direct interaction with fish farm infrastructure. This wildlife logbook will help understand patterns in species utilisation of the area over time.

## 9.4 Baseline Condition

Evidence from the literature indicates that there are 12 key taxa that display depredation behaviour in relation to marine salmon farms within Scottish waters[67]. These include:

- Grey seal (*Halichoerus grypus*);
- Common seal (*Phoca vitulina*);
- European shag (*Gulosus aristotelis*);
- Grey heron (*Ardea cinerea*);
- Great cormorant (*Phalacrocorax carbo carbo*);
- Gull *spp.* (*Larus* genus);
- European otter (*Lutra lutra*);
- Northern gannet (*Morus bassanus*);
- Northern fulmar (*Fulmarus glacialis*);
- Common guillemot (*Uria aalge*);
- Black guillemot (*Cepphus grylle*); and
- American mink (*Neovison vison*).

Within one study[67], which assessed predator interactions across 195 marine salmon farms, predatory interactions with both grey and common seal were most common, being recorded at 81 % of the marine salmon farms included in the sample. Therefore, both grey and common seal are considered primary predatory species, with all other species, listed above, considered to be secondary predatory species.

The DBA sought to determine the presence, as well as the abundance, of these twelve key predatory taxa within a 10 km radius of the Proposed Development. The DBA examined a number of data sources in order to determine the baseline condition of predatory species. The operational wildlife logbook of Gravir were collated and reviewed. Gravir is 1.6 km from the Proposed Development. The DBA also utilised publicly available data sources, under Open Government Licence (OGL), including; the NBN, GeMS and SMP data.

Designated sites (European and National), that have been scoped in for further assessment based on the formal Scoping Opinion and individual consultee Scoping advice, namely NS, have also been reviewed within this section to determine if predatory species originating from these designated sites may have connectivity with the Proposed Development.

[67] Quick, N.J., Middlemas, S.J. and Armstrong, J.D., 2004. A survey of antipredator controls at marine salmon farms in Scotland. *Aquaculture*, *230*(1-4), pp.169-180. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/S0044848603004289

### 9.4.1 Designated Sites

#### 9.4.1.1 European Sites

Full consideration of the potential connectivity between the Proposed Development and European Sites (SPAs, SACs, and Ramsar sites) is provided within the separate RIAA (**Appendix O**). The RIAA has been informed through the CnES Scoping Opinion and the Scoping advice provided by NS.

Although the RIAA (**Appendix O**) is separate from the requirements of the EIA, the European Site screening assessment carried out is also considered to be appropriate in terms of identifying potential connectivity between ecological features (the qualifying features of the respective European Sites) and the Proposed Development under the EIA process. A summary of the identified European Sites along with their qualifying features is presented in **Table 9.2**. Where there is potential for connectivity and the qualifying feature is determined to be either a primary or secondary predatory species of Atlantic salmon fish farms, the qualifying feature is highlighted in bold text within **Table 9.2.**

Where an ecological feature that is a qualifying feature of one or more of the European Sites listed in **Table 9.2** is scoped in for assessment in relation to a potential impact, the potential for connectivity with that European Site is considered in the assessment.

**Table 9.2: Summary of European Sites (and their qualifying features considered to be predatory species in relation to Atlantic salmon fish farms) identified as having potential connectivity with the Proposed Development.**

| Site Name | Designation | Qualifying Features (Ecological Features in Bold have Potential Connectivity)* | Distance and Direction from Proposed Development | Rationale | Scoping Outcome |
|---|---|---|---|---|---|
| Inner Hebrides and the Minches | SAC | Harbour porpoise (*Phocoena phocoena*) | Site is located within the SAC | Not identified as either a primary or secondary predatory species of Atlantic salmon fish farms. | **Scoped Out** |
| St Kilda | SPA | **Northern fulmar** (*Fulmarus glacialis*) breeding, **northern gannet** (*Morus bassanus*) breeding, great skua (*Stercorarius skua*) breeding, common guillemot (*Uria aalge*) breeding, black-legged kittiwake (*Rissa tridactyla*) breeding, Leach's petrel (*Hydrobates leucorhous*) breeding, manx shearwater (*Puffinus puffinus*) breeding, Atlantic puffin (*Fratercula arctica*) breeding, razorbill (*Alca torda*) breeding, seabird assemblages breeding, storm petrel (*Hydrobates pelagicus*) breeding. | 123.36 km (straight-line), west-northwest. | Only two predatory species, the northern fulmar and the northern gannet, are within mean foraging range[43] of the Proposed Development. | **Scoped In** |
| Seas off St Kilda | SPA | **Northern fulmar** (*Fulmarus glacialis*) breeding, **northern gannet** (*Morus bassanus*) breeding, common guillemot (*Uria aalge*) breeding, Atlantic puffin (*Fratercula arctica*) breeding, | 73.69 km (straight-line), west-northwest. | Only two predatory species, the northern fulmar and the northern gannet, are within mean foraging range[43] of the | **Scoped In** |

| Site Name | Designation | Qualifying Features (Ecological Features in Bold have Potential Connectivity)* | Distance and Direction from Proposed Development | Rationale | Scoping Outcome |
|---|---|---|---|---|---|
| | | seabird assemblages breeding, storm petrel (*Hydrobates pelagicus*) breeding. | | Proposed Development. | |
| North Rona and Sula Sgeir | SPA | **Northern fulmar** (*Fulmarus glacialis*) breeding, **northern gannet** (*Morus bassanus*) breeding, common guillemot (*Uria aalge*) breeding, black-legged kittiwake (*Rissa tridactyla*) breeding, Leach's petrel (*Hydrobates leucorhous*) breeding, Atlantic puffin (*Fratercula arctica*) breeding, razorbill (*Alca torda*) breeding, storm petrel (*Hydrobates pelagicus*) breeding. | 112.17 km (straight-line) north | Only two predatory species, the northern fulmar and the northern gannet, are within mean foraging range[43] of the Proposed Development. | **Scoped in** |
| Sule Skerry and Sule Stack | SPA | **Northern fulmar** (*Fulmarus glacialis*) breeding, **northern gannet** (*Morus bassanus*) breeding, Leach's petrel (*Hydrobates leucorhous*) breeding, storm-petrel (*Hydrobates pelagicus)* breeding, European shag (*Gulosus aristotelis)* breeding, common guillemot (*Uria aalge*), breeding, Atlantic puffin (*Fratercula arctica*) breeding. | 148.64 km (straight-line) north-east | Only two predatory species, the northern fulmar and the northern gannet, are within mean foraging range[43] of the Proposed Development. | **Scoped in** |

***Connectivity has been determined based on whether the qualifying feature has been defined as a primary or secondary predatory species, in relation to Atlantic salmon fish farms, along with mean foraging range[43]**

#### 9.4.1.2 Nature Conservation Marine Protected Areas (NCMPA)

The Scoping Report, submitted as part of the formal Screening and Scoping Request in June 2022, identified the potential for connectivity between the Proposed Development and the North East Lewis NCMPA. This potential for connectivity was also highlighted within the CnES Scoping Opinion and the Scoping advice provided by NS in response to the Screening and Scoping Request.

Under Section 83 of the Marine (Scotland) Act 2010, where developments have the potential to impact, other than insignificantly, the protected features of a NCMPA, the LPA must notify the Scottish Ministers and NS and take into account their guidance and advice prior to making a determination on the development proposal. A summary of the identified NCMPAs along with their qualifying features is presented in **Table 9.3**. Where there is potential for connectivity and the qualifying feature is determined to be either a primary or secondary predatory species of Atlantic salmon fish farms, the qualifying feature is highlighted in bold text within **Table 9.3.**

Where an ecological feature, that is a qualifying feature of an NCMPA, listed in **Table 9.3**, is scoped in for assessment in relation to a potential impact, the potential for connectivity with that NCMPA is considered in the assessment.

**Table 9.3: Summary of connectivity with identified NCMPAs.**

| Site Name | Designation | Qualifying Features (Ecological Features in Bold have Potential Connectivity) | Distance and Direction from Proposed Development | Rationale | Scoping Outcome |
|---|---|---|---|---|---|
| North East Lewis | NCMPA | Risso's Dolphins (*Grampus griseus*), Sandeels (*Ammodytes marinus* / *Ammodytes tobianus*), and geological features | 3.96 km North. | Whilst there is potential connectivity between the Risso's Dolphins features of the NCMPA, due to the NCMPA's close proximity to the Proposed Development and the highly mobile nature of these features, they are not considered primary or secondary predatory species in regard to Atlantic salmon fish farms. | **Scoped Out** |

#### 9.4.1.3 Designated Sites Scoped Out of Further Assessment

As detailed within the Scoping Report, submitted in support of the formal Screening and Scoping Request to CnES, the potential for significant effect in relation to designated sites with potential connectivity to the Proposed Development was assessed, in order to scope in the designated sites for which significant effect could not be ruled out, and therefore required further assessment within the EIA and RIAA (**Appendix O**).

It is important to note that neither the Scoping Opinion, issued by CnES, nor the Scoping advice, provided by the respective consultees, highlighted the potential for significant effect in regard to any of the designated sites that were assessed and scoped out within the Scoping Report, with the Scoping Opinion specifically stating that: **"The SAC and SPA sites are correctly identified and Shadow HRA/AA is welcomed to support the EIAR."**

Furthermore, no additional designated sites, with the potential to be significantly affected by the Proposed Development, were highlighted through the Scoping Opinion, or consultee Scoping advice. Therefore, as the Scoping Opinion and supporting Scoping advice did not conclude potential significant effects in relation to the designated sites scoped out within the Scoping Report, these designated sites remained scoped out and were not carried forward for further assessment within the EIA.

A summary of the designated sites that were assessed and subsequently scoped out is provided in **Table 9.4.**

**Table 9.4: Designated site scoped out of further assessment.**

| Designated Site Name | Designation Type |
|---|---|
| Lewis Peatland | SAC |
| Lewis Peatland | SPA |
| Shiant Isles | SPA |
| Shiant Isles | SSSI |

### 9.4.2 Ornithological Features

A DBA was undertaken to determine the ornithological baseline within a 10 km study area around the Proposed Development (focused along the east coast of the Outer Hebrides). The DBA was informed through review of the Gravir operational wildlife logbook. Data obtained through the Joint Nature Conservation Committee (JNCC) SMP were also reviewed to help establish the ornithological baseline condition. The SMP is an ongoing annual monitoring programme established in 1986, covering 25 species of seabird. However, to ensure the data assessed is of relevance, only data from the year 2000 onwards has been included (under normal survey effort SMP data would be reviewed from 2010 onwards, however, due to the reduced survey effort in the region the temporal period has been increased to capture a larger sample size). In addition, ornithological data held within the NBN databases were also integrated as part of the DBA.

**Table 9.5: Summary of the predatory ornithological features identified within a 10 km radius of the Proposed Development.**

| Common Name | Scientific Name | Number of Records | Dates Recorded | Data Source |
|---|---|---|---|---|
| **Ornithological Species** | | | | |
| Great cormorant | *Phalacrocorax carbo (carbo)* | 5 IND | 2019, 2020, 2023 | Wildlife logbooks |
| | | 6 IND | 2011, 2013, 2016, 2017, 2021 | NBN |
| | | 8 Apparently Occupied Nest (AON) | 2019 | SMP |
| Grey heron | *Ardea cinerea* | 11 IND | 2011, 2012, 2013, 2015, 2016, 2017, 2021 | NBN |
| Northern gannet | *Morus bassanus* | 1 IND | 2020 | Wildlife logbooks |
| European shag | *Gulosus aristotelis* | 3 IND | 2011, 2016, 2021 | NBN |
| | | 10 AON | 2019 | SMP |
| Common guillemot | *Uria aalge* | 1 IND | 2004 | NBN |
| Common gull | *Larus canus* | 2 IND | 2021 | Wildlife logbooks |
| | | 20 IND | 2007, 2008, 2009, 2010, 2016, 2018, 2021 | NBN |
| Great black-backed gull | *Larus marinus* | 5 IND | 2011, 2012, 2016, 2021 | NBN |
| Herring gull | *Larus argentatus* | 13 IND | 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2021 | NBN |
| | | 10 AON | 2019 | SMP |

#### 9.4.2.1 Great Cormorant

Great cormorants have historically been regarded as a coastal bird within the UK, but over the last 40 years there has been a shift of wintering locations inland, with great cormorants being present at many freshwater lakes and rivers throughout the UK. The growth of the inland great cormorant population has been driven by the immigration of the sub-species *Phalacrocorax carbo sinensis* from continental Europe. *Phalacrocorax carbo carbo* nests predominantly in coastal locations and therefore makes up the coastal population of great cormorants. Between the Operation Seafarer survey (1969 – 1970) and the Seabird Colony Register (1985 – 1988) the Scottish great cormorant population fell by 13.15 %. However, by the Seabird 2000 survey, Scottish great cormorant numbers had increased by 21.43 % to an estimated population size of 3,626 AON. JNCC believe that since the Seabird 2000 survey, the Scottish great cormorant population has remained fairly stable[68].

The DBA identified a total of 11 IND and eight AONs, between 2011 and 2023, within the 10 km study area.

#### 9.4.2.2 Northern Gannet

The northern gannet is the largest seabird within the North Atlantic and is also endemic to the region, with the majority breeding within Britain and Ireland. National census data for northern gannet

[68] JNCC. Great Cormorant. [Online] Available at: https://jncc.gov.uk/our-work/great-cormorant-phalacrocorax-carbo/

populations in Scotland indicate a trend of continuous increase. Operation Seafarer (1969 – 1970) identified 96,860 AON/AOS and this number increased by 32.01 %, to 127,867 AON/AOS by the time of the Seabird Colony Register (1985 – 1988). By the time of the Gannet Census (2003 – 2004), the Scottish northern gannet population had increased further by 42.74 %, to 182,511 AON/AOS. By the time of the most recent Gannet Census (2013 – 2014), the Scottish northern gannet population had increased by 33.42 %, with an estimated Scottish population size of 243,505 AON/AOS. The distribution of the Scottish northern gannet population is spatially biased, with the colonies at Bass Rock, St Kilda, and Ailsa Craig holding 70 % of the Scottish population. Between the Gannet Census (2003 – 2004) and the Gannet Census (2013 – 2014), the Scottish northern gannet population had increased by 2.90 % per annum[69].

The DBA identified 1 IND, between 2009 and 2020, within the 10 km study area.

#### 9.4.2.3 Great Black-Backed Gull

The UK hosts a large portion of the global population of the great black-backed gull, which breed mainly in the Outer and Inner Hebrides and the Northern Isles of Scotland. These breeding regions within the UK offer extensive areas of preferred breeding habitat, consisting of well-vegetated rocky coastlines with stalks and cliffs. National census data for great black-backed gull show a fairly steady population, with little change between the Operation Seafarer (1969 – 1970) survey and the Seabird 2000 survey (1998 – 2002). Since the early 2000's, SMP data has indicated continual decline in the breeding population, with the population reaching its last recorded value at 69 % below the 1986 baseline in 2018. The Scottish population is estimated to be 14,773 AON (Seabird 2000)[70].

The DBA identified 5 IND between 2011 and 2021, within the 10 km study area.

#### 9.4.2.4 Grey Heron

Grey herons are known to utilise a number of different habitats, including freshwater, brackish water, and saltwater. Grey herons foraging within the marine environment do so in association with intertidal and shallow sub-littoral areas. Within Scotland, grey herons are widely distributed, but rarer in both Orkney and Shetland. The most recent heronries census estimate for the UK indicates a population of 9,509 AON in 2022[71,72].

The DBA identified 11 IND, between 2011 and 2021, within the 10 km study area.

#### 9.4.2.5 Common Guillemot

National census data for common guillemot indicate that between the Operation Seafarer and Seabird Colony Register, the common guillemot populations increased by 81.55 %, to 943,098 IND. By the time of the Seabird 2000 survey, numbers had further increased by 23.83 %, to 1,167,841 IND. Since the Seabird 2000 survey, SMP abundance index data indicate that the population experienced a decline with numbers falling below the 1986 baseline between 2004 and 2016. Since then, the index has risen and in 2019, abundance was 18 % above the baseline[73].

The DBA identified 1 IND, in 2004, within the 10 km study area.

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[69] JNCC. Northern gannet. [Online] Available at: https://jncc.gov.uk/our-work/northern-gannet-morus-bassanus/
[70] JNCC. Great black-backed gull. [Online] Available at: https://jncc.gov.uk/our-work/great-black-backed-gull-larus-marinus/
[71] British Trust for Ornithology (BTO). Heronries Census. [Online] Available at: https://www.bto.org/our-science/projects/heronries-census/results#:~:text=Read%20the%202022%20Heronries%20Census,apparently%20occupied%20nests%20in%202022.
[72] Scottish Wildlife Trust. Grey heron. [Online] Available at: https://scottishwildlifetrust.org.uk/species/grey-heron/
[73] JNCC. Common guillemot. [Online] Available at: https://jncc.gov.uk/our-work/guillemot-uria-aalge/

#### 9.4.2.6 European Shag

The European shag is a species endemic to the northeast Atlantic and the Mediterranean. European shags are known to be an inshore species, which are rarely seen out of sight of land. Within Scotland, the long-term census data indicates that between the Operation Seafarer (1969 – 1970) survey and the Seabird Colony Register (1985 – 1988), the Scottish European Shag population increased by 16.56 %, to 31,560 AON. However, by the time of the Seabird 2000 survey numbers had fallen by 31.92 %, to 21,487 AON. The annual SMP data also indicates a pattern of long-term decline in the Scottish European shag population, to the extent that by 2014, the population was at its lowest recorded level, at 52 % below the 1986 baseline. By 2019, the population had recovered slightly but was still 47 % below the 1986 baseline[74].

The DBA identified 3 IND and 10 AONs between 2011 and 2021, within the 10 km study area.

#### 9.4.2.7 Common Gull

Within the UK, the breeding distribution of the common gull is limited to Scotland and Northern Ireland. Of the common gulls recorded in the Seabird 2000 survey, 42.54 % were nesting in coastal locations. Coastal nesting common gulls have been increasing in abundance within Scotland since Operation Seafarer (1969 – 1970), according to the national census data. The Scottish common gull population increased by 35.24 % between the Seabird Colony Register and the Seabird 2000 surveys and by 67.36 % between the Operation Seafarer survey and the Seabird 2000 survey. By the time of the Seabird 2000 survey, the coastal population was estimated to be 20,467 AON. SMP abundance data correlates with the national census data. However, these SMP data indicate that since 2005, there has been a downward trend in the common gull population. In 2019, the Scottish common gull population was 15 % below the 1986 baseline[75].

The DBA identified 2 IND and 20 AON, between 2007 and 2021, within the 10 km study area.

#### 9.4.2.8 Herring Gull

Herring gull breed throughout north and west Europe. Around the UK, herring gull are widely distributed around the coastline. More recently a proportion of the population increasingly breeds inland, away from the coast. The Scottish coastal herring gull population declined significantly between the Operation Seafarer survey and the Seabird 2000 survey. Between the Operation Seafarer survey and the Seabird Colony Register, the Scottish coastal herring gull population declined by 41.63 %. By the time of the Seabird 2000 survey, the population had declined further, by 22.91 %, to an estimated population size of 71,659 AON. The SMP abundance data for coastal herring gulls displays a pattern of long-term decline to 56 % below the 1986 baseline in 2009. Since 2009, the coastal herring population has fluctuated around a fairly stable level, albeit, still well below the 1986 baseline. In 2019, the Scottish coastal herring gull population had fallen further to 60 % below the 1986 baseline[76].

The DBA identified 13 IND and 10 AON, between 2011 and 2021, within the 10 km study area.

#### 9.4.2.9 Biogeographic Populations of Ornithological Predatory Species

In addition to the information presented above, in **Sub-Section 9.4.2.1** through to **Sub-Section 9.4.2.8**, the biogeographic population of each identified ornithological feature has also been considered in the determination of the baseline condition and the subsequent impact assessment. The relevant biogeographic populations are outlined in **Table 9.6**, below.

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[74] JNCC. European shag. [Online] Available at: https://jncc.gov.uk/our-work/european-shag-phalacrocorax-aristotelis/
[75] JNCC. Common gull. [Online] Available at: https://jncc.gov.uk/our-work/common-gull-larus-canus/
[76] JNCC. Herring gull. [Online] Available at: https://jncc.gov.uk/our-work/herring-gull-larus-argentatus/

**Table 9.6: Biogeographic populations sizes of the predatory ornithological species identified within the baseline condition (taken from Furness (2015)[77]).**

| Species Name | Biogeographic population with connectivity to UK waters (adults and immatures) |
|---|---|
| Great cormorant | 324,000 |
| Grey heron | Not in Furness (2015) |
| Northern gannet | 1,180,000 |
| European shag | 106,000 |
| Common guillemot | 4,125,000 |
| Common gull | Not in Furness (2015) |
| Great black-backed gull | 235,000 |
| Herring gull | 1,098,000 |

## 9.4.3 Mammalian Features

The DBA identified a number of mammalian features, known to predate Atlantic salmon marine fish farms, within the baseline condition. A summary of the identified mammalian features is provided in **Table 9.7**.

**Table 9.7: Summary of the predatory mammalian features identified within a 10 km radius of the Proposed Development.**

| Common Name | Scientific Name | Number of Records | Dates Recorded | Data Source |
|---|---|---|---|---|
| Common seal | *Phoca vitulina* | 24 IND | 2015, 2017 | NBN |
| | | 52 IND | 2016, 2022, 2023 | Wildlife logbooks |
| | | 234 IND | 2011, 2016-2019 | GeMS |
| Grey seal | *Halichoerus grypus* | 6 IND | 2017 | NBN |
| | | 7 IND | 2020 | Wildlife logbooks |
| | | 35 IND | 2011, 2016-2019 | GeMS |
| European otter | *Lutra lutra* | 8 IND | 2009, 2013, 2015, 2017, 2021 | NBN |
| | | 7 IND | 2020, 2023 | Wildlife logbooks |

### 9.4.3.1 Seal Species (Common Seal and Grey Seal)

#### 9.4.3.1.1 Designated Seal Haul Out Sites

Under Section 117 of the Marine (Scotland) Act 2010, Scottish Ministers are permitted to designate specific seal haul out sites (HOSs) to provide additional protection for seals from intentional or reckless harassment. HOSs are locations on land where seals come ashore to rest, moult, or breed. On 30 September 2014, a total of 194 HOSs, including key breeding sites, were designated through the Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014[78].

##### 9.4.3.1.1.1 Common Seal HOSs

When not at sea common seal are typically found around sheltered shores and estuaries, where they often haul out on sandbanks and beaches. Common seal are known to predominantly forage within 40 to 50 km of their HOS. As such, the DBA focused on identifying common seal HOSs within a 50 km radius of the Proposed Development, as outlined within **Sub-Section 2.4.2**.

[77] Furness, R.W., 2015. Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Reports, (164). [Online] Available at: https://publications.naturalengland.org.uk/publication/6427568802627584

[78] Scottish Government: The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014. [Online] Available at: https://www.legislation.gov.uk/ssi/2014/185/contents/made

Based on these search parameters the HOSs listed within **9.8** were identified. Distances between the Proposed Development and the HOSs were determined using straight line distances (Proposed Development centre to nearest point of HOS). However, where straight line distances crossed significant portions of land, at sea distances were also examined to determine if connectivity between common seal from the HOSs and the Proposed Development was still likely based on a 50 km at sea distance (foraging range).

Table 9.8: Summary of common seal HOSs within 50 km of the Proposed Development.

| Haul Out Site Name | Category | Site Code | Location | Management Area | Primary Seal Species | Distance from the Proposed Development (Straight line distance) (km) | Direction from the Proposed Development |
|---|---|---|---|---|---|---|---|
| Eilean Glas Cheann Chrionaig | Seal Haul Out | WI-017 | Loch Bhrolluim | Western Isles | Common seal | 15.46 km | Southwest |
| Aird Dubh | Seal Haul Out | WI-012 | Loch Bhrolluim | Western Isles | Common seal | 15.85 km | Southwest |
| Bhalamus | Seal Haul Out | WI-016 | Loch Bhalamuis | Western Isles | Common seal | 18.55 km | Southwest |
| Sgeir Leathann | Seal Haul Out | WI-004 | Broad Bay | Western Isles | Common and grey seal | 24.63 km | North-northeast |
| An Acarsaid a Deas | Seal Haul Out | WI-015 | SW Scalpay | Western Isles | Common seals | 28.23 km | Southwest |
| Fladda-chuain | Seal Haul Out | WSC-008 | Off North Skye | West Scotland Central | Common and grey seal | 33.80 km | South |

##### 9.4.3.1.1.2 Grey Seal HOSs

Grey seal preferentially come ashore on exposed coasts and islands. They also predominantly forage within 100 km of their HOS. As such, the DBA focused on identifying grey seal HOSs within a 100 km radius of the Proposed Development, as outlined within **Sub-Section 2.4.2**.

Based on these search parameters the HOSs listed within **Table 9.9** were identified. Distances between the Proposed Development and the HOSs were determined using straight line distances (Proposed Development centre to nearest point of HOS). However, where straight line distances crossed significant portions of land, at sea distances were also examined to determine if connectivity between grey seal from the HOSs and the Proposed Development was still likely based on a 100 km at sea distance (foraging range).

**Table 9.9: Summary of grey seal HOSs within 100 km of the Proposed Development.**

| Haul Out Site Name | Category | Site Code | Location | Management Area | Primary Seal Species | Distance from the Proposed Development (Straight line distance km) | Direction from the Proposed Development |
|---|---|---|---|---|---|---|---|
| Sgeir Leathann | Seal Haul Out | WI-004 | Broad Bay | Western Isles | Common and grey seal | 24.63 km | North-northeast |
| Sgeir nam Maol | Seal Haul Out | WSC-010 | East of Fladda-chuain | West Scotland – Central | Grey seal | 33.32 km | South |
| Fladda-chuain | Seal Haul Out | WSC-008 | Off North Skye | West Scotland – Central | Common and grey seal | 33.80 km | South |
| Trodday | Breeding Colony/Seal Haul Out | BC-005 | Off North tip of Skye | West Scotland – Central | Grey seal | 35.86 km | South |
| Glas-Leac Beag | Breeding Colony/Seal Haul Out | BC-006 | Summer Isles | West Scotland – North | Grey seal | 49.92 km | West |
| Glas-Leac Mor | Seal Haul Out | WSN-005 | NW Summer Isles | West Scotland – North | Grey seal | 51.62 km | West |
| Sound of Harris Islands | Breeding Colony/ Seal Haul Out | BC-009 | East Sound of Harris | Western Isles | Grey seal | 52.63 km | Southwest |
| Coppay | Breeding Colony/ Seal Haul Out | BC-012 | North Sound of Harris | Western Isles | Grey seal | 53.53 km | Southwest |
| Gasker | Seal Haul Out | WI-018 | West of Harris | Western Isles | Grey seal | 53.60 km | West |
| Shillay | Breeding Colony/ Seal Haul Out | BC-007 | North West Sound of Harris | Western Isles | Grey seal | 59.10 km | Southwest |

| Haul Out Site Name | Category | Site Code | Location | Management Area | Primary Seal Species | Distance from the Proposed Development (Straight line distance km) | Direction from the Proposed Development |
|---|---|---|---|---|---|---|---|
| Iolla Mhor | Seal Haul Out | WSN-007 | South of Horse Island, East Summer Isles | West Scotland – North | Grey seal | 59.90 km | West |
| Eilean Chrona | Seal Haul Out | WSN-004 | Clashnessie Bay, North of Lochinver | West Scotland – North | Grey seal | 65.25 km | East-northeast |
| Haskeir | Breeding Colony/ Seal Haul Out | BC-014 | 12km off North West North uist | Western Isles | Grey seal | 87.31 km | Southwest |
| Causamul | Breeding Colony/ Seal Haul Out | BC-015 | West of West North Uist | Western Isles | Grey seal | 88.26 km | Southwest |
| Am Balg | Seal Haul Out | WSN-006 | West of Sandwood Bay, South of Cape Wrath | West Scotland – North | Grey seal | 89.65 km | Northeast |

### 9.4.3.2 Common Seal

The UK wide common seal population was believed to be 43,750 in 2020 (approximate 95 % Confidence Interval (CI): 35,800 – 58,300). This population estimate was derived by scaling the most recent composite count of 31,500, (based on surveys between 2016 and 2021) by the estimated proportion hauled out during the surveys (0.72 (95% CI: 0.54-0.88)). Overall, across the whole of the UK, the common seal population has displayed an increasing trend since the late 2000s and is now believed to be close the population size of the 1990s, prior to the decline that occurred as a result of the 2002 Phocine Distemper Virus (PDV) epizootic. Common seal population trends, do, however, show significant regional variation[79].

Individual common seal identified within the baseline condition of the Proposed Development form part of the Western Isles Seal Management Unit (SMU). The common seal population within the Western Isles SMU has experienced a sustained increasing trend between the years 2007 and 2021, see **Table 9.10**. Between 2007 – 2009 and 2016 – 2021, the estimated common seal population within the Western Isles SMU has increased by 95.81 %.

**Table 9.10: Summary of common seal population estimates for the West Scotland SMU[79].**

| Seal Management Unit / Country | Population Estimates | | |
|---|---|---|---|
| | 2007 – 2009 | 2011 – 2015 | 2016 – 2021 |
| Western Isles | 2,505 (95 % C.I. (2050 - 3340)) | 3,804 (95 % C.I. (3112 - 5072)) | 4,905 (95 % C.I. (4013 - 6540)) |
| Scotland | 28, 375 (95 % C.I. (23215 - 37833)) | 35, 276 (95 % C.I. (28862 - 47035)) | 37, 286 (95 % C.I. (30506 - 49714)) |
| UK Total | 25, 566 (95 % C.I. (29052 - 47344)) | 43,358 (95 % C.I. (35475 - 57811)) | 43, 730 (95 % C.I. (35779 - 58307)) |

As identified in **Sub-Section 9.4.3.1.1.1** there are a total of six HOSs that are primarily used by common seal within a 50 km radius (common seal foraging range) of the Proposed Development.

To better understand common seal utilisation of the waters surrounding the Proposed Development, an assessment of the mean percentage at-sea population maps for common seal[80] was undertaken. This assessment identified that the common seal at-sea population within Western Isles SMU is focused along the east coast of the Outer Hebrides, with more regional hot spots identified in association with the east coast of the Isle of Lewis. For each 5 km x 5 km grid cell the value given represents the percentage of the UK and Ireland at-sea population (i.e., excluding hauled-out common seal) estimated to be present at any one time during the main foraging season (spring). The Proposed Development overlaps with two grid cells, these grid cells have values of 0.019% and 0.027% respectively. These values represent the expected mean percentage of common seals within each 5 km x 5 km cell at any given time. The grid cells that run along the east coast of the Isle of Lewis all have similar, high mean percentage values. Therefore, based on these data the east coast of the Isle of Lewis is considered to be a hotspot for common seal within the Western Isles SMU.

The DBA identified 310 IND within the 10 km study area, across a temporal period spanning 2011 to 2023.

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[79] Special Committee on Seals (SCOS). Scientific Advice on Matters Related to the Management of Seal Populations: 2021. [Online] Available at: http://www.smru.st-andrews.ac.uk/files/2022/08/SCOS-2021.pdf

[80] NMPi. Common/Harbour seal (Phoca vitulina) estimated at-sea usage (mean) - Seal usage maps 2017. [Online] Available at: https://marine.gov.scot/maps/1585

Based on the available data (presented above), it is determined that the waters surrounding the Proposed Development are of high importance to common seal within the Western Isles SMU.

### 9.4.3.3 Grey Seal

The most recent census of the principal grey seal breeding locations in Orkney, the Inner and Outer Hebrides, the Firth of Forth and locations in eastern England was undertaken in 2019. The results of this 2019 census, together with a correction to account for less frequently monitored breeding locations, produced an estimate of the number of grey seal pups born in 2019 of 67,850 (95 % C.I.: 60,500 – 75,100). This estimated pup production figure has been used to produce an estimate of the total grey seal population for the UK in 2020 of 157,300 individuals. The UK grey seal population represents 35 % of the world and 82 % of the European grey seal population[79].

Specifically within Scotland, it was estimated that in 2019 a total of 54,050 pups were born and that, at the start of the 2020 breeding season, the Scottish grey seal population numbered 120,800[79].

Overall, the UK grey seal pup production increased by almost 1.50 % between 2016 and 2019, with increases mainly seen within the North Sea and eastern England colonies. The combined pup production estimate for the Inner and Outer Hebrides and Orkney was 3.30 % lower than the 2016 estimate, whereas the North Sea grey seal colonies increased by 23.00 % during the same temporal period[79].

Individual grey seal identified within the baseline condition of the Proposed Development form part of the Western Isles SMU. The 2016 to 2019 estimated population for grey seal within the Western Isles SMU was 5,773.

As identified within **Sub-Section 9.4.3.1.1.2** there are a total of 15 HOSs that are primarily used by grey seal within a 100 km (grey seal foraging range) radius of the Proposed Development. Of these 15 HOSs, seven are identified as breeding colonies. Within a 10 km radius of the Proposed Development, there are zero grey seal HOSs, with the closest HOS being Sgeir Nam Maol (WSC-010), which is located 33.32 km to the south of the Proposed Development. The closest breeding colony to the Proposed Development is Trodday located 35.89 km to the south. As such, despite the identification of 15 grey seal HOSs within a 100 km radius of the Proposed Development, the relatively distant locations of these HOSs indicates that grey seal are likely to be present at negligible to low levels within the waters surrounding the Proposed Development. This assumption is supported by data presented within **Table 9.7**, which outlined that a total of 48 grey seal were recorded within a 10 km radius of the Proposed Development between 2011 and 2020, with only seven individuals identified through the assessment of the Gravir wildlife logbook.

To better understand grey seal utilisation of the waters surrounding the Proposed Development, an assessment of the mean percentage of the grey seal at-sea population[81] was undertaken. This assessment identified that the grey seal at-sea population within Western Isles SMU is predominantly focused off the west coast of the Outer Hebrides. For each 5 km x 5 km grid cell, the value given represents the percentage of the UK and Ireland at-sea population (i.e., excluding hauled-out grey seal) estimated to be present at any one time during the main foraging season (summer). The Proposed Development overlaps with two grid cells, these grid cells have values of 0.015% and 0.047% respectively. This represents both a low and high contribution to the total grey seal at-sea population, the grid cells that run along the east coast of the Isle of Lewis have similar, or lower mean percentage values. In contrast, the grid cells to the west of the Monach Islands have mean percentage values that

[81] NMPi. Grey seal (Halichoerus grypus) estimated at-sea usage (mean) - Seal usage maps 2017. [Online] Available at: https://marine.gov.scot/maps/1584

peak at 0.096 %. Therefore, based on these data the east coast of the Isle of Lewis appears to be of some value to the grey seal at-sea population within the Western Isles SMU.

The DBA identified 48 IND within the 10 km study area, across a temporal period spanning 2011 to 2020.

Based on the available data, it is determined that the waters surrounding the Proposed Development are of **medium importance** to grey seals within the West Scotland SMU.

#### 9.4.3.4 European Otter

The Scottish European otter population is estimated to be made up of approximately 8,000 individuals. The Scottish European otter population, unlike the rest of the UK, is comprised of a high proportion (~ 50%) of coastal-dwelling otters. These coastal otters have much smaller home ranges than their riverine counterparts. This difference is likely due to the higher abundance of fish and crustacean prey within the marine environment.

Coastal-dwelling European otters are known to forage in association with the intertidal and shallow sublittoral zones, with foraging very unlikely to take place at distances greater than 100 m from the shoreline. Coastal European otters typically dive to depths of 2 m for 20 seconds at a time in search of their prey[82].

The DBA identified 15 IND, between 2009 and 2023, within the 10 km study area.

Based on the available data, it is determined that the waters surrounding the Proposed Development are of **low importance** to coastal European otters within the surrounding area.

## 9.5 Identified Potential Impacts

### 9.5.1 Zone(s) of Influence

As defined by CIEEM, the ZoI for a project is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and the associated impact pathways. This is likely to extend beyond the project, for example where there are ecological or hydrological links beyond the project boundary. The ZoI is also likely to vary dependent on specific ecological feature sensitivity to a specific impact pathway. As such it is likely that the Proposed Development will give rise to multiple ZoI. A summary of the impact pathways considered relevant to the Proposed Development, and the associated ZoI for each impact pathway is provided in **Table 9.11.**

[82] McCafferty, D., 2005. Ecology and conservation of otters (Lutra lutra) in Loch Lomond and the Trossachs National Park. Glasgow Naturalist, 24(3), pp.29-35. [Online] Available at: https://eprints.gla.ac.uk/49061/

**Table 9.11: Summary of the potential impact pathways and the associated ZoI of the Proposed Development in relation to the predatory ecological features identified within the baseline condition.**

| Potential Impact Pathway | Zone of Influence | |
|---|---|---|
| | Primary ZoI (Spatial Extent of Potential Impacts) | Secondary ZoI (Spatial Extent of Potential Effects) |
| **Ornithological Features** | | |
| Entanglement or entrapment in top, pen, or anti-predator netting. | The ZoI of entanglement and entrapment is defined by the direct spatial extent of the surface and sub-surface netting deployed at the Proposed Development.<br><br>**Surface Netting Area (lateral and ceiling surface):**<br>Per Pen: 3,745.30 $m^2$; and<br>Total: 18,726.50 $m^2$.<br><br>**Sub-Surface Netting Area (lateral surface only):**<br>Per Pen: 2,399.55 $m^2$; and<br>Total: 11,997.75 $m^2$. | Ornithological features typically forage across large distances, as such, there is the potential for individuals from outwith the primary ZoI to transit through the primary ZoI and therefore be impacted and affected by the impact pathway.<br><br>As such, there is the potential for effects over a greater spatial extent than the primary ZoI. |
| Disturbance in the vicinity of the Proposed Development and Vessel Transit Route (VTR). | The ZoI of disturbance is defined by the distance at which an individual would display a response to the source of the disturbance. This distance is often species specific and will vary with ecological sensitivity.<br><br>The indicative VTR outlines a 4.44 km route from the shorebase to the Proposed Development. | |
| Direct displacement from the footprint of the Proposed Development. | The ZoI of direct displacement is defined by the spatial extent of the infrastructure along with the specific sensitivity of the feature.<br><br>**Spatial Extent of the Proposed Development:** | |

| Potential Impact Pathway | Zone of Influence | |
|---|---|---|
| | Primary ZoI (Spatial Extent of Potential Impacts) | Secondary ZoI (Spatial Extent of Potential Effects) |
| | Surface Infrastructure: 12,762.25 m$^2$; and<br>Mooring Area: 1.02 km$^2$. | |
| Loss of, or damage to prey-supporting habitats. | The ZoI of loss of, or damage to prey-supporting habitats is defined by the spatial extent of the organic and in-feed deposition Mixing Zones along with the mooring system (grid and feed barge) footprint.<br><br>**Spatial Extent of Modelled Mixing Zones:**<br>Organic material deposition: 207,391 m$^2$; and<br><br>In-feed deposition: 166,252 m$^2$.<br><br>**Spatial extent of the Mooring System:**<br>Mooring Area: 1.02 km$^2$. | |
| **Marine Mammals (excluding cetaceans)** | | |
| Marine vessel activity, with the potential to cause disturbance, injury or mortality. | The ZoI of this impact pathway is defined by the VTR taken by the fish farm vessels servicing the Proposed Development.<br><br>The indicative VTR outlines a 4.44 km route from the shorebase to the Proposed Development. | Marine mammals are highly mobile, as such, there is the potential for individuals from outwith the primary ZoI to transit through the primary ZoI and therefore be impacted and affected by these impact pathways.<br><br>As such, there is the potential for effects over a greater spatial extent than the primary ZoI. |
| Underwater noise, with the potential to cause disturbance and exclusion. | The ZoI of this impact pathway is defined by the VTR and a species specific disturbance buffer. | |
| Entanglement in fish farm infrastructure, with the potential to cause injury or mortality. | The ZoI of this impact pathway is defined by the spatial extent of the sub-surface netting deployed at the Proposed Development.<br><br>**Sub-Surface Netting Area (lateral surface only):** | |

| Potential Impact Pathway | Zone of Influence | |
|---|---|---|
| | **Primary ZoI (Spatial Extent of Potential Impacts)** | **Secondary ZoI (Spatial Extent of Potential Effects)** |
| | Per Pen: 2,399.55 $m^2$; and<br>Total: 11,997.75 $m^2$. | |
| Loss of, or damage to prey-supporting habitats. | The ZoI of loss of, or damage to prey-supporting habitats is defined by the spatial extent of the organic and in-feed deposition Mixing Zones along with the mooring system (grid and feed barge) footprint.<br><br>**Spatial Extent of Modelled Mixing Zones:**<br>Organic material deposition: 207,391 $m^2$; and<br><br>In-feed deposition: 166,252.00 $m^2$.<br><br>**Spatial extent of the Mooring System:**<br>Mooring Area: 1.02 $km^2$. | |

### 9.5.2 Important Ecological Features

In order to better focus the assessment of potential impacts on the ecological features within the baseline condition, and to help determine whether an ecological feature qualifies as an IEF, a scoping assessment has been undertaken to identify the distinct impact pathways most likely to result in significant effects on the ecological features. IEFs are those features that are considered both important and potentially affected by the project.

The scoping assessment considered the behavioural sensitivity of each ecological feature to the identified impact pathways, the ecological traits of each ecological feature, the determined abundance and density of each ecological feature within the baseline condition, and the proposed embedded design and operational mitigation. Where impacts on an ecological feature were not predicted to be significant, that ecological feature was scoped out of further assessment within this EcIA. Where the determination of significant effect was uncertain, the precautionary principle was applied, and the ecological feature was scoped in, as an IEF.

**Table 9.12**, below, summarises the ecological features identified within the baseline condition, outlining whether or not each ecological feature has been classified as an IEF, with the rationale for the decision provided. The importance of the ecological features has been assessed on a project-specific basis.

**Table 9.12: Summary of the scoping assessment to determine which ecological features represent important ecological features within the baseline condition.**

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| **Ornithological Species** | | | | |
| Great cormorant | National | **Regional** | **<u>Importance of Feature:</u>**<br>Great cormorant are listed on Annex II of AEWA. They are also afforded general protection under the Wildlife and Countryside Act 1981 but are not listed as a Schedule 1 species.<br><br>The DBA identified low abundance (11 IND and eight AONs) within the baseline condition. The Scottish great cormorant population is estimated to be 3,626 AONs and the biogeographic population is estimated to be 324,000.<br><br>**<u>Entanglement and Entrapment:</u>**<br>**<u>(Scoped In)</u>**<br>Great cormorant are regarded as visually guided pursuit dive foragers and are thought to prey on both pelagic and benthic fishes[83], with benthic species accounting for up to 80 % of their diet[114]. Due to this foraging ecology, they are potentially more at risk of entanglement in sub-surface netting. Evidence indicates that great cormorant are recorded as by-catch in gillnet fisheries[84], indicating that they are sensitive to the impact of entanglement. | **Yes** |

[83] White, C.R., Day, N., Butler, P.J. and Martin, G.R., 2007. Vision and foraging in cormorants: more like herons than hawks? PLoS One, 2(7), p.e639. [Online] Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000639

[84] Žydelis, R., Small, C. and French, G., 2013. The incidental catch of seabirds in gillnet fisheries: a global review. *Biological Conservation*, *162*, pp.76-88. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/S0006320713000979

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | Great cormorant are known to predate marine salmon fish farms, as such they may interact with containment and top netting deployed at the Proposed Development.<br><br>Further assessment is required to determine the magnitude of the potential impact.<br><br>**Disturbance in the vicinity of the Proposed Development and VTR:**<br>**(Scoped Out)**<br>Great cormorant are thought to display a high to very high sensitivity to marine vessel activity[114,85]<br><br>The Proposed Development would result in a negligible increase in marine vessel activity, with one additional vessel, a 9 m polarcirkel. Under normal operational conditions this vessel would be expected to make a single return journey along the 4.44 km indicative VTR per day.<br><br>Great cormorant have a mean foraging range of 10.90 km[43]. They are also fairly plastic in their foraging strategy and exploit prey species in association with the water column and benthic habitats.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects. | |

[85] MMO (2018). Displacement and habituation of seabirds in response to marine activities. A report produced for the Marine Management Organisation. MMO Project No: 1139, May 2018, 69pp. [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/715604/Displacement_and_habituation_of_seabirds_in_response_to_marine_activities.pdf

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | **Direct displacement from the Proposed Development's footprint: (Scoped Out)**<br>Great cormorant sensitivity to the presence of marine structures is thought to be low[114].<br><br>They are known to utilise a number of inshore habitats for foraging. As a result, displacement from a small area is unlikely to significantly constrain great cormorant.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**Loss of, or damage to prey-supporting habitats: (Scoped Out)**<br>Great cormorant are known to utilise a variety of inshore habitats for foraging.<br><br>NewDEPOMOD modelling indicates that the Proposed Development will comply with the SEPA benthic quality standards. The marine modelling also indicates that there will be no organic deposition above 250 $g/m^2/yr^{-1}$, therefore significant effects on benthic habitats are not predicted.<br><br>• This impact pathway is unlikely to result in anything other than insignificant effects. | |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| Grey heron | National | **Local** | **Importance of Feature:**<br>The grey heron is listed in Annex II of the AEWA. Grey heron are afforded general protection under the Wildlife and Countryside Act 1981.<br><br>The DBA identified negligible abundance (11 IND), with sightings largely associated with the intertidal areas of the coastline within the wider vicinity of the Proposed Development. The UK grey heron population is estimated to be 9,509 AON, with grey heron widespread across the majority of Scotland.<br><br>**All Impact Pathways (Entanglement and Entrapment, Disturbance in the vicinity of the Proposed Development and VTR, Direct displacement from the Proposed Development's footprint, and Loss of, or damage to prey-supporting habitats):**<br>**(Scoped Out)**<br>Grey heron are known to utilise the intertidal zone for foraging. However, the Proposed Development is located within the sublittoral zone over significant water depth. As a result, connectivity is not likely.<br><br>The Proposed Development is unlikely to have any significant effects on grey heron given the proposed embedded design and operational mitigation.<br><br>• This impact pathway is unlikely to result in anything other than insignificant effects. | **No** |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| Northern gannet | International | **International** | **Importance of Feature:**<br>Northern gannet are referenced as a migratory species under Article 4.2 of the Wild Birds Directive (2009/147/EC). Northern gannet are also present on Annex II of AEWA. As well as being listed as an amber species on the BCC list. Northern gannet are a qualifying feature of both the St Kilda and Seas off St Kilda SPAs, under Article 4.2.<br><br>The DBA identified negligible abundance (1 IND) of northern gannet within the 10 km study area. The Scottish northern gannet population was estimated to be 243,505 AON/AOS, based on the Gannet Census (2013 – 2014), the biogeographic population is estimated to be 1,180,000.<br><br>**Entanglement and Entrapment:**<br>**(Scoped In):**<br>NS have identified a novel impact pathway for northern gannet, relating to pole mounted top net systems[20].<br><br>The DBA identified potential connectivity between the northern gannet feature of the St. Kilda and Seas off St. Kilda SPAs.<br><br>Further assessment is required to determine the magnitude of the potential impact.<br><br>**Disturbance in the vicinity of the Proposed Development and VTR:**<br>**(Scoped Out)** | **Yes** |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | Northern gannet are thought to display low sensitivity to marine vessel activity[114,85]<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**<u>Direct displacement from the Proposed Development's footprint: (Scoped Out)</u>**<br>Northern gannet forage over very large areas, where they forage in association with oceanic, pelagic and predominantly inshore waters over the continental shelf[114].<br><br>As such they are unlikely to be significantly constrained by displacement from local structures.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**<u>Loss of, or damage to prey-supporting habitats: (Scoped Out)</u>**<br>Northern gannet forage over very large areas, where they forage in association with oceanic, pelagic and predominantly inshore waters over the continental shelf[114]. As a result, significant areas of potential foraging habitat are available to them.<br><br>NewDEPOMOD modelling indicates that the Proposed Development will comply with the SEPA benthic quality standards. Therefore, no significant effect is likely. | |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | This impact pathway is unlikely to result in anything other than insignificant effects. | |
| European shag | International | **Local** | **<u>Importance of Feature:</u>**<br>European shag are listed on Appendix 2 of the Berne Convention. They are also afforded general protection under the Wildlife and Countryside Act 1981, and they are a migratory species under the Wild Birds Directive (2009/147/EC).<br><br>The DBA identified low abundance (3 IND 10 AON) of European shag within the baseline condition. The Scottish population has experienced long-term declines in numbers, with the population in 2019 being 47 % below the 1986 baseline. The biogeographic population is estimated to be 106,000.<br><br>**<u>Entanglement and Entrapment:</u>**<br>**<u>(Scoped Out)</u>**<br>European shag are regarded as visually guided pursuit dive foragers, where they target both pelagic and benthic fishes[86]. Evidence within the literature suggests that the diet of European shag consists of 80 % benthic prey[114]. As a result of this pursuit dive foraging strategy, European shag are at risk of sub-surface net entanglement.<br><br>European shag were identified at low abundance (3 IND 10 AON) within the 10 km study area. | **No** |

[86] Moe, B., Daunt, F., Bråthen, V.S., Barrett, R.T., Ballesteros, M., Bjørnstad, O., Bogdanova, M.I., Dehnhard, N., Erikstad, K.E., Follestad, A. and Gíslason, S., 2021. Twilight foraging enables European shags to survive the winter across their latitudinal range. *Marine Ecology Progress Series*, *676*, pp.145-157. [Online] Available at: https://www.int-res.com/abstracts/meps/v676/p145-157

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
| --- | --- | --- | --- | --- |
| | | | The Proposed Development is unlikely to have any significant effects on European shag given the proposed embedded design and operational mitigation.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**Disturbance in the vicinity of the Proposed Development and VTR:**<br>**(Scoped Out)**<br>European shag are thought to display medium to high sensitivity to marine vessel activity[114,85].<br><br>European shag were identified at low abundance low abundance (3 IND 10 AON) within the 10 km study area.<br><br>The Proposed Development is unlikely to have any significant effects on European shag given the proposed embedded design and operational mitigation.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**Direct displacement from the Proposed Development's footprint:**<br>**(Scoped Out)**<br>European shag sensitivity to marine structures is varied, with the literature indicating that sensitivity varies from low to very high [114,85]. | |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | European shag were identified at low abundance low abundance (3 IND 10 AON) within the 10 km study area.<br><br>The Proposed Development is unlikely to have any significant effects on European shag given the proposed embedded design and operational mitigation.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**<u>Loss of, or damage to prey-supporting habitats:</u>**<br>**<u>(Scoped Out)</u>**<br>The diet of the European shag consists of 80 % benthic prey[114], meaning that the majority of foraging occurs in association with the benthic environment.<br><br>European shag were identified at low abundance (3 IND 10 AON) within the 10 km study area.<br><br>NewDEPOMOD modelling indicates that the Proposed Development will comply with the SEPA benthic quality standards. The marine modelling also indicates that there will be no organic deposition above 250 $g/m^2/yr^{-1}$, therefore significant effects on benthic habitats are not predicted.<br><br>The Proposed Development is unlikely to have any significant effects on European shag given the proposed embedded design and operational mitigation. | |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | This impact pathway is unlikely to result in anything other than insignificant effects. | |
| Common guillemot | National | **Local** | **Importance of Feature:**<br>Common guillemot are listed as a migratory species within the Wild Birds Directive (2009/147/EC). They are also afforded general protection under the Wildlife and Countryside Act 1981. They are also listed as an amber list species in the BCC list.<br><br>The DBA identified negligible abundance (1 IND) within the baseline condition. The Scottish common guillemot population was estimated to be 1,167,841 IND after the Seabird 2000 survey. In 2019, the population was determined to be 18 % above the 1986 baseline.<br><br>**Entanglement and Entrapment:**<br>**(Scoped Out)**<br>Common guillemot are considered to be sensitive to sub-surface entanglement and subsequent drowning[114]. However, evidence suggests that common guillemot typically forage at depths of 90 m in offshore environments[114]. As such, it is considered unlikely that common guillemot utilise the development area as primary foraging habitat.<br><br>The DBA identified negligible abundance (1 IND) within the 10 km study area. As such, utilisation of the development location by common guillemot is considered negligible. | **No** |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | Embedded design mitigation in the form of top netting in-line with NS guidance[20] and high rigidity primary sub-surface netting will reduce the potential for impact.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**Disturbance in the vicinity of the Proposed Development and VTR:**<br>**(Scoped Out)**<br>Common guillemot are thought to display medium sensitivity to marine vessel activity[114,85].<br><br>However, the DBA identified negligible abundance (1 IND) within the 10 km study area. As such, utilisation of the development location by common guillemot is considered negligible.<br><br>The Proposed Development would result in a negligible increase in marine vessel activity, with one additional vessel, a 9 m polarcirkel. Under normal operational conditions this vessel would be expected to make a single return journey per day. The indicative VTR for the Proposed Development covers a distance of 4.44 km between the shorebase and the Proposed Development. The VTR is also located within the inshore environment, whilst common guillemot typically utilise deep, offshore waters for foraging[114]. As such, it is considered unlikely that common guillemot will make significant use of the development location, thereby reducing the potential connectivity with this impact pathway. | |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**<u>Direct displacement from the Proposed Development's footprint: (Scoped Out)</u>**<br>Common guillemot sensitivity to marine structures is believed to be varied, with low, medium and very high sensitivity being reported[114,85].<br><br>However, evidence suggests that common guillemot typically forage at depths of 90 m in offshore environments[114].<br><br>The Proposed Development is not in an offshore environment. Therefore, connectivity with the common guillemot's primary foraging habitat is not likely.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**<u>Loss of, or damage to prey-supporting habitats: (Scoped Out)</u>**<br>Common guillemot typically forage in offshore locations, where they dive to depths of 90 m[114]. The Proposed Development is not located in an offshore location.<br><br>NewDEPOMOD modelling indicates that the Proposed Development will comply with the SEPA benthic quality standards. Therefore, no significant effect is likely. | |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | This impact pathway is unlikely to result in anything other than insignificant effects. | |
| Common gull | International | **Local** | **<u>Importance of Feature:</u>**<br>Common gull are listed in Annex II of the Wild Birds Directive (2009/147/EC), they are also afforded general protection under the Wildlife and Countryside Act 1981.<br><br>The DBA identified low abundance (22 IND) within the 10 km study area. The Scottish common gull population was estimated to be 20,467 AON at the time of the Seabird 2000 survey. SMP data indicate that in 2019, the Scottish common gull population was at 15 % below the 1986 baseline.<br><br>**<u>Entanglement and Entrapment:</u>**<br>**<u>(Scoped Out)</u>**<br>Common gull are considered sensitive to entanglement in surface netting, as a result of their surface foraging strategy.<br><br>The DBA identified low comparative abundance of common gull within the baseline condition.<br><br>The Proposed Development is unlikely to have any significant effects on common gull given the proposed embedded design and operational mitigation.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects. | **No** |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | **<u>Disturbance in the vicinity of the Proposed Development and VTR:</u>**<br>**<u>(Scoped Out)</u>**<br>Common gull are considered to display low sensitivity to marine vessel activity[114,85].<br>The Proposed Development will result in a negligible level of increase in marine vessel activity (one return journey per day), along a 4.44 km indicative VTR.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**<u>Direct displacement from the Proposed Development's footprint:</u>**<br>**<u>(Scoped Out)</u>**<br>Common gull are known to forage over large areas. They are also known to display a generalist foraging strategy that allows them to make use of multiple habitats such as, agricultural land, playing fields, estuaries and marine environments[114].<br><br>Evidence also indicates that common gull make use of marine structures, including aquaculture farms for resting and foraging, as the structures act as fish aggregating devices (FADs) [114].<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**<u>Loss of, or damage to prey-supporting habitats:</u>**<br>**<u>(Scoped Out)</u>** | |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | Common gull are known to forage over large areas. They are also known to display a generalist foraging strategy that allows them to make use of multiple habitats such as, agricultural land, playing fields, estuaries and marine environments[114].<br><br>As a result, they are less likely to be significantly constrained by displacement from small areas of foraging habitat than species that have a high degree of habitat specialisation.<br><br>NewDEPOMOD modelling indicates that the Proposed Development will comply with the SEPA benthic quality standards. Therefore, no significant effect is likely.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects. | |
| Great black-backed gull | International | **Regional** | **<u>Importance of Feature:</u>**<br>Great black-backed gull are listed as an Annex II species in the Wild Birds Directive (2009/147/EC). They are also afforded general protection under the Wildlife and Countryside Act 1981. They are also listed in Annex II of the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA).<br><br>The DBA identified negligible abundance (5 IND) within the 10 km study area. The Scottish population was estimated to be 14,773 AON (Seabird 2000), with numbers declining since this estimate, to their lowest levels at 69 % below the 1986 baseline. The biogeographic population is estimated to be 235,000. | **Yes** |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | **Entanglement and Entrapment:**<br>**(Scoped In)**<br>Great black-backed gull are considered sensitive to entanglement in surface netting, as a result of their surface foraging strategy.<br><br>Further assessment is required to determine the magnitude of the potential impact.<br><br>**Disturbance in the vicinity of the Proposed Development and VTR:**<br>**(Scoped Out)**<br>Great black-backed gull are considered to display low sensitivity to marine vessel activity[87].<br><br>The DBA identified low abundance (3 AON, 10 AOT, and 8 IND) within the 10 km study area.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**Direct displacement from the Proposed Development's footprint:**<br>**(Scoped Out)**<br>Great black-backed gull are thought to display low sensitivity to marine structures[114,85].<br>The DBA identified low abundance (3 AON, 10 AOT, and 8 IND) within the 10 km study area. | |

[87] Garthe, S. and Hüppop, O., 2004. Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. Journal of applied Ecology, 41(4), pp.724-734. [Online] Available at: https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/j.0021-8901.2004.00918.x

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**<u>Loss of, or damage to prey-supporting habitats: (Scoped Out)</u>**<br>Great black-backed gull are known to forage over large areas, as a result, they have multiple potential foraging grounds available[114].<br><br>They also utilise a generalist foraging strategy, and therefore forage over a variety of habitats, including, estuaries, beaches, rocky coasts, and islands, in association with seabird colonies[114].<br><br>The DBA identified low abundance (3 AON, 10 AOT, and 8 IND) within the 10 km study area.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects. | |
| Herring gull | International | **Regional** | **<u>Importance of Feature:</u>**<br>Herring gull are listed as an Annex II species in the Wild Birds Directive (2009/147/EC).<br>They are also listed in the Scottish Biodiversity List, under the Nature Conservation (Scotland) Act 2004 and Annex II of AEWA.<br><br>The DBA identified low abundance of herring gull within the baseline condition, with ten AONs, and 13 IND recorded within the 10 km study area. The Scottish population is estimated to be 71,659 AON (Seabird 2000), since this estimate numbers had fallen to 60 % below the 1986 | **Yes** |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | baseline by 2019. The biogeographic population is estimated to be 1,098,000.<br><br>**<u>Entanglement and Entrapment:</u>**<br>**<u>(Scoped In)</u>**<br>Herring gull are known to predate marine salmon fish farms, as such they are likely to interact with containment and top netting.<br><br>Further assessment is required to determine the magnitude of the potential impact.<br><br>**<u>Disturbance in the vicinity of the Proposed Development and VTR:</u>**<br>**<u>(Scoped Out)</u>**<br>Herring gull are believed to display low sensitivity to marine vessel activity, with foraging activity in association with marine vessels in inshore areas documented[114].<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**<u>Direct displacement from the Proposed Development's footprint:</u>**<br>**<u>(Scoped Out)</u>**<br>Herring gull are believed to display low sensitivity to marine structures[114,85].<br><br>This impact pathway is unlikely to result in anything other than insignificant effects. | |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | **Loss of, or damage to prey-supporting habitats: (Scoped Out)**<br>Herring gull are known to forage over large areas. They also utilise a generalist foraging strategy, where they will take live marine and terrestrial prey and also scavenge for food resource[114].<br><br>NewDEPOMOD modelling indicates that the Proposed Development will comply with the SEPA benthic quality standards. The marine modelling also indicates that there will be no organic deposition above 250 $g/m^2/yr^{-1}$, therefore significant effects on benthic habitats are not predicted.<br><br>As such they are unlikely to be significantly constrained by limited habitat loss.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects. | |
| **Mammal Species** | | | | |
| Common seal | International | **Regional** | **Importance of Feature:**<br>Common seal are listed in Appendix 3 of the Bern Convention, Appendix 2 of the Convention on Migratory Species, and Annexes II and V of the Habitats Directive (92/43/EEC). Common seal are also protected under the Marine (Scotland) Act 2010, the Conservation (Natural Habitats & c.) Regulations 1994, and the Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014. They are also a PMF in Scottish waters. | **Yes** |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | The DBA identified high abundance (310 IND) within the baseline condition. The common seal population within the Western Isles SMU is thought to be 4,905. There are a total of six common seal HOSs within a 50 km radius of the Proposed Development, with the nearest being the Eilean Glas Cheann Chrionaig HOS (WI-017), which is located 15.46 km from the Proposed Development.<br><br>**<u>Marine vessel activity, with the potential to cause disturbance, injury or mortality:</u>**<br>**<u>(Scoped out)</u>**<br>Seals are considered to be at low risk of marine vessel collision, with less than 2 % of seal deaths related to marine vessel collision[88].<br><br>The Proposed Development would result in a negligible increase in marine vessel activity, with one additional vessel, a 9 m polarcirkel. Under normal operational conditions this vessel would be expected to make a single return journey per day along the 4.44 km indicative VTR.<br><br>When hauled out on land common seals are known to display increased alertness to marine vessels at distances of 560 to 850 m and flushing responses at distances of 510 to 850 m[89].<br><br>The nearest common seal HOS is 15.46 km (straight-line (Proposed Development site centre to nearest part of HOS)) from the Proposed | |

88 Onoufriou, J., Jones, E., Hastie, G. and Thompson, D., 2016. Investigations into the interactions between harbour seals (Phoca vitulina) and vessels in the inner Moray Firth. Marine Directorate. [Online] Available at: https://data.marine.gov.scot/sites/default/files/SMFS%20Vol%207%20No%2024.pdf
89 Andersen, S.M., Teilmann, J., Dietz, R., Schmidt, N.M. and Miller, L.A., 2012. Behavioural responses of harbour seals to human-induced disturbances. *Aquatic Conservation: Marine and Freshwater Ecosystems*, *22*(1), pp.113-121. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1002/aqc.1244

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | Development (Eilean Glas Cheann Chrionaig HOS (WI-017)). Due to this distance between the Proposed Development and the HOS it is highly unlikely that marine vessel activity will disturb hauled out common seal.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**<u>Underwater noise, with the potential to cause disturbance and exclusion:</u>**<br>**<u>(Scoped Out)</u>**<br>ADDs will not be deployed at the Proposed Development as a standard predator control measure, thereby avoiding the potential for impact.<br><br>Common seal hear best at frequencies ranging from 1 to 30 kHz[90]. The broadband frequency of noise produced by rigid inflatable boat (RIB) vessels ranges from 1 to 48 kHz[91]. Therefore, common seal are considered sensitive to underwater noise generated from marine vessels.<br><br>The Proposed Development would result in a negligible increase in marine vessel activity, with one additional vessel, a 9 m polarcirkel. Under normal operational conditions this vessel would be expected to make a single return journey per day along the 4.44 km indicative VTR. | |

[90] Richardson, W.J., Greene Jr, C.R., Malme, C.I. and Thomson, D.H., 2013. Marine mammals and noise. Academic press. [Online] Available at:https://books.google.co.uk/books?hl=en&lr=&id=j6bYBAAAQBAJ&oi=fnd&pg=PP1&dq=Richardson,+W.+J.,+C.+R.+J.+Greene,+C.+I.+Malme,+and+D.+H.+Thomson.+Marine+Mammals+and+Noise.+San+Diego,+CA:+Academic+Press,+Inc,+1995.&ots=BbRxEgcqYh&sig=cpQcshXuNIO7O94hPLW32UVWXEI&redir_esc=y#v=onepage&q&f=false

[91] Erbe, C., Liong, S., Koessler, M.W., Duncan, A.J. and Gourlay, T., 2016. Underwater sound of rigid-hulled inflatable boats. The Journal of the Acoustical Society of America, 139(6), pp.EL223-EL227. [Online] Available at: https://asa.scitation.org/doi/full/10.1121/1.4954411

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**<u>Entanglement in fish farm infrastructure, with the potential to cause injury or mortality:</u>**<br>**<u>(Scoped In)</u>**<br>Common seal are determined to be a primary predatory species of Atlantic salmon marine fish farms. As illustrated within **Sub-Section 9.4.3.1** there are a total of six common seal HOSs within a 50 km radius of the Proposed Development.<br><br>As such, it is likely that common seal will be within the vicinity of the Proposed Development and therefore may try to predate on the stocked Atlantic salmon. As a result, further assessment is required to determine the magnitude of the potential impact.<br><br>**<u>Loss of, or damage to prey-supporting habitats:</u>**<br>**<u>(Scoped Out)</u>**<br>Common seal are known to forage over moderate distances, typically within 50 km of their HOSs[114].<br><br>They typically take prey such as sandeels, gadoids, herring, sprat, flatfish, octopus and squid[114].<br><br>NewDEPOMOD modelling indicates that the Proposed Development will comply with the SEPA benthic quality standards. Therefore, no significant effect is likely. | |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | This impact pathway is unlikely to result in anything other than insignificant effects. | |
| Grey seal | International | **Regional** | **<u>Importance of Feature:</u>**<br>Grey seal are listed in Appendix 3 of the Bern Convention, Appendix 2 of the Convention on Migratory Species, and Annexes II and V of the Habitats Directive (92/43/EEC). Grey seal are protected under the Marine (Scotland) Act 2010, the Conservation (Natural Habitats & c.) Regulations 1994, and the Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014. Grey seal are also a PMF in Scottish waters.<br><br>The DBA identified low abundance (48 IND) within the baseline condition. The grey seal population within the Western Isles SMU is thought to be 5,773.<br><br>Grey seal at-sea usage[81] indicates that the waters surrounding the Proposed Development, as well as the east coast of the Isle of Lewis are of limited importance, with these grid cells contributing negligibly to the total at-sea grey seal population. In contrast, at-sea data indicate that the waters associated with the Monach Islands contribute more significantly to the grey seal at-sea population.<br><br>**<u>Marine vessel activity, with the potential to cause disturbance, injury or mortality:</u>**<br>**<u>(Scoped out)</u>**<br>Seals are considered to be at low risk of marine vessel collision, with less than 2 % of seal deaths related to marine vessel collision[88]. | **Yes** |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | The Proposed Development would result in a negligible increase in marine vessel activity, with one additional vessel, a 9 m polarcirkel. Under normal operational conditions this vessel would be expected to make a single return journey per day, along the 4.44 km indicative VTR, between the shorebase and the Proposed Development.<br><br>Grey seal at-sea usage[81] indicates that the waters surrounding the Proposed Development, as well as the entire east coast of the Isle of Lewis are of limited importance, with these grid cells contributing negligibly to the total at-sea grey seal population.<br><br>Seals are known to display increased alertness to marine vessels at distances of 560 to 850 m and flushing responses at distances of 510 to 850 m[89].<br><br>The closest grey seal HOSs are all located at distances greater than 20 km from the Proposed Development. As such, disturbance of grey seal using HOSs is not predicted.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**<u>Underwater noise, with the potential to cause disturbance and exclusion:</u>**<br>**<u>(Scoped Out)</u>**<br>ADDs will not be deployed at the Proposed Development as a standard predator control measure, thereby avoiding the potential for impact. | |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | Grey seal hear best at frequencies ranging from 1 to 20 kHz[90]. The broadband frequency of noise produced by RIB vessels ranges from 1 to 48 kHz[91]. Therefore, grey seal are considered sensitive to underwater noise generated from marine vessels.<br><br>Grey seal at-sea usage[81] indicates that the waters surrounding the Proposed Development, as well as the east coast of the Isle of Lewis are of limited importance, with these grid cells contributing negligibly to the total at-sea grey seal population.<br><br>The Proposed Development would result in a negligible increase in marine vessel activity, with one additional vessel, a 9 m polarcirkel. Under normal operational conditions this vessel would be expected to make a single return journey per day, along the 4.44 km indicative VTR, between the shorebase and the Proposed Development.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects.<br><br>**Entanglement in fish farm infrastructure, with the potential to cause injury or mortality:**<br>**(Scoped In)**<br>Grey seal are determined to be a primary predatory species of Atlantic salmon marine fish farms. As illustrated within **Sub-Section 9.4.3.1** there are a total of 15 grey seal HOSs within a 100 km radius of the Proposed Development. Of these 15 HOSs the closest is the Sgeir | |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | Leathann (WI-004) located 24.63 km to the north-northeast of the Proposed Development.<br><br>Despite to lack of grey seal HOSs within close proximity to the Proposed Development, there is the potential that grey seal may be within the vicinity of the Proposed Development and therefore may try to predate on the stocked Atlantic salmon. As a result, further assessment is required to determine the magnitude of the potential impact.<br><br>**Loss of, or damage to prey-supporting habitats: (Scoped Out)**<br>Grey seal are known to forage over large distances, typically within 100 km of their HOSs[79].<br><br>They typically take prey such as sandeels, gadoids, herring, sprat, flatfish, octopus and squid[79].<br><br>NewDEPOMOD modelling indicates that the Proposed Development will comply with the SEPA benthic quality standards. Therefore, no significant effect is likely.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects. | |
| European otter | International | **Local** | **Importance of Feature:**<br>European otter are listed as an Annex II and IV species in the Habitats Directive (92/43/EEC) and Schedule 5 of the Wildlife and Countryside Act 1981. They are also listed as a PMF in Scotland. | **No** |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | European otter are also listed in Schedule 2 of the Conservation (Natural Habitats and c.) Regulations 1994, as such they are classified as an EPS within Scotland.<br><br>The DBA identified low abundance (15 IND) predominately associated with the shoreline environment within the study area. Across Scotland, European otter are flourishing, with the national population estimated to be around 8,000 IND.<br><br>**All Impact Pathways**<br>**(Marine vessel activity, with the potential to cause disturbance, injury or mortality, Underwater noise, with the potential to cause disturbance and exclusion, Entanglement in fish farm infrastructure, with the potential to cause injury or mortality, and Loss of, or damage to prey-supporting habitats):**<br>**(Scoped Out)**<br>Coastal European otter are known to forage in association with the intertidal and shallow sublittoral zones, with foraging very unlikely to take place at distances greater than 100 m from the shoreline. Coastal European otter typically dive to depths of 2 m, for 20 seconds at a time in search of their prey[82].<br><br>European otter were recorded in negligible abundance within the baseline condition. | |

| Ecological feature | General geographic importance | Intrinsic Value of the Feature in the Context of the Development Area | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| | | | The Proposed Development is unlikely to have any significant effects on European otter given the proposed embedded design and operational mitigation.<br><br>As such, due to the very limited potential for connectivity between coastal European otter and the Proposed Development, it is not considered that there is the potential for a breach of the legislation in regard to the EPS status of the European otter.<br><br>This impact pathway is unlikely to result in anything other than insignificant effects. | |

## 9.6 Evolution of the Baseline Condition

The EIA Regulations require that; ***"A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge"*** (EIA Regulations, Schedule 4, Paragraph 3), is included within the EIAR. Therefore, this Sub-Section of the EIAR, provides a qualitative description of the evolution of the baseline condition, on the assumption that the installation and subsequent long-term operation of the Proposed Development does not take place. The description is based on available information and scientific knowledge of the ecology of the IEFs identified within the baseline condition.

### 9.6.1 Ornithological IEFs

In regard to seabird population dynamics a number of key drivers have been identified. These include climate change[92, 93, 94, 95, 96, 97, 98, 99] and fisheries[100, 93, 101, 102, 103]. There are a number of secondary impacts that are also thought to act upon seabird populations, but to a lesser extent. These secondary impacts include; pollutants, alien mammalian predation at colonies and nesting sites, disease, and loss of nesting habitat98, 101. In addition, in 2022, Highly Pathogenic Avian Influenza (HPAI) adversely affected both survival and productivity rates within seabird colonies, with northern gannet being particularly impacted. The long-term effects of HPAI on seabird populations are difficult to predict, and investigations are currently ongoing.

Population trends in seabird colonies are better understood than trends in numbers of seabirds at sea. Breeding populations are regularly monitored across a number of colonies, and, within the UK, there has been three national seabird censuses; Operation Seafarer (1969 – 1970), Seabird Colony Register (1985 – 1988), and Seabird 2000 (1998 – 2002)[98]. In addition to this there are decadal single species surveys, such as the Gannet Census[104]. Breeding numbers of many seabirds within the UK are

[92] Sandvik, H., Erikstad, K.E. and Sæther, B.E., 2012. Climate affects seabird population dynamics both via reproduction and adult survival. *Marine Ecology Progress Series*, *454*, pp.273-284. [Online] Available at: https://www.int-res.com/abstracts/meps/v454/p273-284/

[93] Frederiksen, M., Wanless, S., Harris, M.P., Rothery, P. and Wilson, L.J., 2004. The role of industrial fisheries and oceanographic change in the decline of North Sea black-legged kittiwakes. Journal of Applied Ecology, 41(6), pp.1129-1139. [Online] Available at: https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/j.0021-8901.2004.00966.x

[94] Frederiksen, M., Anker-Nilssen, T., Beaugrand, G. and Wanless, S., 2013. Climate, copepods and seabirds in the boreal Northeast Atlantic–current state and future outlook. Global change biology, 19(2), pp.364-372. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/gcb.12072

[95] Burthe, S.J., Wanless, S., Newell, M.A., Butler, A. and Daunt, F., 2014. Assessing the vulnerability of the marine bird community in the western North Sea to climate change and other anthropogenic impacts. Marine Ecology Progress Series, 507, pp.277-295. [Online] Available at: https://www.int-res.com/abstracts/meps/v507/p277-295/

[96] MacDonald, A., Heath, M., Edwards, M., Furness, R., Pinnegar, J.K., Wanless, S., Speirs, D. and Greenstreet, S.P., 2015. Climate driven trophic cascades affecting seabirds around the British Isles. Oceanogr. Mar. Biol. Annu. Rev, 53, pp.55-80.

[97] Furness, R.W., Laffoley, D. and Baxter, J.M., 2016. Impacts and effects of ocean warming on seabirds. Explaining ocean warming: causes, scale, effects and consequences. IUCN, Gland, Switzerland, pp.271-288.

[98] JNCC. (2016) Seabird Population Trends And Causes Of Change: 1986-2015 Report Http://Jncc.Defra.Gov.Uk/Page-3201 Joint Nature Conservation Committee, Peterborough.

[99] Pearce-Higgins, J.W., 2021. Climate change and the UK's birds. British Trust for Ornithology Report, Thetford.

[100] Tasker, M.L., Camphuysen, C.J., Cooper, J., Garthe, S., Montevecchi, W.A. and Blaber, S.J., 2000. The impacts of fishing on marine birds. ICES journal of Marine Science, 57(3), pp.531-547. [Online] Available at: https://academic.oup.com/icesjms/article-abstract/57/3/531/635929

[101] Ratcliffe, N. (2004) Causes of seabird population change. Pp 407-437 In Mitchell, P.I., Newton, S.F., Ratcliffe, N. And Dunn, T.E. (Eds.) Seabird Populations of Britain and Ireland. T.and A.D. Poyser, London.

[102] Carroll, M.J., Bolton, M., Owen, E., Anderson, G.Q., Mackley, E.K., Dunn, E.K. and Furness, R.W., 2017. Kittiwake breeding success in the southern North Sea correlates with prior sandeel fishing mortality. Aquatic Conservation: Marine and Freshwater Ecosystems, 27(6), pp.1164-1175. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1002/aqc.2780

[103] Sydeman, W.J., Thompson, S.A., Anker-Nilssen, T., Arimitsu, M., Bennison, A., Bertrand, S., Boersch-Supan, P., Boyd, C., Bransome, N.C., Crawford, R.J. and Daunt, F., 2017. Best practices for assessing forage fish fisheries-seabird resource competition. Fisheries Research, 194, pp.209-221. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/S0165783617301455

[104] Murray, S., Harris, M.P. and Wanless, S., 2015. The status of the gannet in Scotland in 2013-14. Scottish Birds, 35(1), pp.3-18. [Online] Available at: https://nora.nerc.ac.uk/id/eprint/510050/

declining, with the most significant exception being the northern gannet population. The northern gannet population continues to increase, although the rate of increase has been showing signs of slowing[104]. Moreover, the impacts of HPAI on the northern gannet population are unknown but have likely caused significant mortality within the breeding population.

Climate change has been identified as a key cause of seabird declines over recent times. An assessment[99] was undertaken to determine the sensitivity of twenty UK seabird species to climate change. This assessment determined that fourteen of the twenty species assessed are at high to medium risk of negative climate change impacts. In addition, declines in sandeel populations have led to reduced breeding success in seabirds. These declines in sandeel populations have been experienced off both the east and west of Scotland, as well as throughout the UK. The declines are thought to be a result of commercial fishing effort and the impacts of climate change. The reduced availability of sandeels, as a prey resource, is thought to underpin the long-term population declines, at least partially, in UK seabirds[105].

Fisheries management measures are also likely to influence the future of seabird populations. The Common Fisheries Policy (CFP) Landings Obligation (which specifies that catches of quota fish may no longer be discarded), will reduce the available food resource for scavenging seabirds, such as great black-backed gulls, herring gulls, and northern gannet[106, 107]. Moreover, changes to fisheries management that are aimed at recovering predatory fish stocks are also likely to further reduce the food resource available to seabirds that feed primarily on low trophic level species, such as sandeels, as these low trophic species are prey for large predatory fishes[96]. As a result, seabird populations are likely to continue to face food resource shortages across their ranges, especially for those species that depend significantly on sandeels.

Within the *Larus* genus, it is likely that there will be a further redistribution of breeding herring, lesser black-backed and common gulls[75] to inland, urban locations[108]. Although it is uncertain how the proportion of marine and terrestrial foraging within these species will alter over the future baseline, this may depend greatly on the consequences of Brexit on both the commercial fishing and farming industries, and the impacts these have on potential food resource.

As a result, this EcIA is carried out in the context of declining seabird populations, with the notable exception of the northern gannet. Where a IEF is declining, the assessment will take into account whether the specific impact is likely to exacerbate the decline and prevent the recovery of the IEF, should environmental conditions become more favourable.

### 9.6.2 Mammalian IEFs

The evolution of marine mammals IEFs scoped into this assessment is challenging. Some marine mammals, at a UK level, have undergone significant change in parts of their range, with limited understanding of the variables that may have influences these changes.

[105] Mitchell, I., Daunt, F., Frederiksen, M. and Wade, K., 2020. Impacts of climate change on seabirds, relevant to the coastal and marine environment around the UK. [Online] Available at: https://nora.nerc.ac.uk/id/eprint/527055/

[106] Votier, S.C., Furness, R.W., Bearhop, S., Crane, J.E., Caldow, R.W., Catry, P., Ensor, K., Hamer, K.C., Hudson, A.V., Kalmbach, E. and Klomp, N.I., 2004. Changes in fisheries discard rates and seabird communities. Nature, 427(6976), pp.727-730. [Online] Available at: https://www.nature.com/articles/nature02315

[107] Bicknell, A.W., Oro, D., Camphuysen, K. and Votier, S.C., 2013. Potential consequences of discard reform for seabird communities. Journal of Applied Ecology, 50(3), pp.649-658. [Online] Available at: https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2664.12072

[108] Rock, P. and Vaughan, I.P., 2013. Long-term estimates of adult survival rates of urban Herring Gulls Larus argentatus and Lesser Black-backed Gulls Larus fuscus. Ringing & Migration, 28(1), pp.21-29. [Online] Available at: https://www.tandfonline.com/doi/full/10.1080/03078698.2013.811179

**Table 9.13** presents the results of the most recent UK review of conservation status for the scoped in marine mammal IEFs. For grey seals both the short-term (2005 – 2017) and long-term (1993 – 2017) trend in population size were categorised as increasing. The assessment concluded that grey seals have favourable future prospects. For common seals the short-term trend (2007 – 2017) was assessed as unknown, whilst the long-term trend (1993 – 2017) was assessed as increasing. The future prospects for the common seal are assessed as unfavourable – inadequate. This result is based on the current conservation status for each parameter combined with the future trend for each parameter. The future trend for range has been assessed as overall stable. As the current conservation status for range is favourable, the future prospects are considered good. The future trend for the population parameter was assessed as positive – increasing. However, as displayed in **Table 9.13**, the current conservation status for this parameter is unfavourable – inadequate and therefore the future prospect is assessed as poor. The future trend and therefore the future prospects for the habitat parameter were assessed as unknown.

However, it is important to note that this assessment for common seals was conducted at a UK wide level. Within the West Scotland SMU population estimates for common seals have increased over time.

**Table 9.13: Summary of the conservation status for each marine mammal IEF scoped into this EcIA.**

| Species Name | Range | Population | Habitat | Future Prospects | Conservation Status | Overall Trend |
|---|---|---|---|---|---|---|
| Common seal | FV* | U1* | XX* | U1 | U1 | XX |
| Grey seal | FV | FV | FV | FV | FV | +* |

*FV = Favourable. U1 = Unfavourable – Inadequate. XX = Unknown. + = Improving.

Climate change impacts on marine mammals have previously been reviewed and synthesised[109], with the findings indicating that the potential impacts remain poorly understood. Within UK waters, impacts resulting from climate change are likely to result in changes in prey abundance and distribution as a result of warmer sea temperatures. It is hypothesised that the species likely to be most at risk of climate change impacts will be those that have relatively narrow habitat requirements.

There is also the potential that increasing sea temperatures could result in the increased prevalence of domoic acid, derived from toxic algae, as a result of increased algae bloom events. Domoic acid is believed likely to be a contributory factor in common seal population declines across the UK[109]. In addition, sea level rise and an increase in storm event frequency and magnitude could affect the suitability of haul-out sites for seals, whilst also potentially leading to increased pup and juvenile seal mortality[110, 111, 112].

[109] Evans, P.G. and Bjørge, A., 2013. Impacts of climate change on marine mammals. MCCIP Science Review, 2013, pp.134-148. [Online] Available at: https://www.seawatchfoundation.org.uk/wp-content/uploads/2015/05/Evans-Bj%C3%B8rge_2013.pdf
[110] Prime, J.H., 1985. The current status of the grey seal Halichoerus grypus in Cornwall, England. Biological conservation, 33(1), pp.81-87. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/0006320785900060
[111] Gazo, M., Aparicio, F., Cedenilla, M.A., Layna, J.F. and González, L.M., 2000. Pup survival in the Mediterranean monk seal (Monachus monachus) colony at Cabo Blanco peninsula (Western Sahara-Mauritania). Marine Mammal Science, 16(1), pp.158-168. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1748-7692.2000.tb00910.x
[112] Lea, M.A., Johnson, D., Ream, R., Sterling, J., Melin, S. and Gelatt, T., 2009. Extreme weather events influence dispersal of naive northern fur seals. Biology letters, 5(2), pp.252-257. [Online] Available at: https://royalsocietypublishing.org/doi/abs/10.1098/rsbl.2008.0643

# 9.7 Impact Assessment

## 9.7.1 Construction Impacts

During the construction and installation of the Proposed Development, it is highly unlikely that potential predatory species will be actively drawn to and directly interact with the Proposed Development. This is primarily because there will be no stock onsite to act as an attractant. As such, impacts arising from the construction and installation of the Proposed Development have been scoped out of further assessment.

## 9.7.2 Operational Impacts

This Sub-Section assesses the potential impacts arising from the operation of the Proposed Development on potential predatory IEFs within the baseline condition.

### 9.7.2.1 Entanglement or Entrapment in Top and Pen Netting Infrastructure

#### 9.7.2.1.1 Nature of Impact

The potential exists for the identified predatory IEFs within the baseline condition to become entangled in, or entrapped within, the containment netting proposed for deployment at the Proposed Development. Dependent on the foraging ecology of the individual IEFs, they may be more at risk of sub-surface or surface entanglement. For example, the great cormorant IEF, which is known to carry out visually guided pursuit dives to capture prey, is considered to be more at risk of sub-surface entanglement and subsequent drowning. Whilst the gull IEFs, that utilise a surface foraging strategy are considered more at risk of surface entanglement.

Entanglement and entrapment may lead to injury and direct mortality. It may also cause sub-lethal effects, through stress response, that could have consequences for the longer-term fitness of the individual. Entanglement and entrapment may also have an energetic cost, through increased energy output associated with an escape response, and reduced energy intake, as a result of lost foraging time.

#### 9.7.2.1.2 Duration of Impact

The duration of the impact has been determined as **long-term** and **temporary**. It is considered **long-term**, as primary and top netting will be installed at the Proposed Development throughout the duration of the production cycle. However, it is considered **temporary** as, during the fallow period between production cycles, all primary netting will be removed from the Proposed Development. This therefore avoids connectivity for temporary periods.

#### 9.7.2.1.3 Great Cormorant

##### 9.7.2.1.3.1 Importance of IEF

Great cormorant have been assigned a project-specific importance value of '**regional**'.

##### 9.7.2.1.3.2 Magnitude of the Unmitigated Impact

Great cormorants are regarded as visually guided pursuit dive foragers and are thought to prey on both pelagic and benthic fishes[113], with benthic species accounting for up to 80 % of their diet[114]. Due to this foraging ecology, they are potentially more at risk of entanglement in sub-surface netting. Evidence indicates that great cormorant are recorded as by-catch in gillnet fisheries[115], indicating that they are sensitive to the impact of entanglement. However, it has been identified that first year great cormorants

[113] White, C.R., Day, N., Butler, P.J. and Martin, G.R., 2007. Vision and foraging in cormorants: more like herons than hawks? PLoS One, 2(7), p.e639. [Online] Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000639
[114] Furness, R.W., Wade, H.M., Robbins, A.M. and Masden, E.A., 2012. Assessing the sensitivity of seabird populations to adverse effects from tidal stream turbines and wave energy devices. *ICES Journal of Marine Science*, *69*(8), pp.1466-1479. [Online] Available at: https://academic.oup.com/icesjms/article/69/8/1466/704765
[115] Žydelis, R., Small, C. and French, G., 2013. The incidental catch of seabirds in gillnet fisheries: a global review. *Biological Conservation*, *162*, pp.76-88. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/S0006320713000979

are more likely to become entangled than older birds[116]. The Furness *et al.,* report[114] has assigned a drowning risk of 4 out of 5, which reflects the feeding ecology of the great cormorant.

Evidence indicates that great cormorant have a mean diving range of 1 to 12 m. The proposed mooring area has a mean depth of 54.7 m. As a result, it is unlikely that great cormorant would utilise the area as primary benthic foraging ground. However, great cormorant may target the stocked fish within the pens, which will be held in 15 m deep nets.

Great cormorant entanglement in gillnets is associated with larger mesh size and light tensioning. This light tensioning allows the netting to deform on contact, creating a pocket of netting around the animal which results in entanglement. Mesh size is also an important characteristic that influences the probability and frequency of entanglement, with gillnets with a mesh size of 60 mm or greater resulting in six times higher bycatch rates than gillnets with mesh between 18 and 25 mm[117].

In contrast, the proposed rigid netting (Sapphire Seal Pro netting, or similar) that will be deployed as embedded mitigation at the Proposed Development will have a standard mesh size of 25 mm along with high structural rigidity, which ensures it does not easily deform. As a result, the specific netting characteristics that increase the risk of entanglement are not associated with the proposed sub-surface rigid netting. This, in combination with an effective sinker tube tensioning system will ensure that the primary netting presents as a 'wall' to any great cormorant trying to access the pens.

Great cormorant may also be at risk of entanglement or entrapment in the pole-mounted top net system, where they may perch whilst preening and drying[118] or where they may try and access the stocked fish from the surface. The top netting will have a ceiling mesh size of 75 mm and a sidewall mesh size 75 mm in line with NS requirements. This, in combination with effective daily checks, will reduce the potential for entanglement and entrapment.

Across the existing Gravir farms there are no records of great cormorant entanglement in either sub-surface or surface netting. The probability and frequency of the impact are therefore both determined to be **negligible**.

As a result of the above assessment, the overall magnitude of the impact of entanglement and entrapment on the great cormorant IEF is determined to be **negligible**.

#### 9.7.2.1.3.3 Significance of Effect without Mitigation

In light of the assessed **negligible magnitude**, the effect of entanglement and entrapment on the great cormorant IEF is assessed as **not significant** in relation to the EIA Regulations.

#### 9.7.2.1.3.4 Mitigation

No significant effect is anticipated, therefore no additional mitigation measures above the embedded mitigation measures are required.

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[116] Žydelis, R., Bellebaum, J., Österblom, H., Vetemaa, M., Schirmeister, B., Stipniece, A., Dagys, M., van Eerden, M. and Garthe, S., 2009. Bycatch in gillnet fisheries–an overlooked threat to waterbird populations. *Biological Conservation*, *142*(7), pp.1269-1281. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/S0006320709001001

[117] Dagys, M. and Žydelis, R., 2002. Bird bycatch in fishing nets in Lithuanian coastal waters in wintering season 2001–2002. Acta Zoologica Lituanica, 12(3), pp.276-282. [Online] Available at: https://www.tandfonline.com/doi/abs/10.1080/13921657.2002.10512514

[118] Roycroft, D., Kelly, T.C. and Lewis, L.J., 2007. Behavioural interactions of seabirds with suspended mussel longlines. *Aquaculture International*, *15*(1), pp.25-36. [Online] Available at: https://link.springer.com/article/10.1007/s10499-006-9065-y

#### 9.7.2.1.3.5 Significance of Residual Effect Post Mitigation

No mitigation is required as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

### 9.7.2.1.4 Northern Gannet

#### 9.7.2.1.4.1 Importance of IEF

Northern gannet have been assigned a project-specific importance value of '**international**'.

#### 9.7.2.1.4.2 Magnitude of the Unmitigated Impact

Northern gannets utilise a plunge diving foraging strategy, where they dive once prey have been located[119,120]. Foraging strategy varies from shallow plunge dives to longer and deeper, wing propelled active pursuit dives[121]. The Furness *et al.,* report[114] assigned a drowning risk score of 2 out of 5, which is indicative of a low risk. Evidence within the literature indicates that northern gannet are recorded as bycatch in gillnet fisheries. Therefore, due to the combination of plunge diving and active pursuit diving northern gannet may interact with both the surface and sub-surface netting of the Proposed Development.

Northern gannet have a large mean foraging range of 120.40 km (+/- 50.00 km), which when applied to a central place, such as a breeding colony, represents a potential foraging area of 91,019.24 km$^2$. Due to the comparatively small surface area of the Proposed Development, the spatial extent of the impact is determined to be negligible. Northern gannet recorded within the baseline study area are likely to be associated with the St. Kilda SPA and Seas off St Kilda SPA, the nearest two SPAs for northern gannet to the Proposed Development. Only one individual was recorded in the 2020 wildlife logs, indicating a negligible degree of use of the waters surrounding the Proposed Development. As a result, the development location is determined to represent a negligible to low importance foraging ground. An RIAA (**Appendix O**) has been undertaken, under the requirements of the Habitats Regulations, where the potential for AEOSI has been assessed for the St. Kilda SPA and Seas off St Kilda SPA. Northern gannet entanglement in gillnets is associated with larger mesh size and light tensioning. This light tensioning allows the netting to deform on contact, creating a pocket of netting around the animal which results in entanglement. Mesh size is also an important characteristic that influences the probability and frequency of entanglement, with gillnets with a mesh size of 60 mm or greater resulting in six times higher bycatch rates than gillnets with mesh between 18 and 25 mm[117].

In contrast, the proposed rigid netting (Sapphire Seal Pro netting, or similar) that will be deployed as embedded mitigation at the Proposed Development will have a standard mesh size of 25 mm along with high structural rigidity, which ensures it does not easily deform. As a result, the specific netting characteristics that increase the risk of entanglement are not associated with the proposed sub-surface rigid netting. This, in combination with an effective sinker tube tensioning system will ensure that the primary netting presents as a 'wall' to any northern gannet engaged in an active pursuit dive. Therefore, both the probability and frequency of entanglement in sub-surface netting is determined to be **negligible**.

[119] Hamer, K.C., Humphreys, E.M., Magalhaes, M.C., Garthe, S., Hennicke, J., Peters, G., Grémillet, D., Skov, H. and Wanless, S., 2009. Fine-scale foraging behaviour of a medium-ranging marine predator. Journal of Animal Ecology, 78(4), pp.880-889. [Online] Available at: https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/j.1365-2656.2009.01549.x
[120] Ropert-Coudert, Y., Daunt, F., Kato, A., Ryan, P.G., Lewis, S., Kobayashi, K., Mori, Y., Grémillet, D. and Wanless, S., 2009. Underwater wingbeats extend depth and duration of plunge dives in northern gannets Morus bassanus. Journal of Avian Biology, 40(4), pp.380-387. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1600-048X.2008.04592.x
[121] Garthe, S., Benvenuti, S. and Montevecchi, W.A., 2000. Pursuit plunging by northern gannets (Sula bassana)" feeding on capelin (Mallotus villosus)". *Proceedings of the Royal Society of London. Series B: Biological Sciences*, *267*(1454), pp.1717-1722. [Online] Available at: https://royalsocietypublishing.org/doi/abs/10.1098/rspb.2000.1200

Due to the plunge diving strategy of the northern gannet, they are also at risk of entanglement or entrapment in the pole-mounted top net system. The bird netting will have a ceiling and sidewall mesh size of 75 mm, in line NS requirements[20]. This, in combination with effective daily checks, will reduce the potential for entanglement and entrapment. Monitoring and reporting requirements, outlined within **Sub-Section 9.3.2.6,** will ensure accurate monitoring of any interaction events to allow a proactive approach to future mitigation, if needed.

At the existing Gravir farms there are no records of northern gannet entanglement in either sub-surface or surface netting. The probability and frequency of the impact are therefore both determined to be **negligible**.

Whilst northern gannet are central place foragers during the breeding season, which typically runs from August and September, they are present around the UK throughout the year[122]. However, during the winter period the highest concentrations of northern gannet are associated with the Northern Isles, southeast Scotland, northwest and southwest England and southwest Ireland. However, despite this geographical variation in northern gannet abundance, there is the potential for the Proposed Development to impact northern gannet over a wide temporal period (throughout the year).

As a result, the overall magnitude of the impact of entanglement and entrapment on the northern gannet IEF is determined to be **negligible**.

###### 9.7.2.1.4.3 Significance of Effect without Mitigation

In light of the assessed **negligible magnitude**, the effect of entanglement and entrapment on the northern gannet IEF is assessed as **not significant** in relation to the EIA Regulations.

###### 9.7.2.1.4.4 Mitigation

No significant effect is anticipated, therefore no additional mitigation measures above the embedded mitigation measures are required.

###### 9.7.2.1.4.5 Significance of Residual Effect Post Mitigation

No mitigation is required, as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

##### 9.7.2.1.5 Gull Species

###### 9.7.2.1.5.1 Importance of IEF

Great black-backed gull, and herring gull have been assigned a project-specific importance value of ‘**regional**’.

###### 9.7.2.1.5.2 Magnitude of the Unmitigated Impact

The identified gull species all utilise a surface feeding strategy, meaning that when foraging at sea, they take prey from the surface layer of the water column and do not dive within the water column to take prey. The Furness *et al.,* report assigned a drowning risk score of 1 out of 5 for all the identified gull species, which is indicative of extremely low risk[114]. As a result, the identified gull species are considered not to be sensitive to entanglement in sub-surface netting.

Gull species are known to utilise structures in the marine environment as roosting platforms, where they undertake behaviours, such as standing and preening. Structures within the marine environment can also provide a potential foraging opportunity to gull species through either biofouling of the structures or

[122] Northern gannet, RSPB. [Online] Available at: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/gannet/

via the structure acting as a fish aggregating device (FAD). As a result, gulls may congregate at the Proposed Development. Due to the generalist foraging strategy of gull species, they may then target the fish feed or the stocked fish as a potential food resource. However, it is anticipated that they may only target the stocked fish as prey during the early stages of the production cycle, due to the smaller size of fish.

The area over which the potential for entanglement and entrapment could occur is also very limited, with the total surface area of the Proposed Development being just 0.02 $km^2$. Gull species are known to forage over moderate to large ranges[114]. As a result, the spatial extent of the impact is determined to be **negligible**.

As detailed in **Sub-Section 9.3**, the feed will be stored in a sealed environment, within purpose-built feed silos, to ensure that gulls cannot scavenge on the stored feed. Feeding operations will also be monitored via high-definition cameras to ensure that the feed spreaders are working correctly and not spraying feed into the air, and therefore not providing a potential foraging opportunity. By ensuring best practice procedures are in place for feeding operations, the risk of gulls being attracted to the pens and therefore at risk of entanglement and entrapment in the pole-mounted top netting should be reduced.

To further reduce the probability and frequency of entanglement and entrapment occurring, the Proposed Development will deploy top netting with a ceiling and sidewall mesh size of 75 mm, in line with current NS guidance[20]. This, in combination with effective daily checks, will reduce the potential for entanglement and entrapment.

Furthermore, across the existing Gravir fish farm, there has been no recorded entanglement incident involving the IEF gull species. As a result of the embedded mitigation measures to be implemented, and no evidence of entanglement of the gull IEFs across the existing farms, the probability and frequency of entanglement in top netting is determined to be **negligible**.

As a result, the overall magnitude of the impact of entanglement and entrapment on the identified gull IEFs is determined to be **negligible**.

###### 9.7.2.1.5.3 Significance of Effect without Mitigation

In light of the assessed **negligible magnitude**, the effect of entanglement and entrapment on the gull IEFs is assessed as **not significant** in relation to the EIA Regulations.

###### 9.7.2.1.5.4 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

###### 9.7.2.1.5.5 Significance of Residual Effect Post Mitigation

No mitigation is required, as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

##### 9.7.2.1.6 Seal Species

###### 9.7.2.1.6.1 Importance of IEF

Both grey and common seal have been assigned a project-specific importance value of ‘**regional**’.

#### 9.7.2.1.6.2 Magnitude of the Unmitigated Impact

Both grey and common seal are at risk of entanglement in marine debris, this can lead to either direct mortality or, more likely, entanglement which may restrict feeding or cause deep abrasions[123]. There is also evidence indicating that anti-predator netting deployed at salmon farms, outside of the UK, has caused mortality in seal species. However, these entanglement interactions have been in relation with the deployment of anti-predator netting, of large mesh sizes, typically 100 mm square mesh. One report states that a reduction in anti-predator net mesh size could potentially reduce entanglement incidence[124].

The Proposed Development will utilise rigid primary netting (Sapphire Seal Pro, or similar), which has far higher structural rigidity than traditional braided PE netting, which results in greater bite and cut resistance. In addition, rigid netting, utilises a knotted mesh design, these rough knots are on the outer surface of the netting, which will be presented towards the seal. These knots will then irritate the seal's snout (sensitive skin) and deter further predation and interaction. Furthermore, the Special Committee on Seals (SCOS) states that the risk of entanglement and drowning in relation to aquaculture netting in only associated with anti-predator netting, with no reference made to primary containment netting. As part of the operational embedded mitigation (**Sub-Section 9.3**), anti-predator netting will not be used at the Proposed Development. Therefore, the probability and frequency of entanglement in sub-surface netting is determined to be **negligible**.

As a result, the overall magnitude of the impact of entanglement and entrapment on both the grey and common seal IEFs is determined to be **negligible**.

#### 9.7.2.1.6.3 Significance of Effect without Mitigation

In light of the assessed **negligible magnitude**, the effect of entanglement on both the grey and common seal IEFs is assessed as **not significant** in relation to the EIA Regulations.

#### 9.7.2.1.6.4 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

#### 9.7.2.1.6.5 Significance of Residual Effect Post Mitigation

No mitigation is required, as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

## 9.8 Cumulative Impacts

### 9.8.1 Entanglement or Entrapment in Top and Pen Netting Infrastructure

The Proposed Development will result in an increase in the biomass of Atlantic salmon held within the waters surrounding the Isle of Lewis. This increase in biomass may cause an increase in predatory attraction. However, due to the open and unconstrained nature of the development location, and its relative isolation from the existing Gravir sites, it is unlikely that there will be a significant cumulative attraction effect. The addition of the Proposed Development will also increase the surface area of both surface and sub-surface netting, thereby increasing the potential spatial extent over which the impact of entanglement may occur. However, the embedded mitigation, outlined within **Sub-Section 9.3**, that will be implemented at the Proposed Development through both design and operational management is already established at the existing fish farm. This suite of embedded mitigation is anticipated to reduce

[123] SCOS: Scientific Advice on Matters Related to the Management of Seal Populations: 2020. [Online] Available at: http://www.smru.st-andrews.ac.uk/files/2021/06/SCOS-2020.pdf

[124] Northridge, S., Coram, A. & Gordon, J. (2013). Investigations on seal depredation at Scottish fish farms. Edinburgh: Scottish Government. [Online] Available at: https://synergy.st-andrews.ac.uk/smru/files/2015/10/1758.pdf

the magnitude of potential impacts to **negligible** levels. As a result of the assessed **negligible magnitude**, the cumulative effect of entanglement on the identified predatory IEFs is determined to be **not significant** in relation to the EIA Regulations.

## 9.9 Statement of Significance

The findings of the impact assessment on predatory species are summarised below, with the full detailed assessment provided in **Section 9** of the EIAR.

The EIA considers the potential impacts of the Proposed Development as a result of interactions with predatory species. Ecological Impact Assessment (EcIA) methodology, as outlined within **Sub-Section 2.4.2**, has been used to assess the impact of the Proposed Development on identified IEFs within the baseline. Impacts have been limited to direct interactions as a result of predatory behaviour therefore the impact assessment relates only to entanglement and entrapment in sub-surface and surface netting.

**Section 11** of the EIAR provides an assessment of the other potential impacts of the Proposed Development on identified IEFs within the baseline condition.

A number of data sources including the operational wildlife logbooks of the two existing fish farms to the northeast of the Isle of Lewis, the NBN database, the SMP database, and the GeMS database were used to determine the presence of potential predatory species within the baseline. It was then determined which ecological features represented IEFs within the baseline. The predatory IEFs, outlined within **Table 9.14**, were identified within the baseline that have the potential to be significantly negatively impacted by the Proposed Development.

**Table 9.14: Summary of the predatory IEFs identified within the baseline**

| IEFs Relevant to the Assessment of Interactions with Predatory Species | |
|---|---|
| Common seal | Grey seal |
| Great black-backed gull | Herring gull |
| Great cormorant | Northern gannet |

A number of embedded mitigation measures have been incorporated into both the design and operation of the Proposed Development, including:

- Containment net strategy (design);
- Bird nets (design);
- Feed storage and feeding (design);
- Best practice husbandry procedures (operational);
- Pellet Detection Software (operational);
- Acoustic deterrent devices (ADDs) (will **NOT** be deployed) (operational);
- Anti-predator netting (will **NOT** be deployed) (operational);
- Predator Control Plan (PCP) (operational);
- Monitoring and reporting (operational); and
- Wildlife logbook monitoring (operational).

The identified IEFs within the baseline, whilst all displaying sensitivity to the pressure of entanglement and entrapment, display variation in the level of sensitivity. This is due to the differences in foraging ecology between the IEFs with some, such as the identified gull species, displaying surface feeding behaviour, making them more sensitive to surface pressures, whilst others, such as the European shag, display a visually guiding pursuit dive strategy, which makes them more sensitive to sub-surface pressures. Whilst there was a degree of overlap between the Proposed Development and potential foraging areas of the identified IEFs, it is identified that considerable foraging habitat also exists outwith the footprint of the Proposed Development. In regard to certain IEFs the Proposed Development does not represent primary foraging habitat and therefore the potential for utilisation of the area by specific IEFs in much reduced.

In relation to the IEFs that are primarily at risk of entanglement and entrapment in surface netting (bird top netting), the embedded mitigation of incorporating top net mesh size aligned with the NS recommendations will reduce the magnitude of potential impacts. This will be further mitigated through the daily inspection and maintenance schedule for the top netting, that will ensure that top netting is maintained at an effective standard, resulting in effective deterrence of avian predator interactions, whilst also reducing the potential for entanglement and entrapment. The monitoring and reporting requirements will also help improve the understanding of top net interactions with ornithological features and will allow for an adaptive approach to mitigation, if needed.

In regard to the IEFs that are primarily at risk of entanglement and entrapment in sub-surface netting (pen containment netting), the embedded mitigation of deploying high rigidity primary netting and an effective sinker tube tensioning system to ensure uniform tension across the surface of the netting will sufficiently reduce the potential for sub-surface entanglement and subsequent drowning. The assessment of the potential effect of entanglement and entrapment in both surface and sub-surface netting of the Proposed Development in isolation, resulted in the final determination that, due to the proposed embedded mitigation, the overall magnitude of any impact would be **negligible** and the effect **not significant** in relation to the EIA Regulations.

The Proposed Development, when assessed in-combination with the existing Gravir fish farm will result in an increase in the biomass of Atlantic salmon held within the surrounding waters of the Isle of Lewis, which may increase predatory attraction. However, the Proposed Development, in an open and unconstrained location, is considered to be sufficiently isolated from the existing fish farm to not result in a significant cumulative attractive effect. Moreover, the existing fish farm is currently operated in line with the identified embedded mitigation for the Proposed Development. As a result of the cumulative assessment carried out, it was determined that the overall magnitude of the cumulative impact of entanglement and entrapment would be **negligible** and the cumulative effect **not significant** in relation to the EIA Regulations.

## 9.10 Data Limitations and Uncertainties

Limitations and uncertainties associated with the overall evaluation of impact and effect on predatory species have been identified. However, it is determined that these limitations do not undermine the robustness of the assessment. These include aspects such as:

- **Pole-mounted top net interactions:** Pole-mounted top netting is increasingly commonly used within the Scottish salmon sector as a top net containment system. However, due to the limited historical commercial deployment of pole-mounted top netting, there is a lack of historic entanglement data available for top netting, particularly of various mesh sizes.

  In response to this novel top netting system and reports of entanglement of northern gannet, NS produced industry guidance on pole-mounted top netting mesh size to reduce the potential for connectivity[20]. As a precaution BFS are proposing to deploy netting in line with the NS guidance. Moreover, BFS will maintain an entanglement logbook to help better understand the magnitude of potential interactions. These data will be fed back to NS and will help inform future management and mitigation, if required.

# 10 Interactions with Wild Salmonids

## 10.1 Introduction

This technical assessment considers the potential impacts of the Proposed Development as a result of interactions with wild salmonids. This Section follows EcIA methodology and therefore assesses the impact of the Proposed Development on identified IEFs within the baseline condition.

## 10.2 Scoping

The potential for significant effects on wild salmonids was raised by consultees in their specific Scoping advice, in response to the Screening and Scoping Request submitted to CnES. A brief summary of the requirements of the consultees is provided below in **Table 10.1**. However, for a full review of the Scoping information requirements please see **Section 5**.

**Table 10.1: Summary of required information relevant to interactions with wild salmonids.**

| Consultee | Information Requirement | Cross Reference |
|---|---|---|
| MD | • Request that potential impacts on local wild salmonid populations are considered;<br>• Request that cumulative impacts are considered;<br>• Request that the EMP covers specific requirements; and<br>• Request that a Sea Lice Management and Efficacy Statement be produced and submitted with the planning application. | Section 10;<br><br>Appendix E (EMP);<br><br>Appendix F (Sea Lice Management);<br><br>Appendix H (Draft Farm Management Statement); and<br><br>Appendix R (Sea Lice Modelling). |
| NS | • NS state that they welcome the multiple non-chemical control measures identified within the Scoping Report and that they do not require any further information to what has been provided with the Scoping Report. | Section 10;<br><br>Appendix E (EMP);<br><br>Appendix F (Sea Lice Management);<br><br>Appendix H (Draft Farm Management Statement); and<br><br>Appendix S (Sea Lice Modelling) |
| CnES | • Request demonstration of effective stock containment;<br>• Request that a FMS is produced and submitted with the planning application;<br>• Request that the EIAR assesses the potential impact on wild fish species | Section 10;<br><br>Appendix E (EMP);<br><br>Appendix F (Sea Lice Management);<br><br>Appendix H (Draft Farm Management Statement); and |

| Consultee | Information Requirement | Cross Reference |
|---|---|---|
| | from escapes, disease and sea lice;<br>• Request that details on containment, stocking, and escape management measures are provided within the EIAR;<br>• Request that an EMP be submitted with the planning application that covers the Proposed Development; and<br>• Request that the EMP meets a number of specific criteria;<br>• Request that a Sea Lice Management and Efficacy Statement is produced and submitted with the planning application;<br>• Request operational details on sea lice management measures; and<br>• Request evidence of effectiveness of sea lice management measures. | Appendix R (Sea Lice Modelling). |
| WIDSFB | • Provide evidence on how BFS will identify the source of sea lice being recorded through wild fish monitoring being carried out by other operators.<br>• State that there is the potential for significant cumulative impacts, as a result of the existing BFS fish farms within the region. WIDSFB therefore request that sea lice dispersal modelling is undertaken. | Section 10;<br><br>Appendix E (EMP, including PCP and ECP);<br><br>Appendix F (Sea Lice Management Statement);<br><br>Appendix H (Draft Farm Management Statement); and<br><br>Appendix R (Sea Lice Modelling). |

## 10.3 Embedded Mitigation

### 10.3.1 Design Mitigation

Detailed below is an outline of the key design aspects related to the protection of wild salmonids.

#### 10.3.1.1 Development Location

The development location has been selected due to its highly dispersive hydrographic location. This dispersion potential of the development location is anticipated to help disperse sea lice and disease pathogens to low levels, helping to ensure low concentrations within the marine environment. This, therefore, minimises the infection risk to wild fishes. Moreover, the Proposed Development is not located within the vicinity of an SAC designated for Atlantic salmon.

#### 10.3.1.2 Containment Net Strategy

BFS will install enhanced, high rigidity primary netting at the Proposed Development. This high rigidity netting (Sapphire Seal Pro netting or similar) is constructed out of different combinations of polyolefins and co-polymers and, as such, it is highly compact, resulting in a final product that displays greater rigidity than that of regular PE braided netting. This netting also has a higher bite and cut resistance than traditional containment netting and, therefore, provides an additional level of predator deterrence. High rigidity netting has a knotted mesh with large rough knots on the outer surface of the netting and a smooth inner surface, presented to the stocked fish. These large rough knots have been documented to help reduce seal depredation incidence, as the knot structures irritate the noses of seal, the skin of which is highly sensitive.

An effective net tensioning system will ensure that all pen nets are highly tensioned and thereby hold their volume and structure within the water column. It is proposed that sinker tubes will be deployed to ensure correct tensioning. Correct tensioning of the primary netting will help reduce the impact of predator interactions, as a uniformly taut pen net presents as a ‘wall’ to any underwater predator. As such, escape events due to predator interactions are unlikely to occur. Correctly tensioned netting will also help to prevent abrasion and microtears, whilst also helping to reduce overall strain on the mesh and ropes by creating a structure with balanced loading.

#### 10.3.1.3 Mooring and Grid System

The proposed mooring system has been modelled against environmental conditions specific to the development location and is certified against the Norwegian standard NS 9415:2021. The resulting outputs from the modelling were then used to design bespoke mooring specifications for the Proposed Development which ensure that during periods of inclement weather the mooring system will hold the pens and associated infrastructure in place, the Mooring Report is provided within **Appendix B**. Moreover, a 120 x 120 m grid system will be installed to hold the individual 200 m pens. The 120 x 120 m grid system will ensure that the bridles are attached at more of a horizontal angle, thereby reducing the overall loading through the bridles, which means that during high stress events, such as inclement weather, the bridles will experience less overall tension than would be expected if a smaller grid system was in place.

### 10.3.2 Operational Mitigation

Detailed below is an outline of the key operational aspects related to the protection of wild salmonids.

#### 10.3.2.1 Best Practice Husbandry Procedures

Best practice husbandry procedures will be employed at the Proposed Development to ensure fish health and welfare are maintained at a high standard throughout the production cycle. Full details of fish health and welfare husbandry procedures are outlined in **Sub-Section 3.3.2**.

The presence of mortalities building up at the base of pens is a known attractant to seal species. Therefore, an effective mortality removal procedure, such as the one proposed in **Sub-Section 3.3.3**, can reduce the potential for predatory interactions.

#### 10.3.2.2 Draft Farm Management Statement (FMS)

The Proposed Development will join the existing BFS fish farms within CoGP Management Area (MA) W-4. All operational activities onsite will be in line with CoGP and MD recommendations. The draft FMS (**Appendix H**) details the following aspects:

- General health and stocking approach;
- Sea lice management strategy;
- Movement of fish and harvesting;
- Escapes; and
- Predator exclusion and control.

One key element of the Draft FMS is the requirement for all W-4 fish farms to be stocked with a single year class.

#### 10.3.2.3 Veterinary Health and Welfare Plan (VHWP)

All BFS fish farms operate under a Veterinary Health and Welfare Plan (VHWP), this will also be the case for the Proposed Development. The VHWP details the procedures and documentation relating to the health and welfare of fish held at the specific fish farm. All procedures are targeted at preventative rather than remedial action. The content of the VHWP has been specifically designed to achieve the following aims (all references to 'disease' below include sea lice infection):

- The prevention of the introduction of disease onto fish farms and the prevention of the spread of disease between fish farms;
- The reduction and elimination of factors which predispose to disease;
- The reduction of disease incidence;
- The maintenance of an environment and systems of management and husbandry which reflect best practice in terms of maintaining fish health and welfare; and
- The establishment of a monitoring and reporting structure which ensures adequate fish health surveillance, early warning of any potential health or welfare problem, rapid action and follow up.

#### 10.3.2.4 Escapes Contingency Plan (ECP)

The Proposed Development will have an ECP in place. The plan outlines the mechanisms that will be in place to ensure effective maintenance of the containment units. The plan also outlines the actions to be taken in the event of an escape and the post-notification actions. All the containment and notification measures outlined within the ECP are aligned with the requirements of both the CoGP and The Fish Farming Business (Record Keeping) (Scotland) Order 2008.

The ECP is provided in **Appendix E**.

#### 10.3.2.5 Predator Control Plan (PCP)

Escapes of farmed Atlantic salmon may occur as a result of containment failure due to predatory interactions. Therefore, in an attempt to limit predator interactions, BFS have designed and implemented fish farm specific PCPs. The PCP for the Proposed Development (**Appendix E**) outlines the adaptive management measures to mitigate against predatory interactions and therefore reduce the potential for containment failure as a direct result of predator interactions. The various measures are detailed within the PCP and outlined below:

- Wildlife assessment;
- Wildlife logbook;
- Net tensioning and seal blinds; and
- Effective husbandry.

#### 10.3.2.6 Environmental Management Plan (EMP)

As part of a suite of measures to understand potential impacts on and monitor wild salmonid populations, the Loch Odhairn EMP details BFS's commitment to achieving the four primary objectives:

- Report on the level of sea lice released into the environment;

- Identify the likely area(s) of sea lice dispersal from the farm;
- Provide details of the monitoring data that will be collected to assess potential interactions with wild salmonids; and
- Provide details on how this monitoring information will feed back to management practice.

The Loch Odhairn EMP is provided in **Appendix E**.

#### 10.3.2.7 Integrated Sea Lice Management (ISLM) Plan

An EMP, provided in **Appendix E**, will be implemented at the Proposed Development. A key aspect of the EMP is centred around ensuring compliance to the quality assured ISLM Plan. The aim of the ISLM Plan is to actively reduce the use of medicinal products, by prioritising the use of biological controls, physical removal systems, and freshwater interventions for sea lice. **Sub-Section 3.3.2** outlines the various intervention options available.

#### 10.3.2.8 Health Intervention Capacity

In line with the ISLM Plan, BFS actively prioritises mechanical and freshwater interventions over traditional chemical interventions. In order to effectively carry out this intervention strategy, BFS has invested heavily in fish health intervention vessel capacity, with vessels equipped with FLS delousing systems. Specific FLS intervention vessels have a FLS treatment capacity of 50 T of salmon per hour per line, with a total of four lines. Therefore, at maximum capacity it would be possible to treat 200 T of salmon per hour. Therefore, based on this treatment capacity, it would be possible to treat the Proposed Development, at peak biomass (4,680 T), in 25 hours.

In addition to specific FLS vessels, BFS also has internal access to wellboats, equipped with reverse osmosis freshwater and FLS. These wellboats allow BFS to implement a rolling freshwater intervention strategy across all marine operations. As such BFS have current capacity to effectively treat the Proposed Development to ensure high levels of fish health and welfare.

These three vessels form a central part of the BFS health intervention strategy, and they will be available for deployment at the Proposed Development.

Further information on the BFS health intervention strategy is provided in **Sub-Section 3.3.2**, **Appendix E**, and **Appendix F**.

## 10.4 Baseline

### 10.4.1 Study Area

A ZoI with a 35 km radius from the Proposed Development has been determined as appropriate. This radius has been determined based on NS guidance for assessing the potential impact between fish farms and SACs, with either Atlantic salmon (*Salmo salar*) or freshwater pearl mussels (FWPMs) (*Margaritifera margaritifera*) as qualifying features. This guidance, and associated 35 km distance parameter, suggests that wild salmonids originating from any freshwater course at a distance greater than 35 km from a fish farm are likely to be at a low risk of effects from fish farm related impacts.

### 10.4.2 Designated Sites

Full consideration of the potential connectivity between the Proposed Development and European Sites (SPAs, SACs, and Ramsar sites) is provided within the separate RIAA (**Appendix O**). The RIAA has been informed through the CnES Scoping Opinion and the Scoping advice provided by NS.

Although the RIAA (**Appendix O**) is separate from the requirements of the EIA, the European Site screening assessment carried out is also considered to be appropriate in terms of identifying potential connectivity between ecological features (the qualifying features of the respective European Sites) and the Proposed Development under the EIA process. A summary of the identified European Sites along with their qualifying features is presented in **Table 10.2**. Where there is potential for connectivity, the qualifying feature is highlighted in bold text within **Table 10.2.**

Where an ecological feature that is a qualifying feature of one or more of the European Sites listed in **Table 10.2** is scoped in for assessment in relation to a potential impact, the potential for connectivity with that European Site is considered in the assessment.

**Table 10.2: Summary of European Sites (and their qualifying features considered to be predatory species in relation to Atlantic salmon fish farms) identified as having potential connectivity with the Proposed Development.**

| Site Name | Designation | Qualifying Features (Ecological Features in Bold have Potential Connectivity)* | Distance and Direction from Proposed Development | Rationale | Scoping Outcome |
|---|---|---|---|---|---|
| Langavat | SAC | **Atlantic salmon *(Salmo salar)*** | 20.62 km (straight-line), east. | Scoped out due to at sea distance being in excess of 35 km (~130 km). The Langavat SAC discharges into Loch Roag on the west coast of the Isle of Lewis. | **Scoped Out** |

### 10.4.3 Atlantic Salmon and Sea Trout Status

Atlantic salmon are widely distributed throughout Scotland, with populations recognised as being both nationally and internationally important. Salmon are listed in Appendix III of the Bern Convention, Annex II and V of the Habitats Directive (92/43/EEC), Schedule 3 of the Habitats Regulations, the UK Biodiversity Action Plan (BAP) list of priority species, the Scottish Biodiversity List, the IUCN Red List, as an 'endangered' species (Great Britain sub-population), and in the OSPAR List of Threatened and/or Declining Species and Habitats.

Brown trout (*Salmo trutta*) have two potential life-cycle routes; whilst brown trout will remain within the freshwater environment, a proportion will migrate to the marine environment to feed and mature, these individuals are known as 'sea trout'.

Sea trout are native to Scotland and are distributed throughout many countries down the European Atlantic seaboard. Small sea trout in their first year after migration to sea are known as finnock. Finnock range widely up and down coasts and move in and out of freshwater with the tides.

Sea trout are included within the Biodiversity Action Plan UK list of priority species (UK BAP), and the Scottish Biodiversity List, they are also listed as 'least concern' within the IUCN Red List.

Both salmon and sea trout are listed as Scottish Priority Marine Features (PMFs), during the marine phase of their lifecycles.

### 10.4.4 Atlantic Salmon and Sea Trout Populations

#### 10.4.4.1 National Atlantic Salmon Population

##### 10.4.4.1.1 Atlantic Salmon (*Salmo salar*) Fishery Statistics

Within Scotland, Atlantic salmon and sea trout fishery statistics are currently obtained via annual returns from proprietors or occupiers of Atlantic salmon and sea trout fisheries, under the provisions of Section 64 of the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003. The MD combine data geographically into 56 districts, which are again further collated into 11 regions covering both mainland Scotland, and the Islands. These fishery statistics data have been collected annually since 1952[125].

**Figure 10.1** presents the national Atlantic salmon rod catch statistics from 1952 to 2023 (inclusive). The dataset for multi-sea-winter (MSW) fish across the complete temporal period demonstrates a pattern of weak long term decline ($R^2$=0.27). The catch returns for 2023 indicate that 18,972 MSW fish were caught via rod, this number represents 76.09 % of the previous 5-year average (2018 to 2022) and also represents the lowest catch return of MSW since records began in 1952.

However, when the dataset is further interrogated, and split into two temporal sub-units, it is possible to draw out more detailed temporally dependent variations in catch returns. MSW fish return data for 1952 to 2010 (**Figure 10.2**) illustrate a pattern of inter-annual fluctuation with a very weak trend of decline noted ($R^2$=0.04) (see **Sub-Section 10.9** for detail on the limitations of fishery statistic catch returns). Throughout this temporal period (1952 to 2010) the mean catch return of MSW fish was 52,532. In contrast, the second temporal sub-unit (**Figure 10.3**) (2010 to 2023) clearly illustrates a strong pattern of sharp decline ($R^2$=0.83). Between 2010 and 2023, returns of MSW fish fell by 69.62 %. The MD do

[125] Marine Directorate: Collecting the Marine Directorate Salmon and Sea Trout Fishery Statistics. [Online] Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/factsheet/2020/10/collecting-salmon-sea-trout-fishery-statistics-marine-scotland-science-topic-sheet-67/documents/collecting-marine-scotland-salmon-sea-trout-fishery-statistics/collecting-marine-scotland-salmon-sea-trout-fishery-statistics/govscot%3Adocument/collecting-marine-scotland-salmon-sea-trout-fishery-statistics.pdf

not yet fully understand whether this recent decline in catches since 2010 represents a long-term declining trend or a short-term fluctuation[126].

In regard to one sea winter (1SW) fish, however, these data (**Figure 10.1**) show a pattern of moderate long-term increase ($R^2$=0.46) between 1952 and 2023. If these data are further interrogated and split into two temporal sub-units, temporally dependent phases in catch returns can be identified. As displayed in (**Figure 10.2**), between 1952 and 2010 there was a strong trend of increase ($R^2$=0.75) in the number of 1SW fish catch returns. The number of 1SW fish caught in 2010 (48,950) represents a 698.14 % increase in the number of 1SW fish caught in 1952 (6,133). Moreover, the number of 1SW fish caught in 2010 represented a 42.20 % increase in the previous 5 year average (2005 to 2009) of 1SW fish catch returns.

However, the second temporal sub-unit (**Figure 10.3**) (2010 to 2023) clearly illustrates a change in trend, with a pattern of moderate decline ($R^2$=0.48) noticeable. Between 2010 and 2023, catch returns fell by 72.41 %. The 2023 return of 13,505 1SW fish represents 78.22 % of the previous 5 year average (2018 to 2022).

The combined MSW and 1SW catch data for 2023 was 32,477, this is the lowest number since records began in 1952 and represents 76.96 % of the previous 5-year average (2018 to 2022).

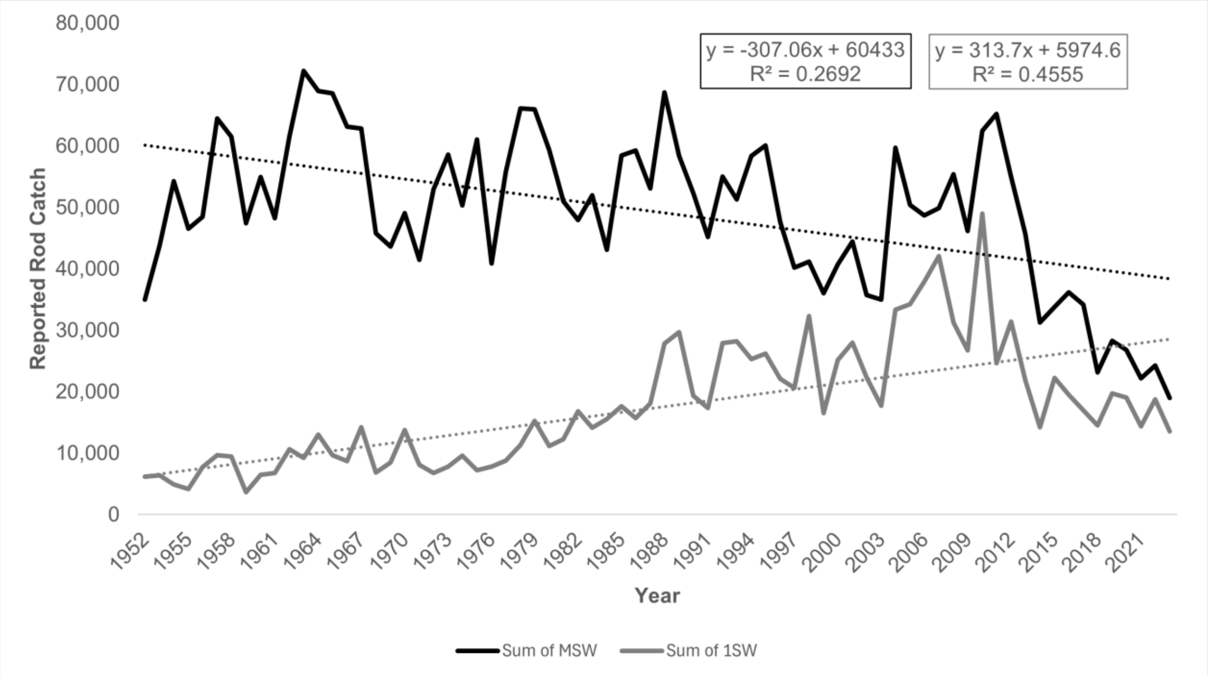


**Figure 10.1: Annual rod catch data for salmon in Scotland between 1952 and 2023 (inclusive) grouped as multi-sea-winter fish and one-sea-winter fish.**

[126] Marine Directorate: Status of Scottish Salmon and Sea Trout Stocks 2014. [Online] Available at: https://www.gov.scot/publications/marine-scotland-science-report-01-15-status-scottish-salmon-sea/

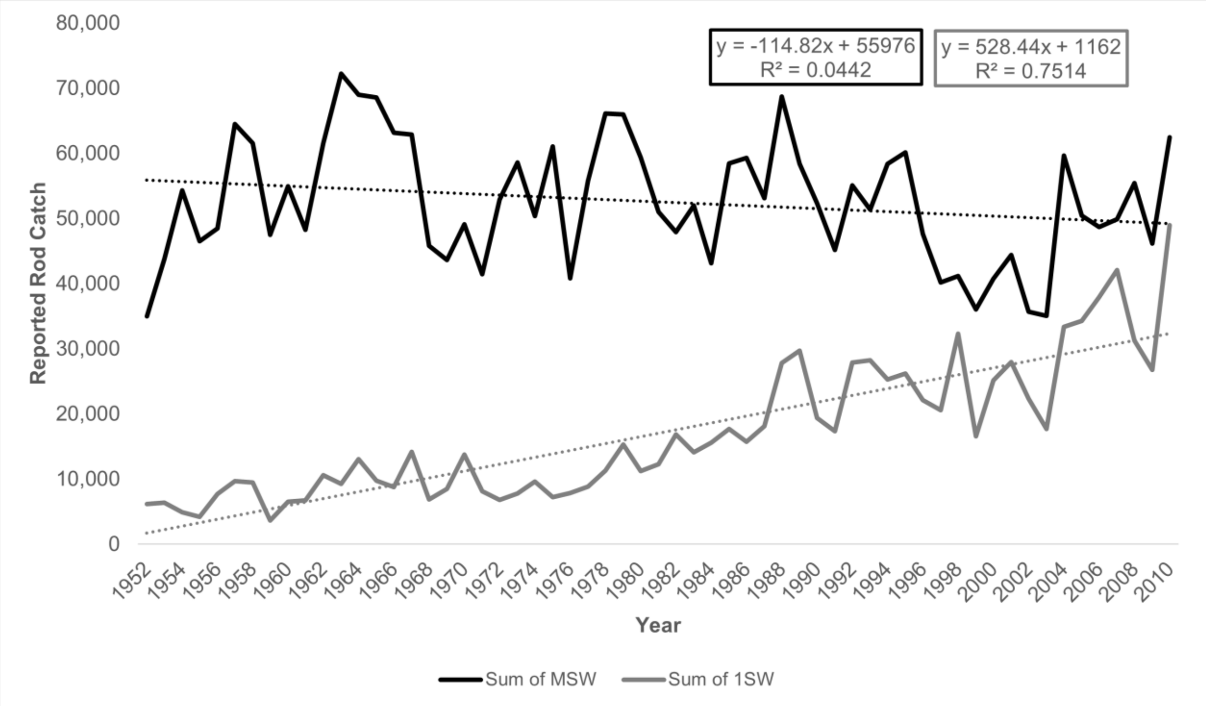


**Figure 10.2: Annual rod catch data for salmon in Scotland between 1952 and 2010 (inclusive) grouped as multi-sea-winter fish and one-sea-winter fish.**

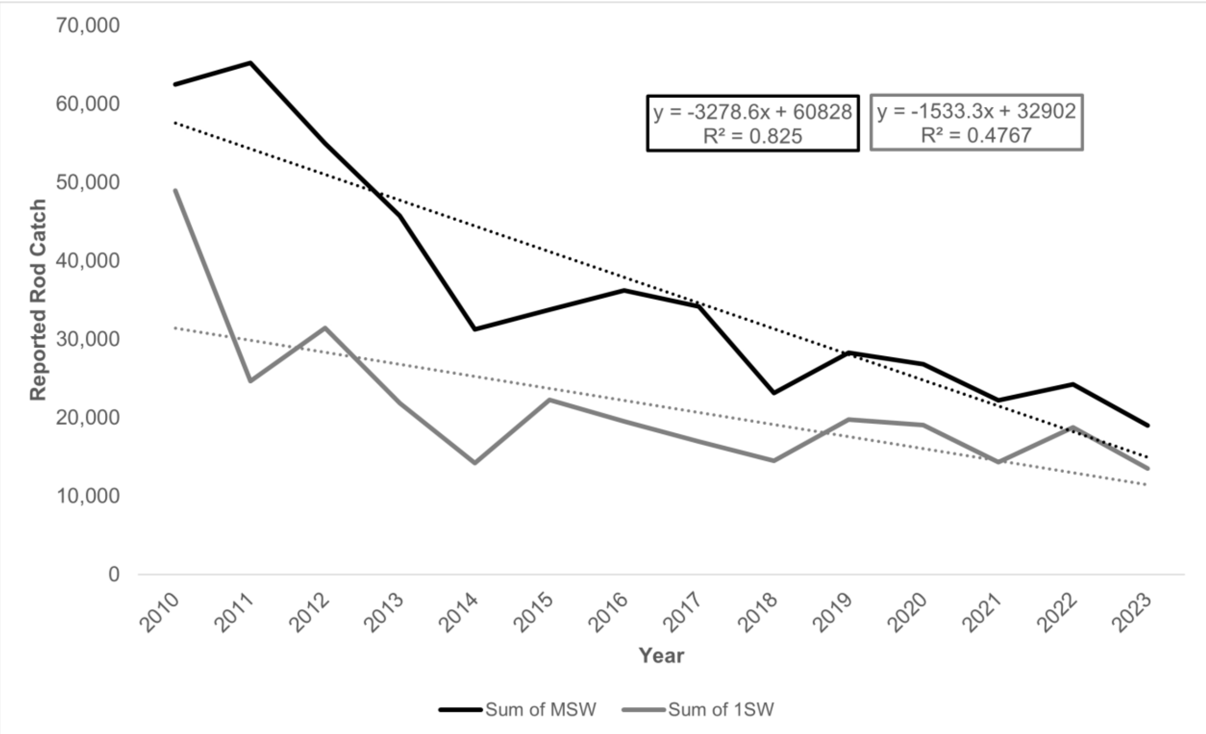


**Figure 10.3: Annual rod catch data for salmon in Scotland between 2011 and 2023 (inclusive) grouped as multi-sea-winter fish and one-sea-winter fish.**

#### 10.4.4.1.2 International Council for the Exploration of the Sea (ICES) Working Group on North Atlantic Salmon Estimated Numbers of Returning Atlantic Salmon to Scottish Waters

The ICES Working Group on North Atlantic Salmon (WGNAS) have estimated the numbers of Atlantic salmon returning to Scottish waters. These data illustrate a different trend to that noted within the MD rod catch datasets. Rod catch data indicate a fairly stable return of MSW fish between 1952 and 2010 and an increasing trend in 1SW catch returns, followed by declines in both MSW and 1SW catch returns from 2010 onwards. The ICES estimate illustrates a clear decline in salmon returning to Scottish waters since the 1970s[127]. This discrepancy noted between the MD fishery statistics, and the ICES estimate is likely due to the reduction in fishing effort in coastal waters (with fixed engine and net catch and effort both displaying significant declines) allowing rod catch numbers to increase, as their percentage of the total catch increases, despite an overall declining trend in returning numbers.

The ICES estimates for the returning population of MSW fish (**Figure 10.4**) show a gradual decline ($R^2$=0.24) across the period (1971 to 2020). Notably, the ICES estimate for returning MSW spawning fish shows an increasing trend ($R^2$=0.27) in returning numbers. During the temporal period (1971 to 2020), returning numbers of spawning MSW fish increased from 99,890 fish in 1971 to 340,759 in 2011. Since 2011, the numbers of returning MSW spawning fish has declined to 184,825 in 2020. These data indicate that there has been an 85.03 % increase in the number of MSW spawning fish returning to Scottish waters between 1971 and 2020.

**Figure 10.5** illustrates the estimated returning population of 1SW fish across Scotland. These data indicate a moderate trend of decline ($R^2$=0.65) across the period 1971 to 2020, with the number of 1SW fish in 2020 representing a 48.54 % decrease in comparison to the estimated 566,839 returning 1SW in 1971. However, throughout this time the estimated returning population of 1SW spawning fish stayed fairly stable ($R^2$=0.02).

The difference in trends noted between the overall returning population estimates for both MSW and 1SW fish and the estimates for the spawning population of MSW and 1SW fish is likely a result of the reduction in fishing effort in coastal waters (with fixed engine and net catch and effort both displaying significant declines), meaning that less Atlantic salmon are being removed by these fisheries. Therefore, although these data indicate that fewer salmon (both 1SW and MSW) have been returning to Scottish waters, fewer fish have been removed by fisheries, resulting in the numbers of salmon spawning in rivers remaining fairly constant and even increasing in regard to MSW fish.

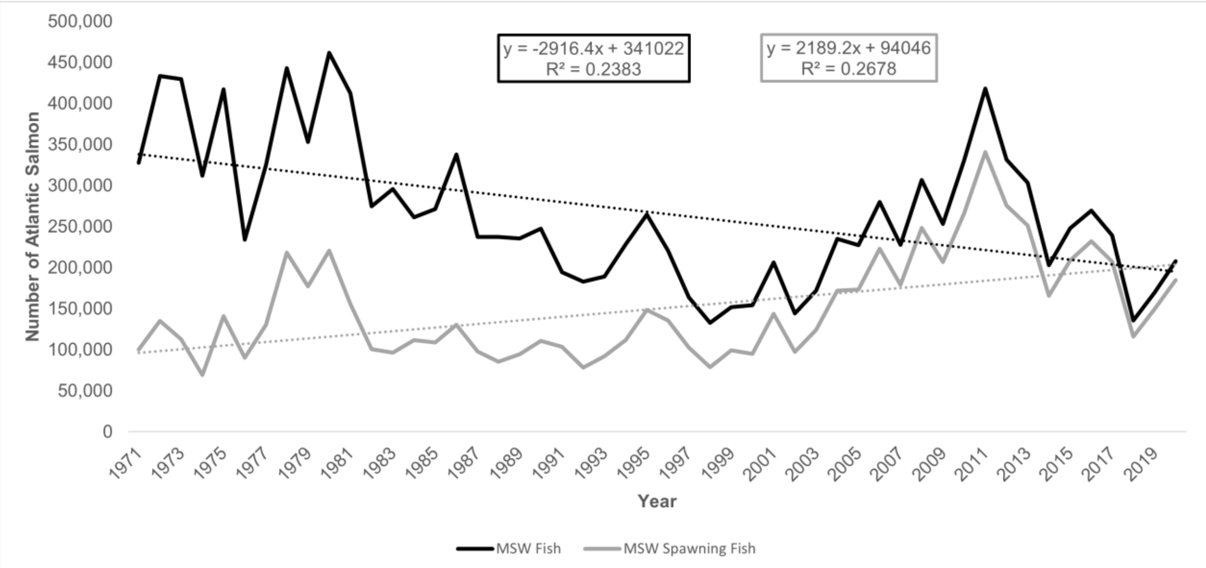


**Figure 10.4: Estimated numbers of returning MSW and MSW spawning fish within Scotland.**

[127] Scottish Parliament. SPICe Briefing Wild Salmon. [Online] Available at: https://sp-bpr-en-prod-cdnep.azureedge.net/published/2019/8/19/Wild-Salmon/SB%2019-48.pdf

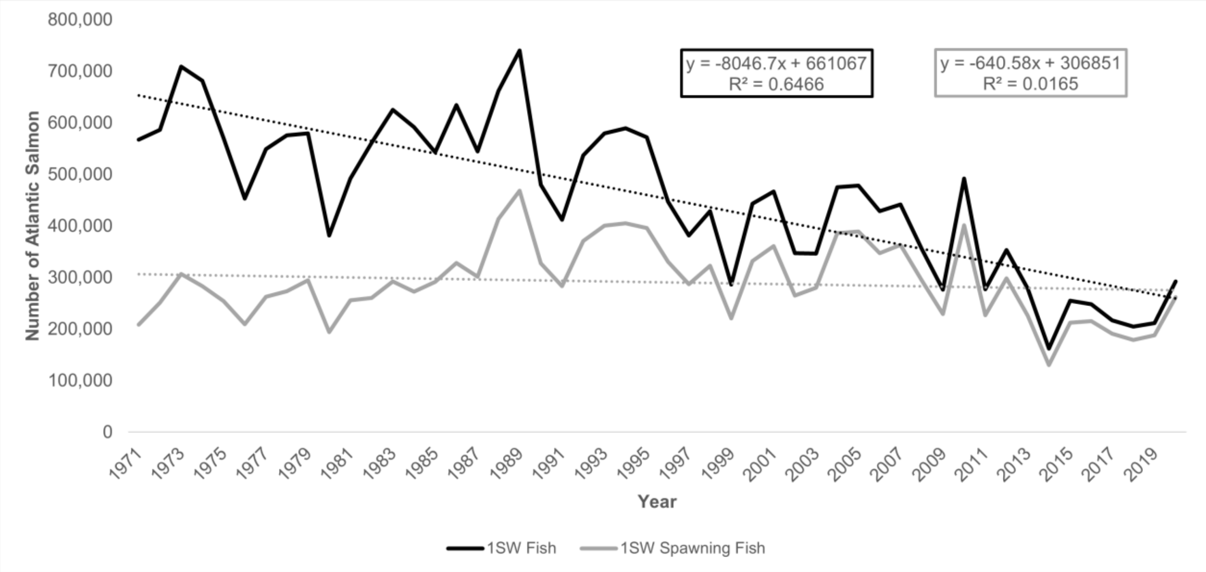


**Figure 10.5: Estimated numbers of returning 1SW fish and 1SW spawning fish within Scotland.**

### 10.4.4.2 Regional Atlantic Salmon (*S. salar*) Population

To better understand any intra-national trends, particularly in relation to the east coast and west coast of Scotland, within these Atlantic salmon catch statistics data, BFS has divided these data to form two distinct spatial units, each unit is comprised of different MD regions, these spatial units are:

- East coast (East, Moray Firth, North, and Northeast); and
- Aquaculture Zone (Clyde Coast, Northwest, West Coast, Solway*, and Outer Hebrides).

*To account for smolt migrating from Solway through areas of aquaculture production

Fishery statistics for the Northern Isles (Shetland) have been excluded from this baseline assessment, due to the lack of relevance to the Proposed Development, as well as the low catch return numbers, which indicate that the Northern Isles have limited influence on the national level trends.

#### 10.4.4.2.1 East Coast Spatial Unit

**Figure 10.6** displays data for the East Coast spatial unit throughout the complete temporal period, 1952 to 2023 (inclusive). When reviewing the dataset for MSW fish across the complete temporal period it is possible to identify a weak ($R^2$=0.23), but declining, trend in returns, as displayed in **Figure 10.6**. The returns for 2023 indicate that 17,033 MSW fish were caught via rod, this number represents 77.56 % of the previous 5-year average (2018 to 2022) and also represents the lowest catch return of MSW fish within the East Coast spatial unit since records began in 1952.

However, when the dataset is further interrogated, and split into two temporal sub-units, temporally dependent phases in catch returns can be identified. MSW fish return data for 1952 to 2010 (**Figure 10.7**) illustrate a pattern of inter-annual fluctuation, with a very weak trend of decline noted ($R^2$=0.02) (although, due to the weakness of this trend, it is more appropriate to describe MSW returns as stable rather than declining across this temporal period). Between 1952 and 2010 the mean catch return of MSW fish was 44,330.

In contrast, the second temporal sub-unit (Figure 10.8) (2010 to 2023) clearly illustrates a strong pattern of sharp decline ($R^2$=0.83). This pattern of recent decline since 2010 within the East Coast spatial unit matches that seen at the national level ($R^2$=0.83). Between 2010 and 2023, returns of MSW fish fell by 68.85 %. The 2023 returns represent 77.56 % of the previous five year (2018 to 2022) average of MSW fish returns. These data from this second temporal sub-unit clearly indicate a strong, sustained decline in the catch returns of MSW fish within the East Coast spatial unit.

Throughout the complete temporal period (1952 to 2023) the East Coast spatial unit displays a moderate ($R^2$=0.49) increasing trend in the catch returns of 1SW fish, as illustrated within **Figure 10.6**. However, by splitting the complete dataset into two temporal sub-units, temporally dependent phases in catch returns for 1SW fish can be identified. Between 1952 and 2010, as displayed in **Figure 10.7**, there is a strong trend of increase ($R^2$=0.77) in the annual catch returns of 1SW fish, with catches increasing from 4,507 in 1952 to 41,351 in 2010 (representing an 817.48 % increase in returns). The returns in 2010 also represented a 51.23 % increase in comparison to the previous five year average (2005 to 2009) of 27,343 1SW fish. As a result, data held within this first temporal sub-unit indicate that between 1952 and 2010 there were sustained, increasing catch returns of 1SW fish.

In contrast, within the second temporal sub-unit (**Figure 10.8**), running from 2010 to 2023, there is a moderate trend ($R^2$=0.42) of decrease in the returns of 1SW fish within the East Coast spatial unit. Between 2010 and 2023, returns of 1SW fish fell by 72.65 %. The 2023 1SW returns also represent 82.47 % of the previous five year (2018 to 2022) average of 13,715 1SW fish. These data indicate that since 2010, there has been a sustained decline in the catch returns of 1SW fish within the East Coast spatial unit.

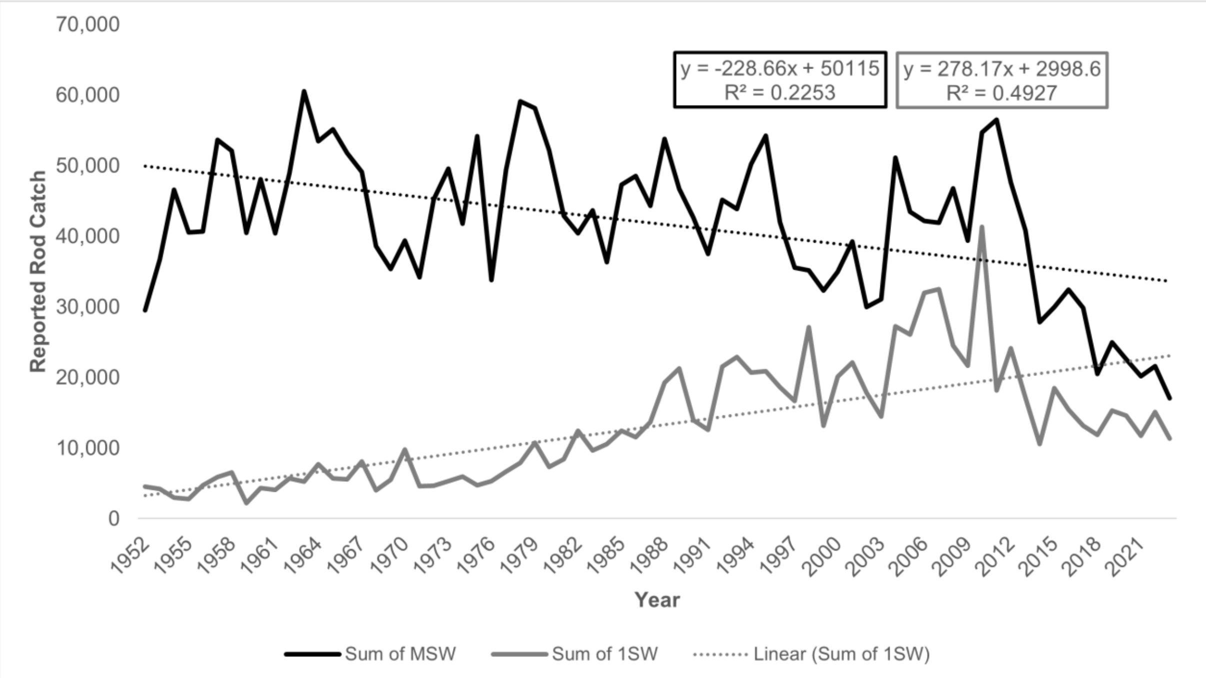


**Figure 10.6: Annual rod catch data for Atlantic salmon in the East Coast spatial unit between 1952 and 2023 (inclusive) grouped as multi-sea-winter fish and one-sea-winter fish.**

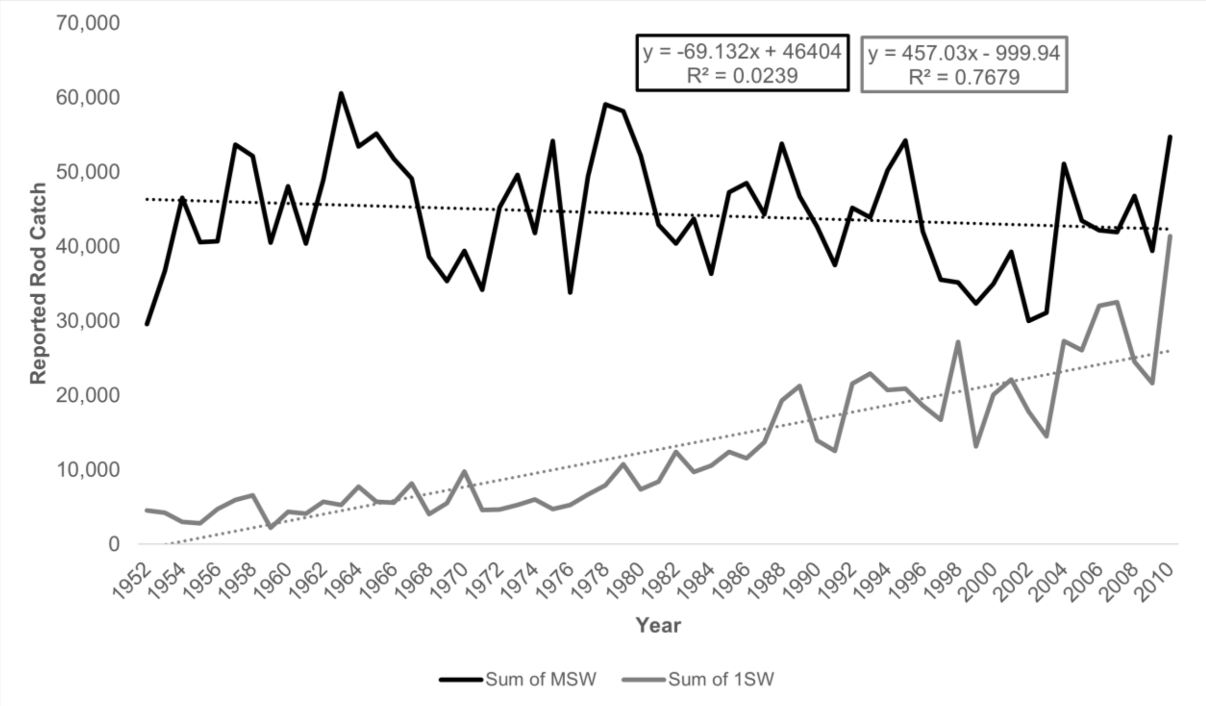


**Figure 10.7: Annual rod catch data for Atlantic salmon in the East Coast spatial unit between 1952 and 2010 (inclusive) grouped as multi-sea-winter fish and one-sea-winter fish.**

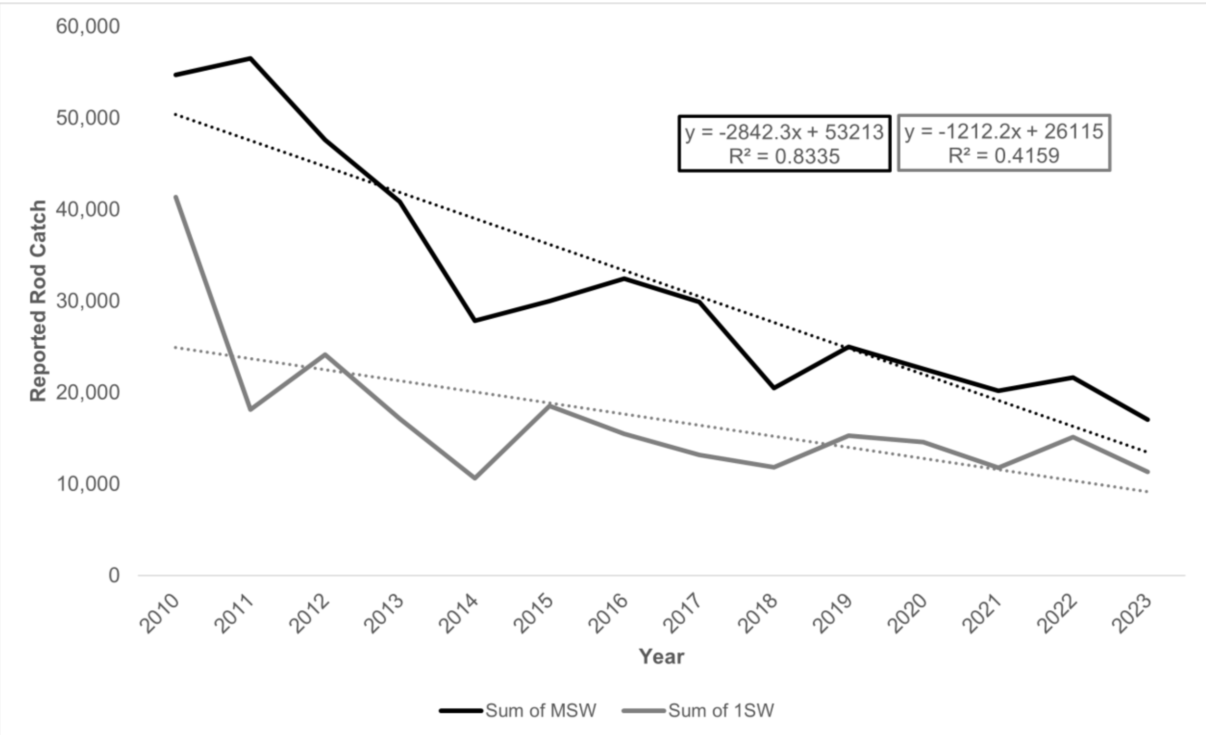


**Figure 10.8: Annual rod catch data for Atlantic salmon in the east coast spatial unit between 2010 and 2023 (inclusive) grouped as multi-sea-winter fish and one-sea-winter fish.**

### 10.4.4.2.2 Aquaculture Zone

**Figure 10.9** displays data for the Aquaculture Zone, for the complete temporal period 1952 to 2023. The number of Atlantic salmon caught, both MSW and 1SW, are substantially lower within the Aquaculture Zone compared to the East Coast spatial unit. The mean annual number of MSW and 1SW catch returns for the East Coast spatial unit for the complete temporal period was 41,768.67 and 13,151.74, respectively. In comparison the Aquaculture Zone had a mean annual catch return for MSW and 1SW of 7,456.39 and 4,263.40. Based on these mean values the Aquaculture Zone catch returns represented 17.85 % of the East Coast mean MSW returns and 32.42 % of the mean 1SW catch returns. As a result, the Aquaculture Zone is anticipated to contribute less to the national Atlantic salmon fishery statistics and trends within the Aquaculture Zone may not be clearly noticeable in the national data.

When reviewing the dataset for MSW fish it is possible to identify a moderate ($R^2$=0.32), but declining, trend in returns, as displayed in **Figure 10.9**. When directly comparing the Aquaculture Zone with the East Coast, across the complete temporal period (1952 to 2023), it is noted that the declining trend is slightly more pronounced in the Aquaculture Zone ($R^2$=0.32) compared to the East Coast spatial unit ($R^2$=0.23), although the difference is marginal. The returns for 2023 indicate that 1,939 MSW fish were caught via rod, this number represents 65.30 % of the previous 5-year average (2,969.40 (2018 to 2022)) and also represents the lowest catch return of MSW within the Aquaculture Zone since records began in 1952.

However, when the dataset is further interrogated and split into two temporal sub-units, temporally dependent phases in catch returns can be identified. MSW fish return data for 1952 to 2010 (**Figure 10.10**) illustrate a pattern of marked, inter-annual fluctuation, with a very weak trend of decline noted (R2=0.10). Due to the weakness of this trend, it may be more appropriate to describe catch returns as stable rather than declining across this temporal period. Between 1952 and 2010 the mean catch return of MSW fish was 8,201. Throughout this period the Aquaculture Zone mean return of MSW represented 18.50 % (8,201 /44,330) of the mean MSW returns for the East Coast spatial unit.

In contrast, the second temporal sub-unit (**Figure 10.11**) (2010 to 2023) clearly illustrates a strong pattern of sharp decline ($R^2$=0.73). This pattern of recent decline since 2010 within the Aquaculture Zone is, however, weaker than that identified within both the national ($R^2$=0.83) and East Coast ($R^2$=0.83) datasets. Between 2010 and 2023, returns of MSW fish fell by 75.05 %. Despite the declining trend within the Aquaculture Zone being less pronounced than in the East Coast spatial unit, these data still illustrate a steady and sustained decline in the returns of MSW fish since 2010, in line with the national level trends in catch returns.

Throughout the complete temporal period the Aquaculture Zone displays a weak ($R^2$=0.18) increasing trend in the returns of 1SW fish. However, by splitting the complete dataset into two temporal sub-units, temporally dependent phases in returns for 1SW fish can be identified. Between 1952 and 2010, as displayed in **Figure 10.10**, there is a moderate trend of increase ($R^2$=0.46) in the annual returns of 1SW fish, where catches went from 1,595 in 1952 to 7,599 in 2010, this represents an 376.43 % increase in returns. The returns in 2010 also represented a 7.32 % increase in comparison to the previous five year average (2005 to 2009) of 7,081 1SW fish. As a result, data held within this first temporal sub-unit indicate that between 1952 and 2010 there were sustained, increasing catch returns of 1SW fish.

In contrast, within the second temporal sub-unit (**Figure 10.11**) (2010 to 2023), there is a clear moderate to strong trend ($R^2$=0.63) of decline in the returns of 1SW fish within the Aquaculture Zone, this pattern of recent decline in 1SW fish mirrors that seen with the East Coast and national level datasets. Between 2010 and 2023, returns of 1SW fish fell by 71.27 %. It should be noted that the percentage decrease in 1SW returns within the East Coast spatial unit between 2010 and 2023 was greater (72.65 %) than that seen in the Aquaculture Zone. The 2023 1SW returns for the Aquaculture Zone also represent 61.56 % of the previous five year average of 3,546 1SW fish (2018 to 2022). As a result, these data indicate that since 2010 there has been a sustained decline in the catch returns of 1SW fish within the Aquaculture Zone.

These available rod catch data for the Aquaculture Zone illustrate that the catch returns within this spatial unit have followed a similar pattern to that identified within the East Coast and national level fishery statistics. This indicates that, on a national level, Scotland has experienced significant declines in Atlantic salmon catch returns, particularly post 2010.

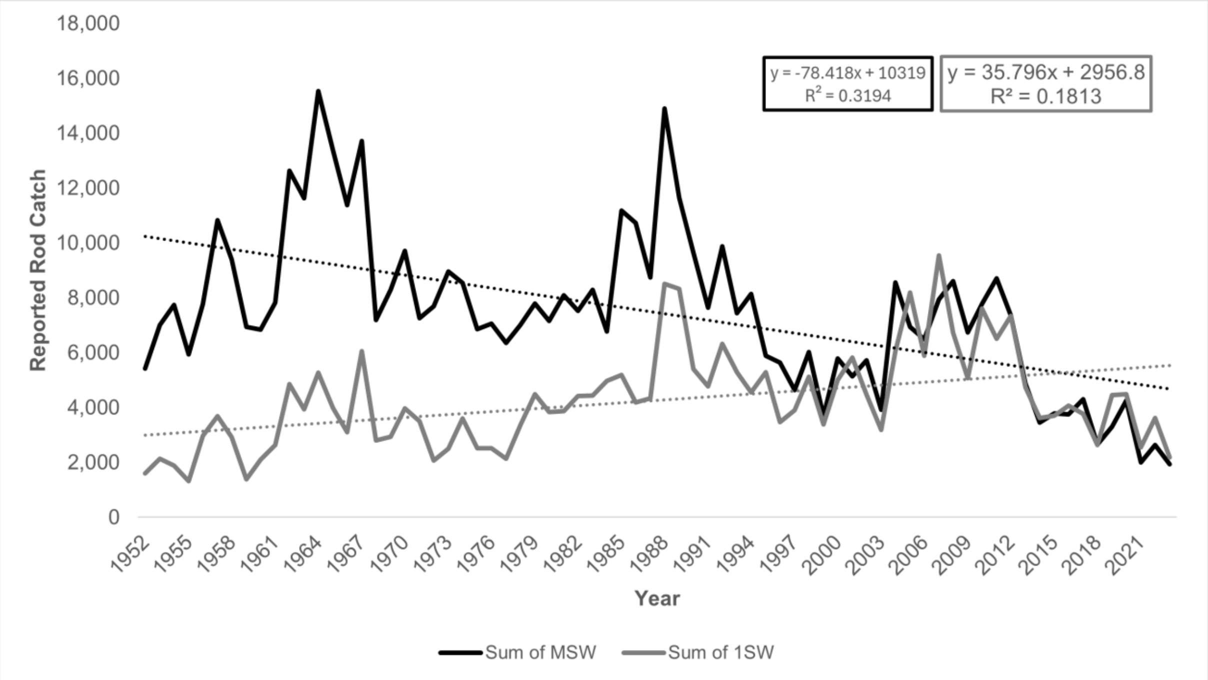


**Figure 10.9: Annual rod catch data for Atlantic salmon in the Aquaculture Zone between 1952 and 2023 (inclusive) grouped as multi-sea-winter fish and one-sea-winter fish.**

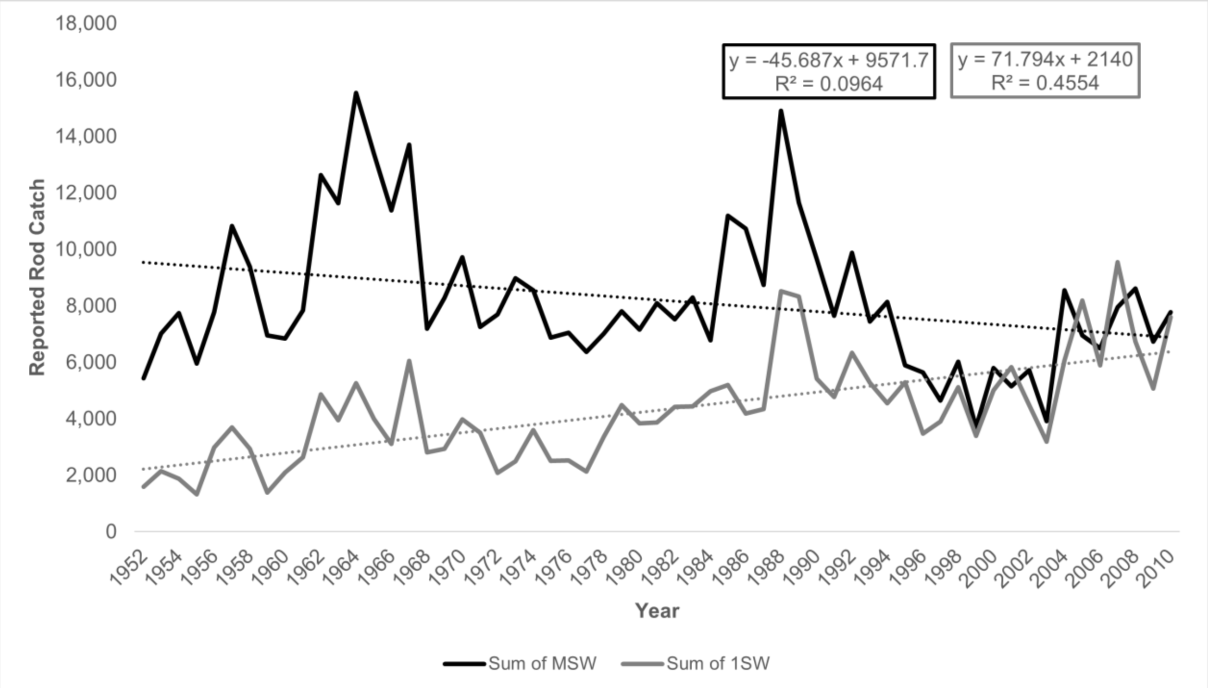


**Figure 10.10: Annual rod catch data for Atlantic salmon in the Aquaculture Zone between 1952 and 2010 (inclusive) grouped as multi-sea-winter fish and one-sea-winter fish.**

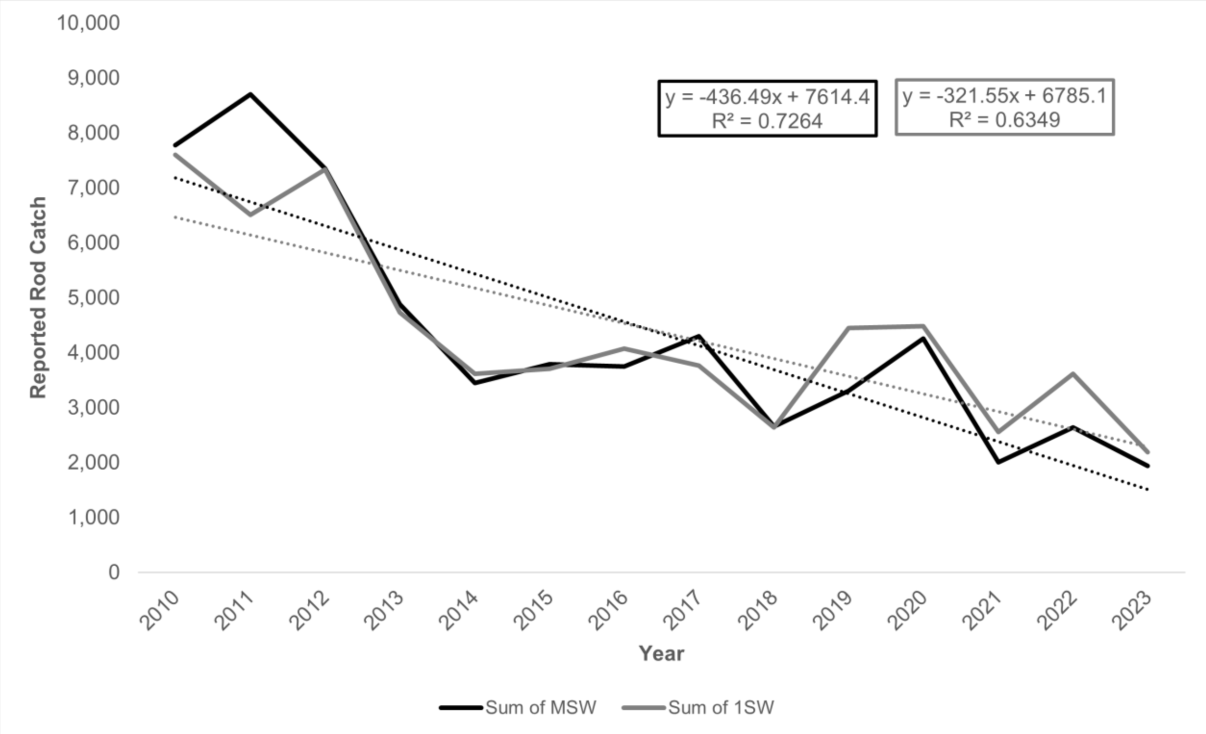


**Figure 10.11: Annual rod catch data for Atlantic salmon in the Aquaculture Zone between 2010 and 2023 (inclusive) grouped as multi-sea-winter fish and one-sea-winter fish.**

### 10.4.4.3 National Sea Trout (*Salmo trutta*) Population

#### *10.4.4.3.1* Sea Trout Fishery Statistics

**Figure 10.12** presents the national sea trout rod catch statistics from 1952 to 2023 (inclusive). The dataset indicates a moderate trend of long term decline ($R^2$=0.68). The rod catch return for 2023 was 14,823, this number represents a 2.55 % increase in comparison to the previous five year average ((14,454) 2018 to 2022). The lowest rod catch return was 13,102 recorded in 2021.

Since 1994, sea trout rod catch statistics have distinguished between caught and released and caught and retained. Throughout the period of 1994 to 2023, total catch returns (released and retained) of sea trout have shown a strong trend of decrease ($R^2$=0.79) (see **Figure 10.13)**. However, during this period the proportion of sea trout released as a percentage of the total catch return has increased, reaching a peak of 92.09 % in 2023. A proportion of the fish released from the rod fishery may be re-caught and hence inflate the catch statistics for caught and released sea trout by appearing in the dataset more than once. There is no way to quantify this effect on the dataset.

Since 2004 catch returns of finnock have been recorded in the fishery statistics. **Figure 10.14** presents the national finnock rod catch statistics for the period 2004 to 2023 (inclusive). Throughout the period there has been significant inter-annual variation in the finnock catch returns, around a mean of 8,007 finnock. Across the period there is no obvious trend in catch returns ($R^2$=0.03). The lowest rod catch return was 5,831 recorded in 2008.

However, as displayed in **Figure 10.14**, since 2004 the proportion of finnock released as a percentage of the total catch return has increased, reaching a peak of 98.12 % in 2022. A proportion of the fish released from the rod fishery may be re-caught and hence inflate the catch statistics for caught and released finnock by appearing in the dataset more than once. There is no way to quantify this effect on the dataset.

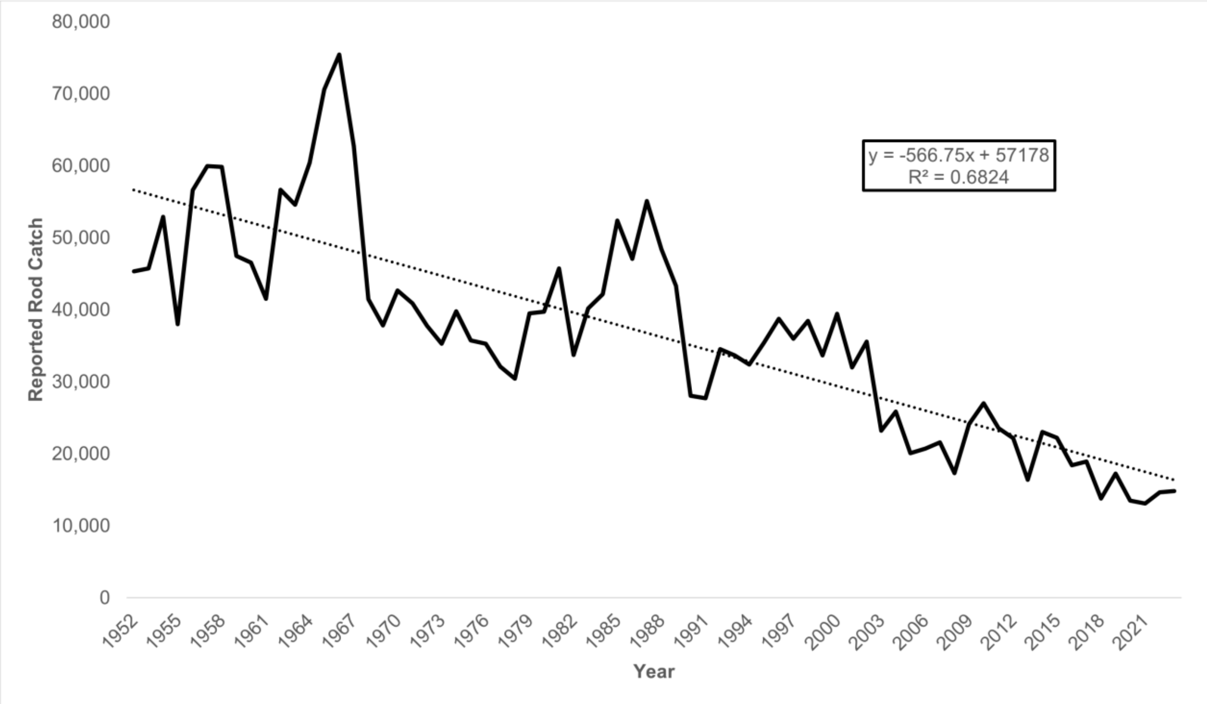


**Figure 10.12: Annual rod catch data for sea trout in Scotland between 1952 and 2023 (inclusive).**

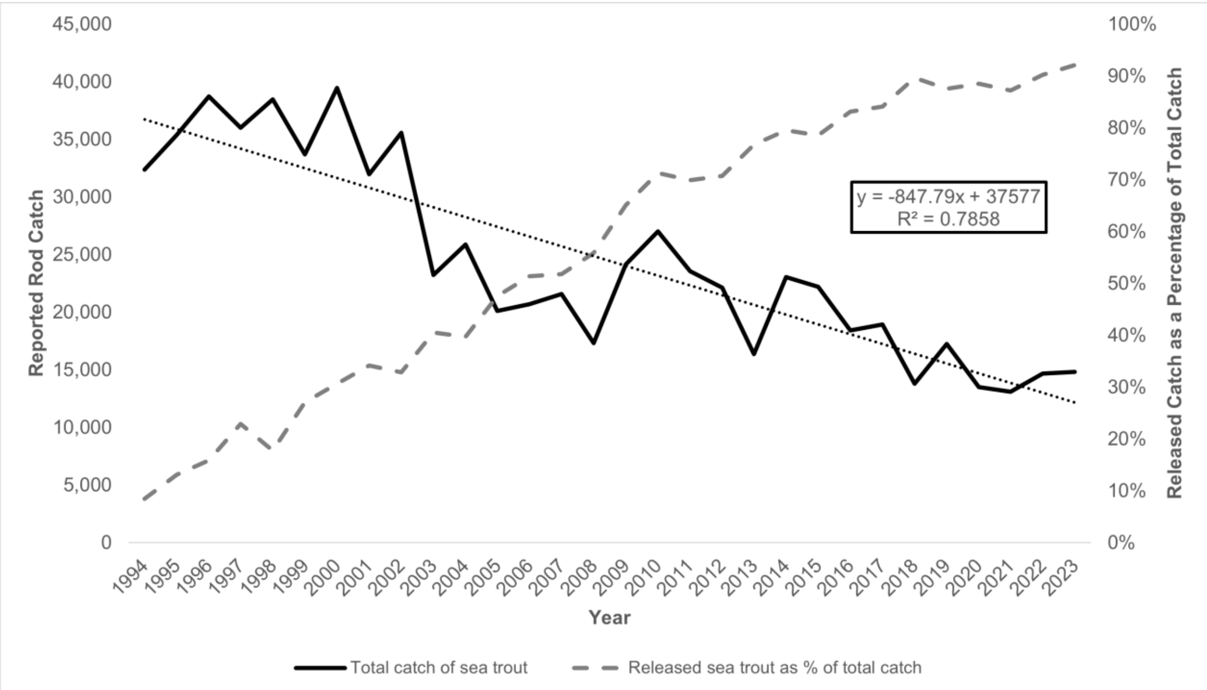


**Figure 10.13: Percentage of catch and release of sea trout in relation to the total catch of sea trout between 1994 and 2023 (inclusive).**

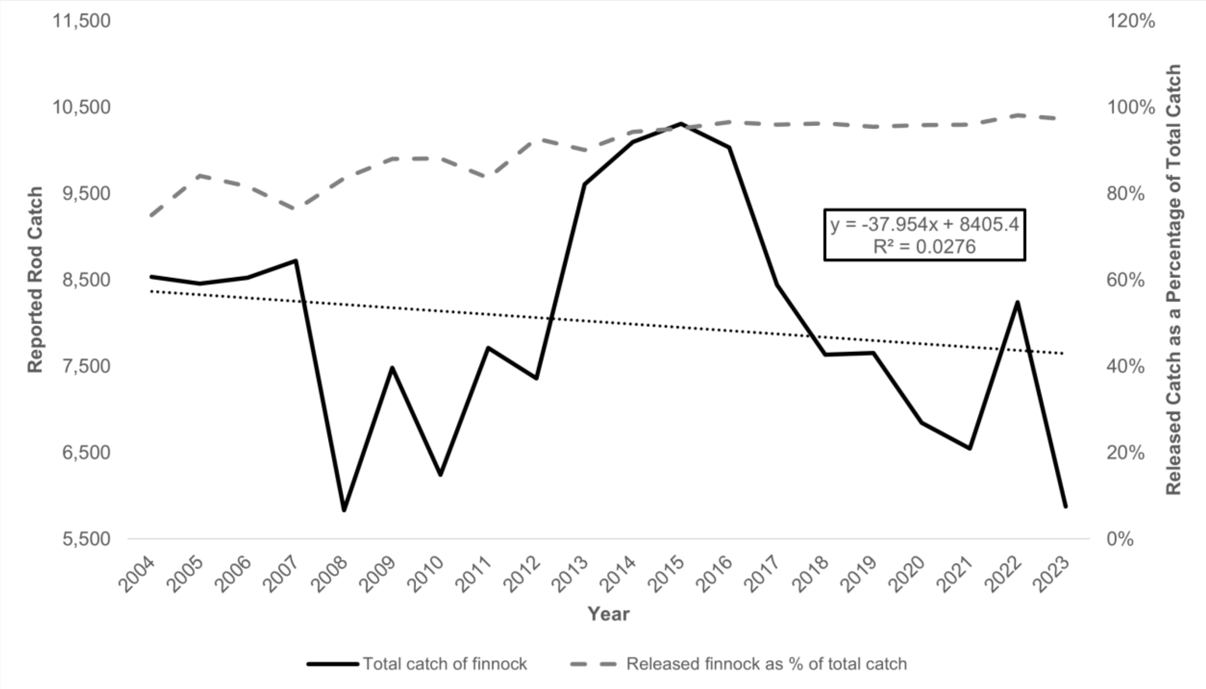


**Figure 10.14: Percentage of catch and release of finnock in relation to the total catch of finnock between 2004 and 2023 (inclusive).**

## 10.4.4.4 Regional Sea Trout (*Salmo trutta*) Population

To better understand any intra-national trends within these sea trout catch statistics data, BFS has divided the dataset into two distinct spatial units, each unit is comprised of different MD regions. These spatial units are:

- East Coast (East, Moray Firth, North, and Northeast); and
- Aquaculture Zone (Clyde Coast, Northwest, West Coast, and Outer Hebrides).

*Solway has been excluded from the sea trout Aquaculture Zone, due to the local migratory behaviour of sea trout in the marine environment suggesting that the majority of sea trout from the Solway region will not migrate into regions with active salmonid aquaculture operations.

Fishery statistics for the Northern Isles (Shetland) have been excluded from this baseline assessment, due to the lack of relevance to the Proposed Development, as well as the low catch return numbers, which indicate that the Northern Isles have limited influence on the national level trends.

### 10.4.4.4.1 East Coast Spatial Unit

The dataset for sea trout across the complete temporal period indicates a weak declining ($R^2$=0.23) trend, as shown in **Figure 10.15**. The returns for 2023 indicate that 9,253 fish were caught via rod, this number represents a 5.69 % increase in comparison to the previous 5-year average (8,755 (2018 to 2022)). The lowest rod catch return was 7,805 recorded in 2018.

Since 1994, sea trout rod catch statistics have distinguished between caught and released and caught and retained. Throughout the period of 1994 to 2023, total catch returns (released and retained) of sea trout have shown a strong trend of decrease ($R^2$=0.76) (see **Figure 10.16)**. However, during this period the proportion of sea trout released as a percentage of the total catch return has increased, reaching a peak of 91.82 % in 2023. A proportion of the fish released from the rod fishery may be re-caught and hence inflate the catch statistics for caught and released sea trout by appearing in the dataset more than once. There is no way to quantify this effect on the dataset.

Since 2004 catch returns of finnock have been recorded in the fishery statistics. **Figure 10.17** presents the East Coast finnock rod catch statistics for the period 2004 to 2023 (inclusive). Throughout the period there has been significant inter-annual variation in the finnock catch returns, around a mean of 2,964 finnock. Across the period there is no obvious trend in catch returns ($R^2$=0.03). The lowest rod catch return was 1,591 recorded in 2007.

However, as displayed in **Figure 10.17**, since 2004 the proportion of finnock released as a percentage of the total catch return has increased, reaching a peak of 99.32 % in 2018. A proportion of the fish released from the rod fishery may be re-caught and hence inflate the catch statistics for caught and released finnock by appearing in the dataset more than once. There is no way to quantify this effect on the dataset.

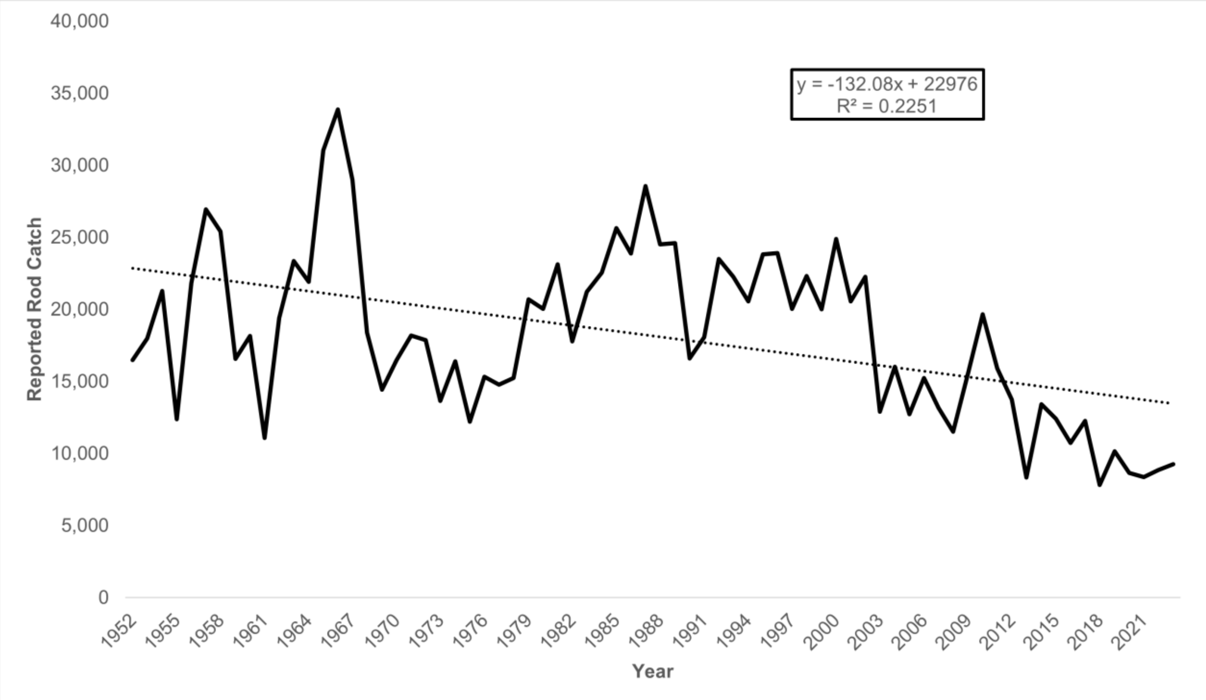


**Figure 10.15: Annual rod catch data for sea trout in the East Coast spatial unit between 1952 and 2023 (inclusive).**

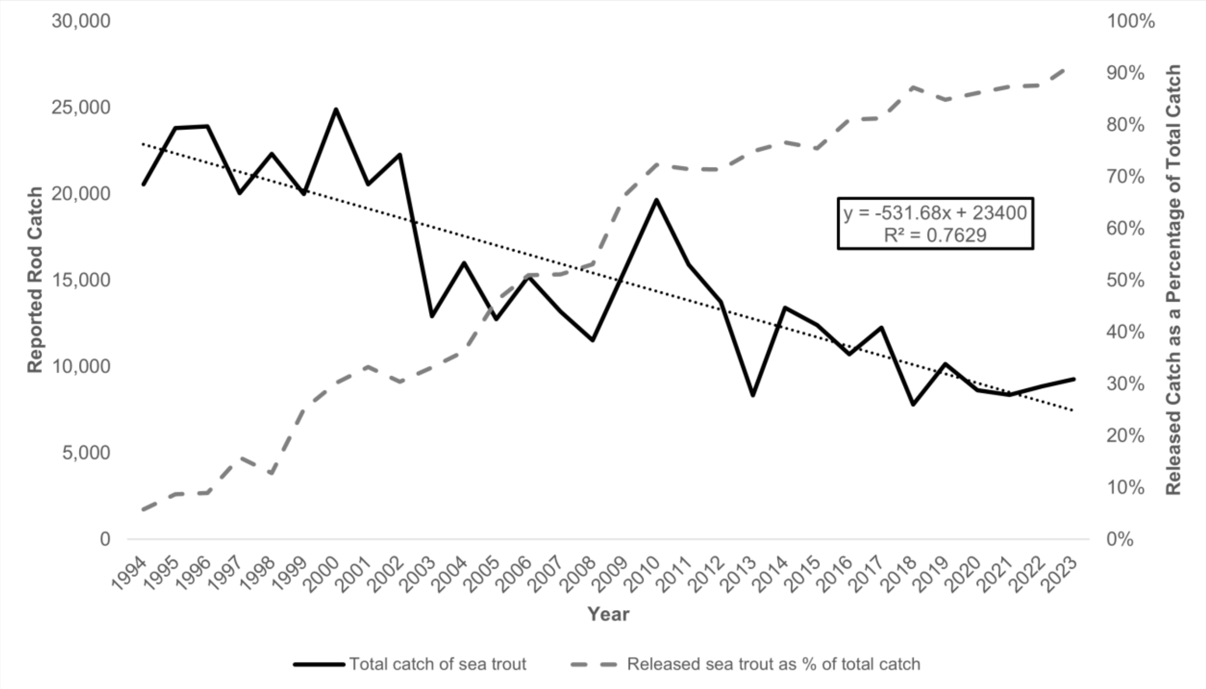


**Figure 10.16: East coast, percentage of catch and release of sea trout in relation to the total catch of sea trout between 1994 and 2023 (inclusive).**

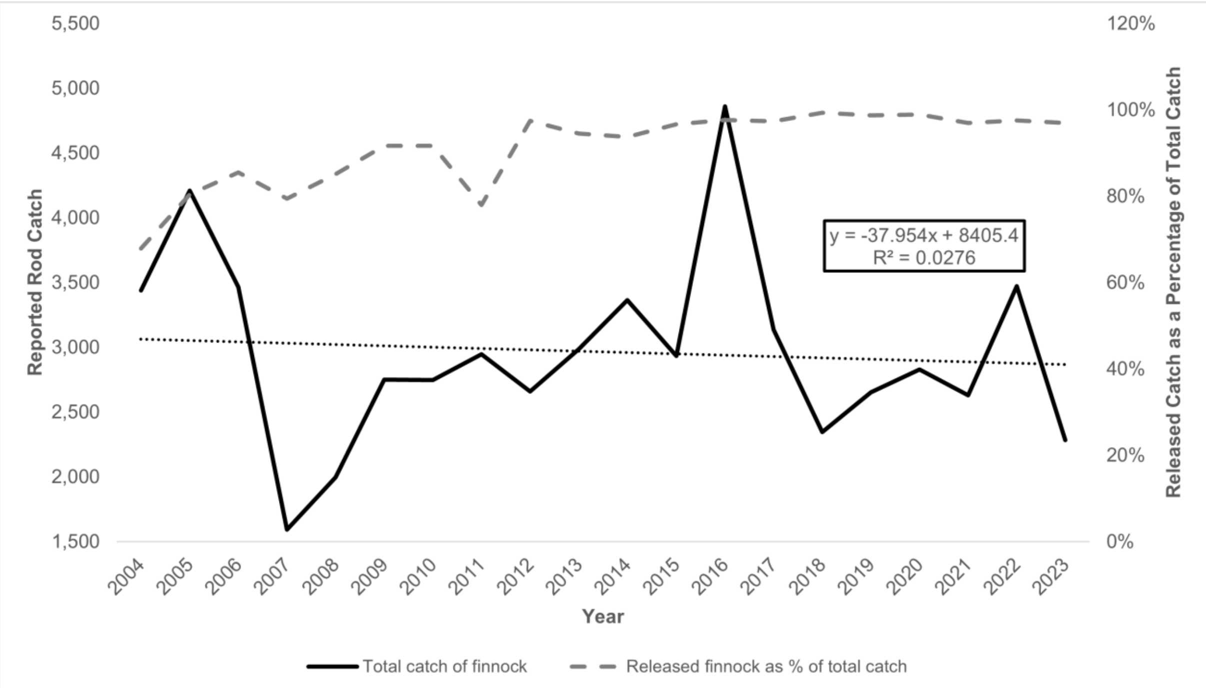


**Figure 10.17: East coast, percentage of catch and release of finnock in relation to the total catch of finnock between 2004 and 2023 (inclusive).**

### 10.4.4.4.2 Aquaculture Zone

**Figure 10.18** displays data for the Aquaculture Zone and indicates that throughout the complete temporal period (1952 to 2023), the Aquaculture Zone has supported a mean catch return of 13,160, whereas the East Coast spatial unit has supported a mean catch return of 18,155. The dataset, across the complete temporal period, indicates a strong ($R^2$=0.83) declining trend in catch returns. The returns for 2023 indicate that 4,618 fish were caught via rod, this number represents an increase of 6.52 % in comparison to the previous 5-year average (4,335 (2018 to 2022)). The lowest rod catch return was 3,395 recorded in 2021.

Since 1994, sea trout rod catch statistics have distinguished between caught and released and caught and retained. Throughout the period of 1994 to 2023, total catch returns (released and retained) of sea trout have shown a moderate trend of decrease ($R^2$=0.62) (see **Figure 10.19**). However, during this period the proportion of sea trout released as a percentage of the total catch return has increased, reaching a peak of 94.52 % in 2022. A proportion of the fish released from the rod fishery may be re-caught and hence inflate the catch statistics for caught and released sea trout by appearing in the dataset more than once. There is no way to quantify this effect on the dataset.

Since 2004 catch returns of finnock have been recorded in the fishery statistics. **Figure 10.20** presents the Aquaculture Zone finnock rod catch statistics for the period 2004 to 2023 (inclusive). Throughout the period there has been significant inter-annual variation in the finnock catch returns, around a mean of 4,242 finnock. Across the period there is no obvious trend in catch returns ($R^2$=0.10). The lowest rod catch return was 2,896 recorded in 2023.

However, as displayed in **Figure 10.20**, since 2004 the proportion of finnock released as a percentage of the total catch return has increased, reaching a peak of 98.50 % in 2020. A proportion of the fish released from the rod fishery may be re-caught and hence inflate the catch statistics for caught and released finnock by appearing in the dataset more than once. There is no way to quantify this effect on the dataset.

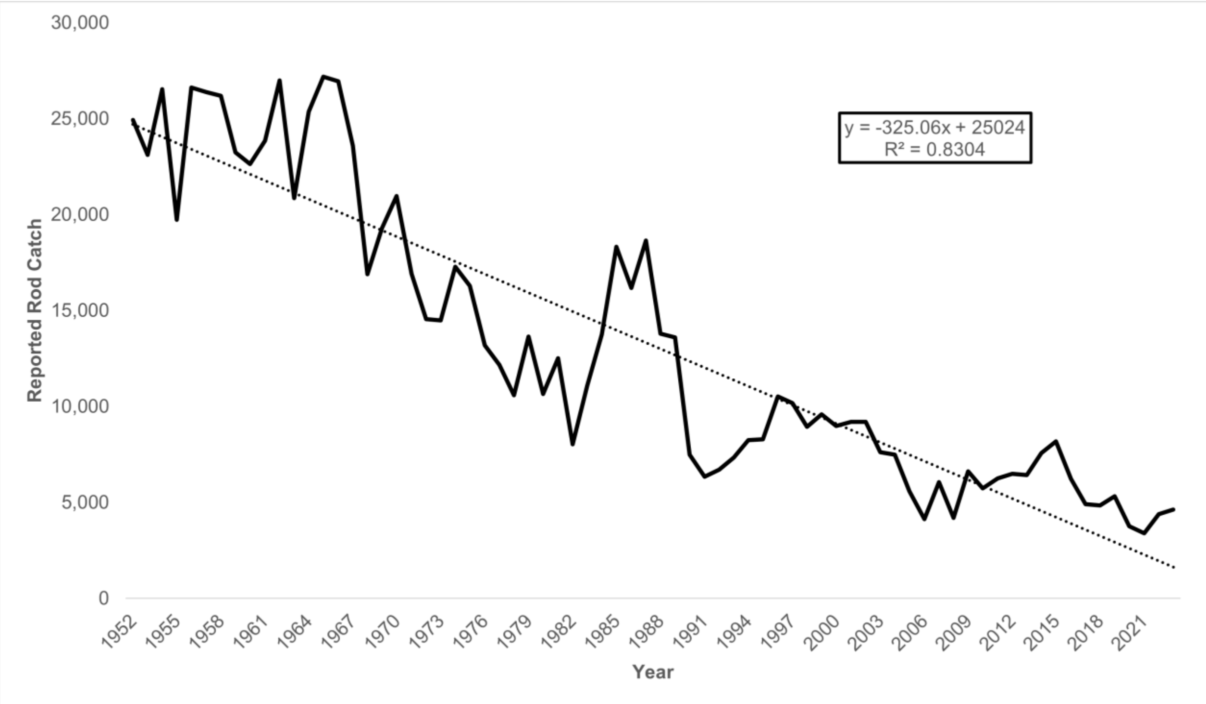


**Figure 10.18: Annual rod catch data for sea trout in the Aquaculture Zone between 1952 and 2023 (inclusive).**

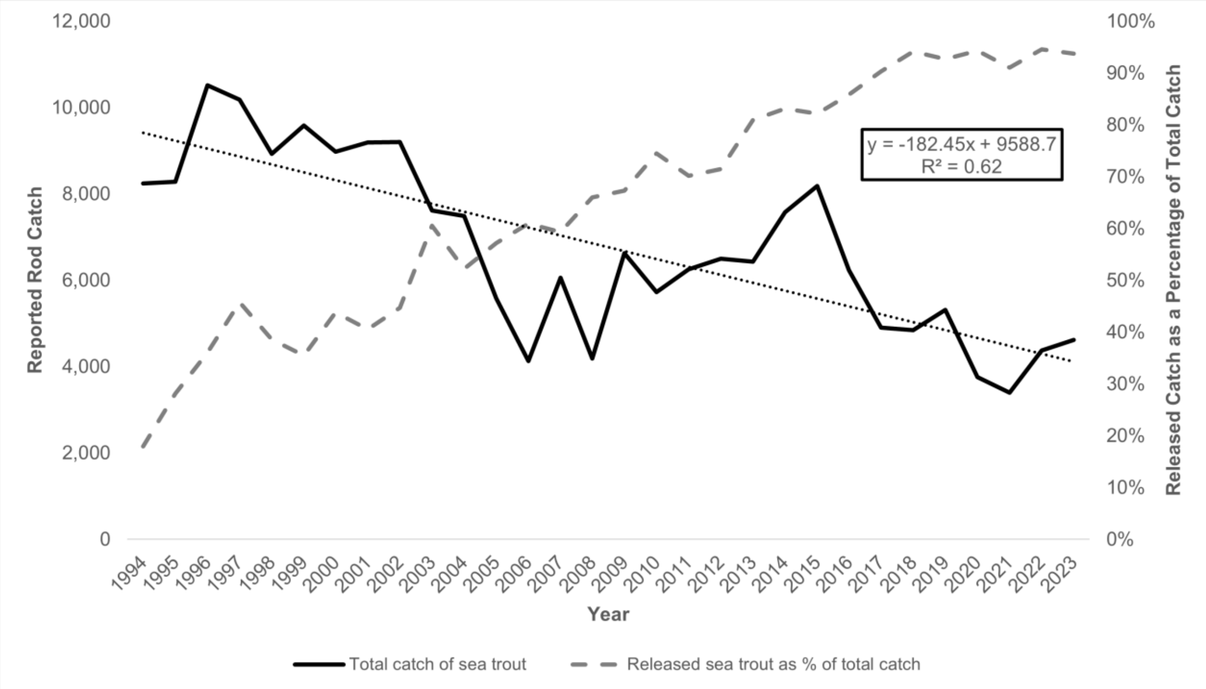


**Figure 10.19: Aquaculture Zone, percentage of catch and release of sea trout in relation to the total catch of sea trout between 1994 and 2023 (inclusive).**

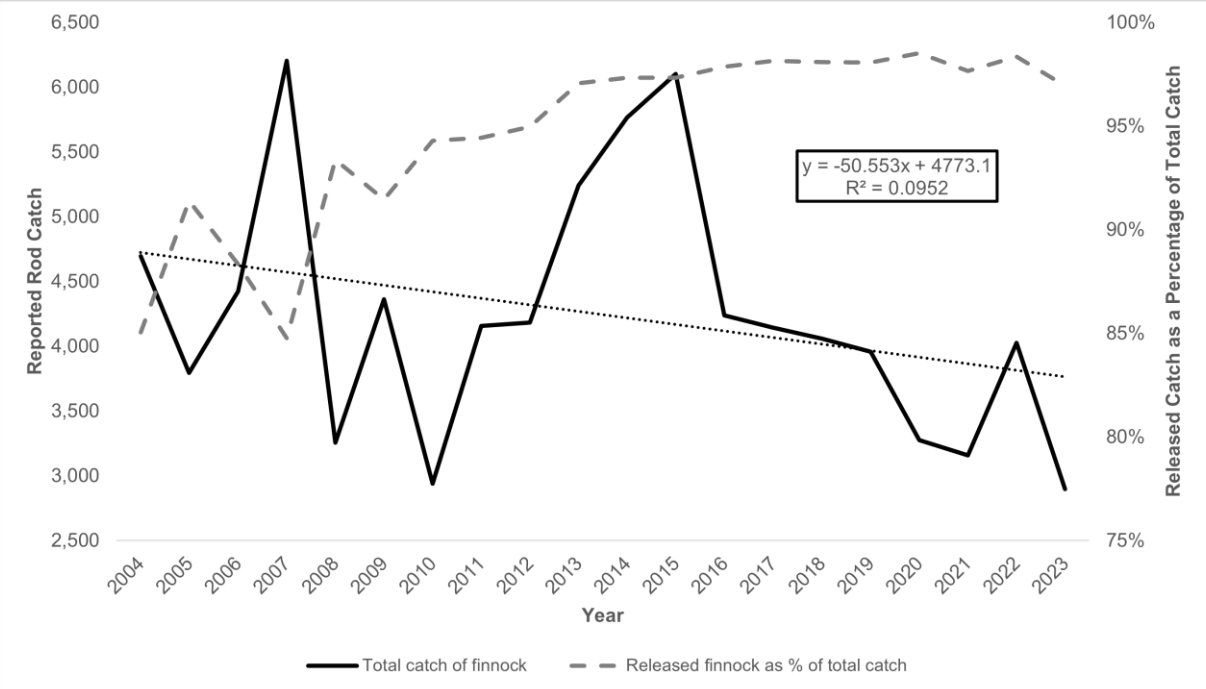


**Figure 10.20: Aquaculture Zone, percentage of catch and release of finnock in relation to the total catch of finnock between 2004 and 2023 (inclusive).**

## 10.4.4.5 District Level Atlantic Salmon and Sea Trout Population

### 10.4.4.5.1 Atlantic Salmon (*Salmo Salar*) Fishery Statistics

The Proposed Development will be located within the Creed statistical district, this district includes much of the east coast of the Isle of Lewis. Due to the spatial extent of this district, statistics for the district as a whole may not be representative of catches in the immediate area of the Proposed Development.

The dataset for MSW fish across the complete temporal period (1952 to 2023), presented in **Figure 10.21** illustrates a pattern of significant inter-annual variation, around a mean annual return of 145 MSW fish. Nevertheless, when reviewing the dataset for MSW fish across the complete temporal period it is possible to identify a weak ($R^2$=0.27), but declining, trend in returns, as displayed in **Figure 10.21**. The returns for 2023 indicate that nine MSW fish were caught via rod, this number represents 61.64 % of the previous 5-year average (14.60 (2018 to 2022)). And also represents the fourth lowest catch return (1982 returned seven, 2018 and 2021 returned four MSW fish and 2022 returned nine) of MSW within the Creed district since records began in 1952.

Between 2010 and 2023, there is a declining trend ($R^2$=0.83) in MSW catch returns in the Creed district, as presented in **Figure 10.22**, with the catch return of nine MSW fish in 2023 representing a 86.15 % decrease in comparison to the 2010 catch return of 65 MSW fish.

Throughout the complete temporal period the Creed district displays an increasing trend ($R^2$=0.46) in the returns of 1SW fish, around a mean of 124 (See
**Figure** 10.21**)**. The trend in 1SW fish catch returns identified within the Creed district does display the same increasing pattern in catch returns seen at the national level. These catch returns are remaining steady in comparison to the average 1SW returns, with an average return of 158 for the last ten years (2013-2022).

The returns for 2023 indicate that 102 1SW fish were caught via rod, this number represents a 19.81 % decrease in comparison to the previous 5-year average (127.20 (2018 to 2022)).

Between 2010 and 2023, there is a declining trend ($R^2$=0.48) in 1SW catch returns in the Creed district, as presented in **Figure 10.22**, with the catch return of 102 1SW fish in 2023 representing a 64.83 % decrease in comparison to the 2010 catch return of 290 MSW fish.

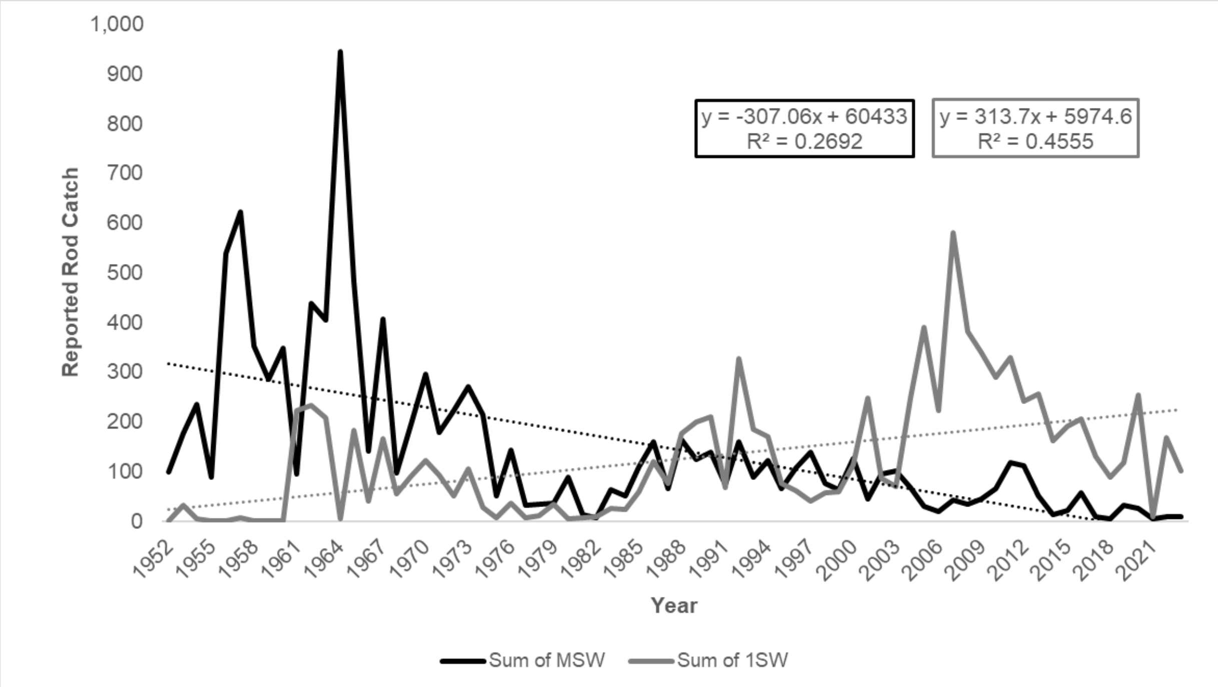


**Figure 10.21: Annual rod catch data for salmon in the Creed district between 1952 and 2023 (inclusive) grouped as multi-sea-winter fish and one-sea-winter fish.**

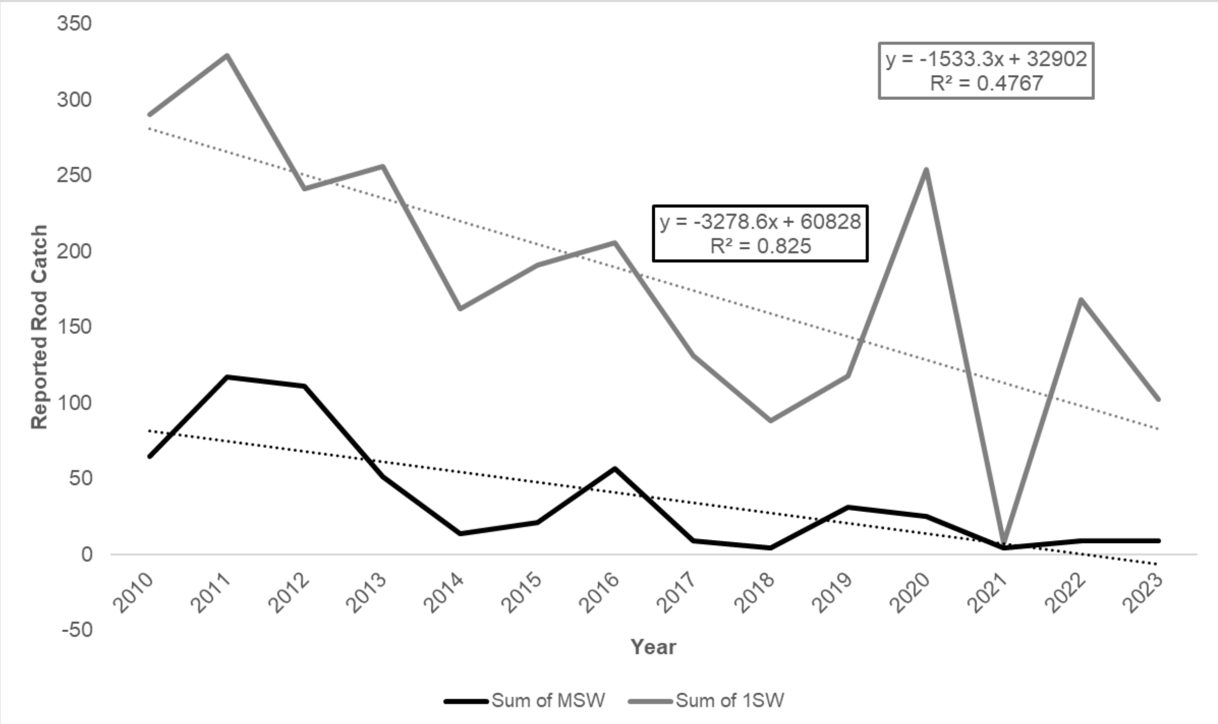


**Figure 10.22: Annual rod catch data for salmon in the Creed district between 2010 and 2023 (inclusive) grouped as multi-sea-winter fish and one-sea-winter fish.**

### 10.4.4.5.2 Sea Trout Fishery Statistics

**Figure 10.23** displays the sea trout fishery statistics for the Creed district, these data indicate that throughout the complete temporal period (1952 to 2023) the Creed district has supported a mean catch return of 838 sea trout, which represents 6.37 % of the mean sea trout catch return within the wider Aquaculture Zone (13,160).

The dataset across the complete temporal period indicates a weak decreasing trend ($R^2$=0.35) in returns, as displayed in **Figure 10.23**. When these Creed district data are compared with the Aquaculture Zone ($R^2$=0.83 (declining)) and national ($R^2$=0.68 (declining)) data it is clear that the Creed district is not experiencing the same declines in sea trout catch returns seen within these other datasets. The returns for 2023 indicate that 308 sea trout were caught via rod, this number represents a 584.44 % increase from the previous 5-year average (45 (2018 to 2022)).

Since 1994, sea trout rod catch statistics have distinguished between caught and released and caught and retained. Throughout the period of 1994 to 2023, total catch returns (released and retained) of sea trout have shown a moderate trend of decrease ($R^2$=0.34) (see **Figure 10.24**). However, during this period the proportion of sea trout released as a percentage of the total catch return has displayed an increasing trend peaking in 2023 at 100.00 %. A proportion of the fish released from the rod fishery may be re-caught and hence inflate the catch statistics for caught and released sea trout by appearing in the dataset more than once. There is no way to quantify this effect on the dataset.

Since 2004 catch returns of finnock have been recorded in the fishery statistics. **Figure 10.25** presents the Creed district finnock rod catch statistics for the period 2004 to 2023 (inclusive). Throughout the period there has been significant inter-annual variation in the finnock catch returns, around a mean of 509 finnock. This mean annual finnock catch return of 509 represents 12.00 % of the mean annual catch return of finnock in the wider Aquaculture Zone (4,242). Due to the inter-annual variation seen in the finnock catch return data for the Creed district, across the period there is no obvious trend in catch returns ($R^2$=0.11). The lowest rod catch return was 173 recorded in 2021.

However, as displayed in **Figure 10.25**, since 2004 the proportion of finnock released as a percentage of the total catch return has remained at a high level, ranging from 90.15 % to 100.00 %. A proportion of the fish released from the rod fishery may be re-caught and hence inflate the catch statistics for caught and released finnock by appearing in the dataset more than once. There is no way to quantify this effect on the dataset.

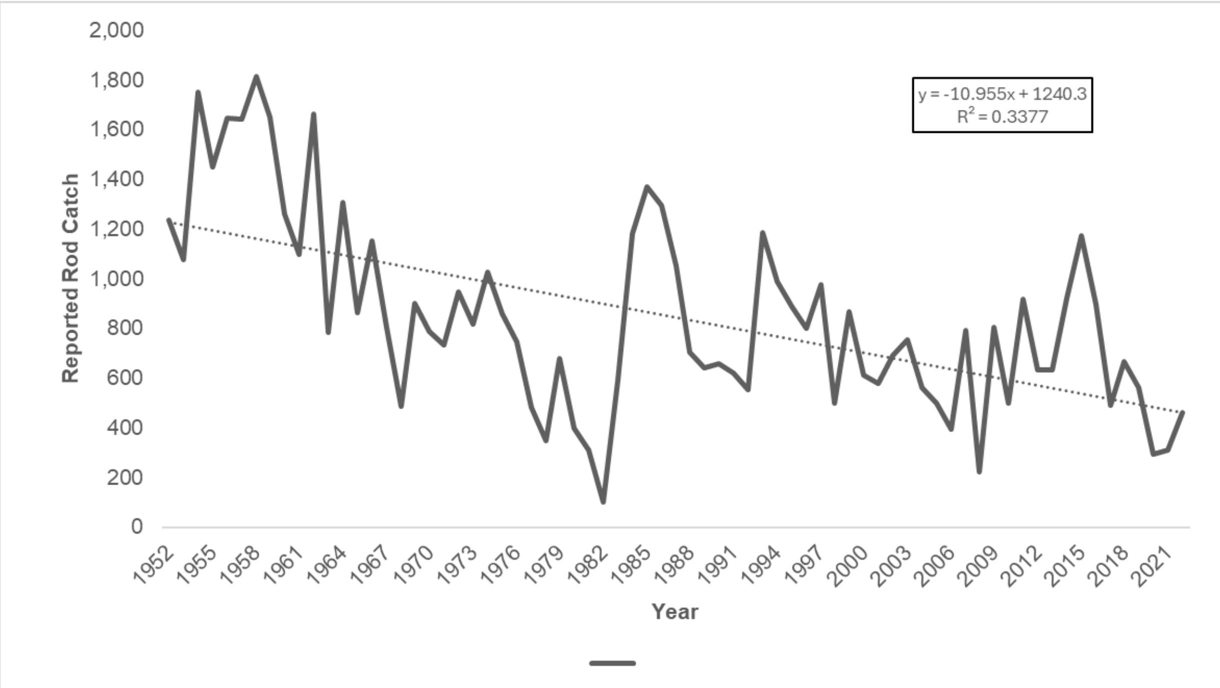


**Figure 10.23: Annual rod catch data for sea trout within the Creed statistical district between 1952 and 2023.**

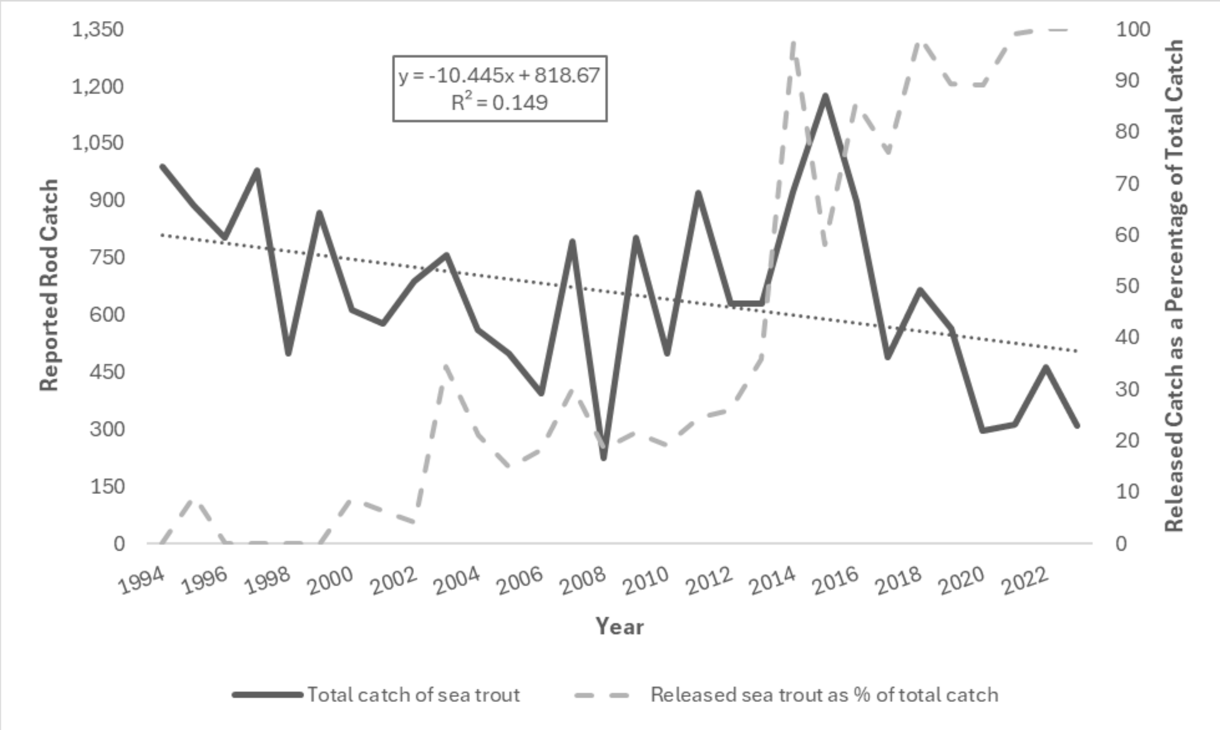


**Figure 10.24: Creed, percentage of catch and release of sea trout in relation to the total catch of sea trout between 2004 and 2023 (inclusive).**

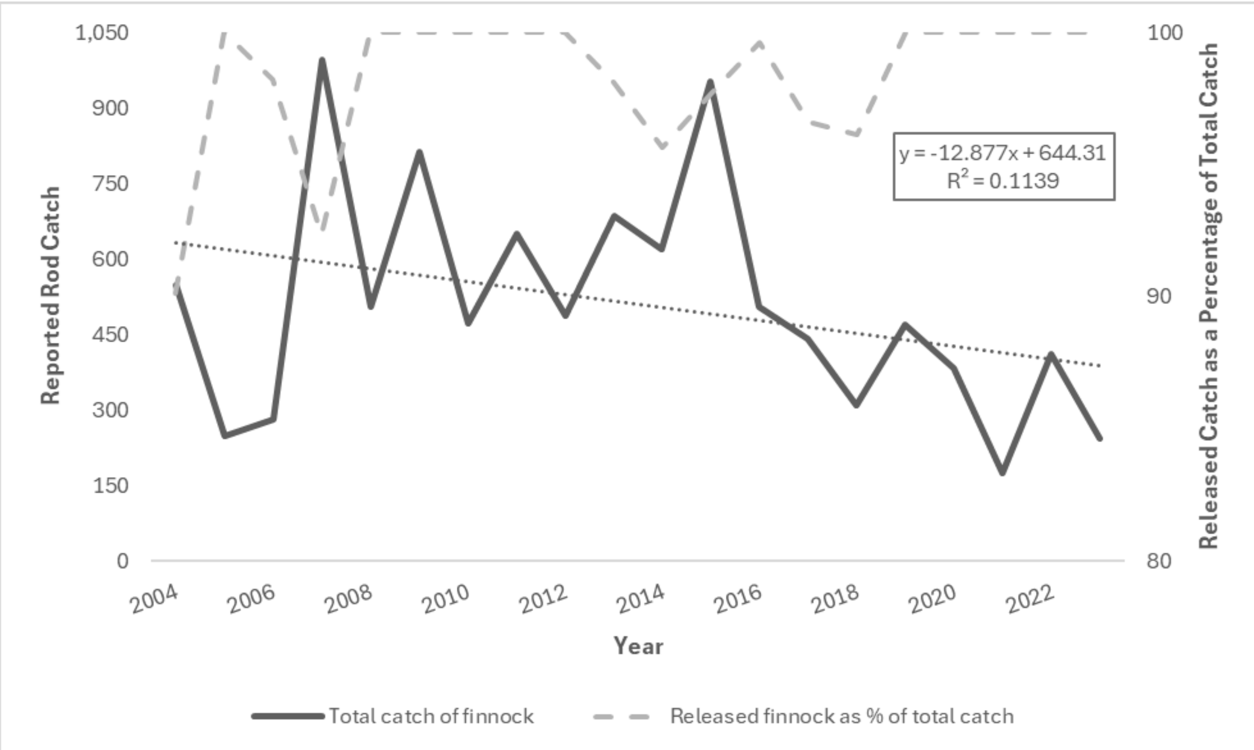


**Figure 10.25: Creed, percentage of catch and release of finnock in relation to the total catch of finnock between 2004 and 2023 (inclusive).**

### 10.4.4.6 Atlantic Salmon (*S. salar*) and Sea Trout (*S. trutta*) Distribution

Since 2016, Scottish rivers have been assigned, on an annual basis, one of three grades via the Atlantic Salmon Conservation Status Assessment in accordance with the Conservation of Salmon (Scotland) Regulations 2016 (as amended). The three grades are based on the probability of each river meeting a spatially varying egg deposition target, that provides an indication of the maximum sustainable yield, which is indicative of the conservation limit. The three categories are defined within **Table 10.3**. The Conservation of Salmon (Scotland) Regulations 2016 (as amended) also:

- Prohibits the retention of salmon caught in coastal waters;
- Permits the killing of salmon within inland waters where stocks are above a defined conservation limit; and
- Requires mandatory catch and release of salmon in areas which fall below their defined conservation limit following the assessment of salmon stocks.

**Table 10.3: Summary of the three categories implemented under the Conservation of Salmon (Scotland) Regulations 2016 (as amended).**

| Category | Definition |
|---|---|
| Good | At least 80 % probability of meeting the Conservation Limit. Exploitation is sustainable therefore no additional management action is currently required. This recognises the effectiveness of existing non-statutory local management interventions. |
| Moderate | Between 60 – 80 % probability of meeting the Conservation Limit. Management action is necessary to reduce exploitation. Catch and release should be promoted strongly in the first instance. The need for mandatory catch and release will be reviewed annually. |
| Poor | Less than 60 % probability of meeting the Conservation Limit. Exploitation is unsustainable therefore management action, including mandatory catch and release (for all methods), is required to reduce exploitation. |

Within a 35 km radius of the Proposed Development there are a total of 23 graded rivers, under The Conservation of Salmon (Scotland) Regulations 2016, details of which are presented below in **Table 10.4** and **Figure 10.26.**

**Table 10.4: Summary of the graded Scottish Atlantic salmon rivers within 35 km of the Proposed Development.**

| District | Watercourse Name | River Grading | | | | | | Distance (km) |
|---|---|---|---|---|---|---|---|---|
| | | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 (Proposed) | |
| Clayburn | Laxadale Lochs | G | M | M | M | M | Moderate | 29.20 |
| Clayburn | Scaladale and Vigadale - River Scaladale | P | P | P | P | P | Poor | 24.24 |
| Clayburn | Scaladale and Vigadale - River Vigadale | P | P | P | P | P | Poor | 24.10 |
| Creed | Eishken Estate - Abhainn Shromois | P | P | P | P | P | Poor | 17.74 |
| Creed | Eishken Estate - Abhainn Smuaisibhig | P | P | P | P | P | Poor | 18.66 |
| Creed | Eishken Estate - Loch Eishken system | P | P | P | P | P | Poor | 10.53 |
| Creed | Eishken Estate - Loch Sgiobacleit system | P | P | P | P | P | Poor | 13.12 |
| Creed | Eishken Estate - Loch Stiomrabhaigh system | P | P | P | P | P | Poor | 8.94 |
| Creed | River Creed | G | M | M | P | P | Moderate | 15.18 |
| Creed | Soval Estate - Loch Strandavat system | P | M | M | P | M | Poor | 15.87 |
| Creed | Soval Estate - River Laxay | P | M | M | P | M | Poor | 10.43 |
| Creed | Aline Estate - Abhainn Mhuil | P | P | P | P | P | Poor | 21.52 |
| Creed | Aline Estate - Abhainn Mor Kintaravay | P | P | P | P | P | Poor | 19.38 |
| Fincastle | North Harris SAC - Abhainn Mhiabhaig | M | P | P | P | P | Poor | 34.07 |
| Gress (Greiss) | River Gress | P | P | P | P | P | Poor | 25.17 |
| Gress (Greiss) | Laxdale and Blackwater (Lewis) - River Laxadale | P | P | P | P | M | Poor | 17.75 |
| Gress (Greiss) | Laxdale and Blackwater (Lewis) - River Blackwater | P | P | P | P | M | Poor | 19.24 |
| Loch Roag | Langavat SAC | G | G | G | G | G | Good | 24.76 |
| Loch Roag | Loch Morsgail system | P | P | P | P | P | Poor | 29.70 |
| Loch Roag | Mhor a' Ghlinne Ruaidh and Geisiada - Loch Geisiadar system | P | P | P | P | P | Poor | 34.94 |
| Loch Roag | River Blackwater (Lewis) | G | G | G | M | G | Moderate | 24.23 |
| Loch Roag | River Carloway | P | P | P | P | P | Poor | 34.19 |
| Resort | North Harris SAC - Abhainn Mhor Ceann Reasort | M | P | P | P | P | Poor | 31.97 |

Of these 23 rivers, the Eishken Estate - Loch Stiomrabhaigh system is closest, at 8.94 km (straight line distance) from the Proposed Development. The Loch Stiomrabhaigh system is located within the Creed statistical district.


**Figure 10.26: Map showing all identified salmon rivers and their proximity to the Proposed Development[17].**

### 10.4.4.6.1.1 National Electrofishing Programme for Scotland

National Electrofishing Programme for Scotland (NEPS) data[128] is also available for the Outer Hebrides region. Survey work during 2018 and 2019 was carried out across a total of fifty survey sites. These NEPS data have been used to assess the juvenile population conservation status in order to compliment the adult conservation status of Atlantic salmon populations within river systems, as defined through the grading system, under the Conservation of Salmon (Scotland) Regulations 2016 (as amended). **Figure 10.27** and **Figure 10.28** present the mean density and conservation status grade for juvenile Atlantic salmon populations within the Outer Hebrides region in 2018 and 2019. As can be seen, mean densities in 2018 and 2019 are both above the national benchmark, with the juvenile population being assigned a Category 1 grade, meaning that juvenile populations within the Outer Hebrides have at least an 80 % probability of meeting the Conservation Limit.

[128] National Electrofishing Programme for Scotland (NEPS): Final site locations for the National Electrofishing Programme for Scotland (NEPS) (2018) [Online] Available at: https://marine.gov.scot/maps/1669

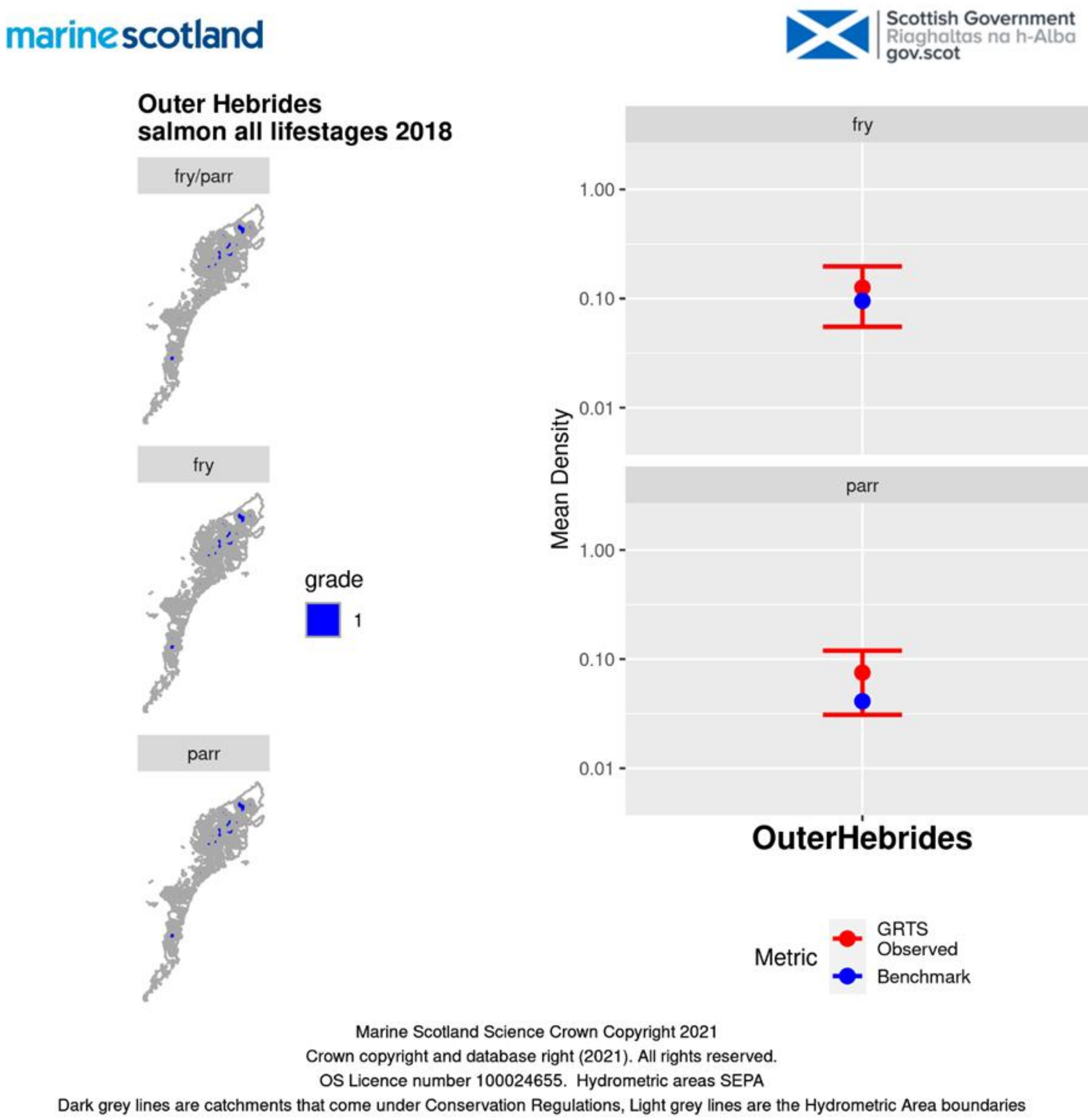


**Figure 10.27: Outer Hebrides juvenile Atlantic salmon conservation status for 2018.**

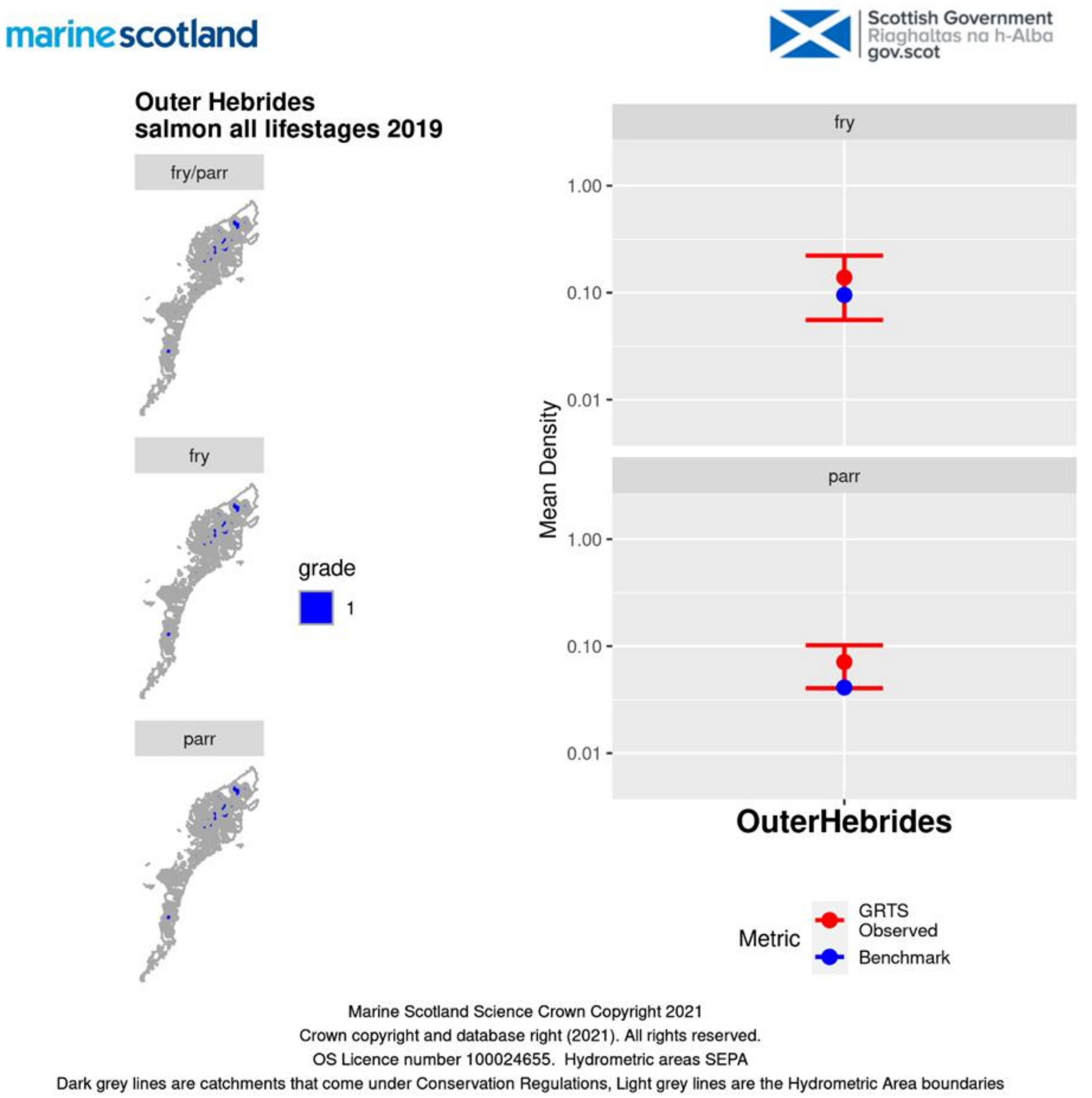


**Figure 10.28: Outer Hebrides juvenile Atlantic salmon conservation status for 2019.**

## 10.4.5 Pressures Influencing Wild Salmonid Population Dynamics

Both Atlantic salmon and sea trout undertake large migrations within the marine environment, with Atlantic salmon migrating to the high North Atlantic to reach feeding grounds. Sea trout are generally believed to remain within 100 km of their natal river system[129]. However, evidence indicates that some sea trout may migrate over substantially greater distances[130]. As a result of this migratory life-cycle both salmonid species are subject to a number of pressures, often anthropogenic in origin, that may impact upon survival. Thus, determining the causative agent of declines in salmonid stock is particularly difficult.

[129] Thorstad, E.B., Todd, C.D., Uglem, I., Bjørn, P.A., Gargan, P.G., Vollset, K.W., Halttunen, E., Kålås, S., Berg, M. and Finstad, B., 2016. Marine life of the sea trout. Marine Biology, 163(3), pp.1-19. https://link.springer.com/article/10.1007/s00227-016-2820-3

[130] Birnie-Gauvin, K., Thorstad, E.B. and Aarestrup, K., 2019. Overlooked aspects of the Salmo salar and Salmo trutta lifecycles. *Reviews in Fish Biology and Fisheries*, *29*(4), pp.749-766. [Online] Available at: https://link.springer.com/article/10.1007/s11160-019-09575-x

The Scottish Government published the Scottish Wild Salmon Strategy in January 2022[131]. This strategy outlined the breadth of pressures and management responses to ensure a path to restoration and recovery for Atlantic salmon within Scotland. As part of this strategy, the below pressures on wild Atlantic salmon were identified. The strategy states that these pressures are unlikely to be acting upon salmon individually, but rather cumulatively, with multiple pressures impacting Atlantic salmon throughout the lifecycle:

- **Exploitation:** Atlantic salmon suffer direct and indirect mortality through both legal and illegal forms of fishing, including rod and line, coastal and in-river net fisheries. Voluntary catch and release measures, changes to the annual close times to protect vulnerable spring stocks and, since 2016, statutory prohibitions on the killing of salmon in coastal waters and certain inland waters, have reduced fisheries-related mortality in recent years. Mortality can also occur through catch and release fisheries, and can be exacerbated by high temperatures;
- **Predation:** Atlantic salmon are predated on by a number of species. Those species considered to present the greatest risk include other fish (e.g., trout, pike, eels), birds (e.g., cormorant, goosander) and mammals (e.g. seals). The effects of predation can be exacerbated in the presence of anthropogenic pressures including barriers and impoundments that alter habitats and disrupt migration;
- **Disease and Parasites:** Atlantic salmon can be host to a wide range of pathogens and parasites that can affect growth and survival. Diseases can be bacterial (e.g., Furunculosis) and viral (e.g., Infectious Salmon Anaemia (ISA)). Red Vent Syndrome (RVS) caused by a parasite, *Anisakis*, has been highlighted as a cause for concern in recent years;
- **Sea Lice:** Sea lice are a naturally occurring parasite of wild fish that impair performance and can kill Atlantic salmon smolts when present above threshold levels. Atlantic salmon farms can elevate levels of sea lice in coastal habitats and potentially increase risks to wild Atlantic salmon growth and mortality under certain local conditions;
- **Genetic introgression:** Escaped farmed Atlantic salmon can negatively impact wild Atlantic salmon through direct competition in freshwater. Breeding of escaped fish with wild Atlantic salmon can disrupt adaptive genetic selection with negative consequences for fitness and thus the viability of wild populations;
- **Invasive Non-Native Species (INNS):** Species introduced outside their native range (e.g., North American signal crayfish, American mink and pink salmon) can have direct (e.g., predation, competitive exclusion) and indirect (e.g., habitat alteration) negative effects on Atlantic salmon populations. Non-native plants (e.g., giant hogweed, Japanese knotweed) may have impacts on Atlantic salmon by their effect on riverbank erosion;
- **Water Quality:** Atlantic salmon require clean, well oxygenated water to thrive. Point source (e.g., septic tanks or licenced discharges) and diffuse (e.g., acidification, eutrophication, sedimentation) pollution can cause direct mortality or stress that affects subsequent growth and survival. Fine sediment can alter the suitability of habitats and suffocate eggs;
- **Water Quantity:** Atlantic salmon prefer specific water flow characteristics, including depth and velocity, that vary across life stages. Too little water can reduce the availability and suitability or river habitat, causing increased mortality. Too much water can affect breeding success or in extreme circumstances displace fish from habitats;
- **Thermal Habitat:** Atlantic salmon are a cold water adapted species that are highly sensitive to river temperature. Temperatures may be elevated broadly due to climate change and locally due to point source thermal effluents from industry and discharges from dams which, in some instances, may alternatively have a cooling effect. During the warm summer of 2018,

[131] Scottish Government: Scottish Wild Salmon Strategy, January 2022. [Online] Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2022/01/scottish-wild-salmon-strategy/documents/scottish-wild-salmon-strategy/scottish-wild-salmon-strategy/govscot%3Adocument/scottish-wild-salmon-strategy.pdf

approximately 70 % of Scotland's rivers experienced temperatures that could cause stress to Atlantic salmon;

- **Instream and Riparian Habitats:** Riparian (riverside) habitat affects water quality, temperature, food availability and channel shape and structure. The loss of natural riparian woodland can increase temperatures and have other detrimental impacts, while excessive over-shading by commercial forestry can reduce instream Atlantic salmon growth and numbers and exacerbate acidification. The physical characteristics of rivers and their banks (riparian zone), including the shape of the river channel and the bed substratum, affect hydraulic conditions and the availability of shelter and refuges for Atlantic salmon. Engineering activities, such as straightening, dredging and bank reinforcement, can negatively affect the quality and quantity of Atlantic salmon habitat.
- **Obstacles to Fish Passage:** Man-made barriers to migration, including dams, weirs, bridge foundations and culverts can completely prohibit the migrations necessary to complete the lifecycle of Atlantic salmon. Where barriers are partial, they can impede migration, deplete energy reserves of the fish, and increase the likelihood of predation and illegal exploitation;
- **Marine Development:** Activities in the marine and estuarine environments, including dredging and maintenance of harbours, have the potential to affect Atlantic salmon through impacts on water quality and noise. Marine renewable developments also may affect Atlantic salmon through noise, impacts on water quality, strike (in the case of turbines) and effects on local electromagnetic fields used by fish for migration;
- **Conditions in the High Seas:** Growth and survival of Atlantic salmon on the high seas may be influenced by predators, food availability, fisheries, and costs to metabolism. Climate change has elevated sea surface temperatures, influencing metabolic costs directly and potentially affecting growth and survival of Atlantic salmon indirectly through changes in the ecosystem and hence food availability and/or predation risk;
- **Other Pressures:** Potential pressures as diverse as numbers of terrestrial insects falling into streams and activities of inshore fisheries might have significant impacts on Atlantic salmon growth and mortality, have probably changed over time but have not been assessed.

### 10.4.6 Disease Management Areas and Farm Management Areas

DMAs were established within the 'Final Report' of the Joint Government/Industry Working Group on Infectious Salmon Anaemia in January 2000. These DMAs were based on separation distances around active farms, which considers tidal excursions and other epidemiological risk factors. The existing Gravir fish farm lays within DMA 5a, which covers a marine area of 189.22 km$^2$. The Proposed Development will join DMA 5a, this addition will result in an increase in the marine area by 23.50 km$^2$, as detailed in **Figure 10.29** .

Gravir lays within the CoGP FMA W4, the Proposed Development will also be located within this MA. As BFS are the sole marine salmonid operator in the area there is not a FMA in place. However, the existing Isle of Lewis fish farm is operated in line with an internal FMS, which aligns production activities with the requirements of the CoGP. The FMS covers the following:

- General health and stocking approach;
- Sea lice management strategy;
- Movement of fish and harvesting;
- Escapes; and
- Predator exclusion and control.

The Proposed Development will be included within this FMS and all production activities will align with CoGP requirements (**Appendix H**).

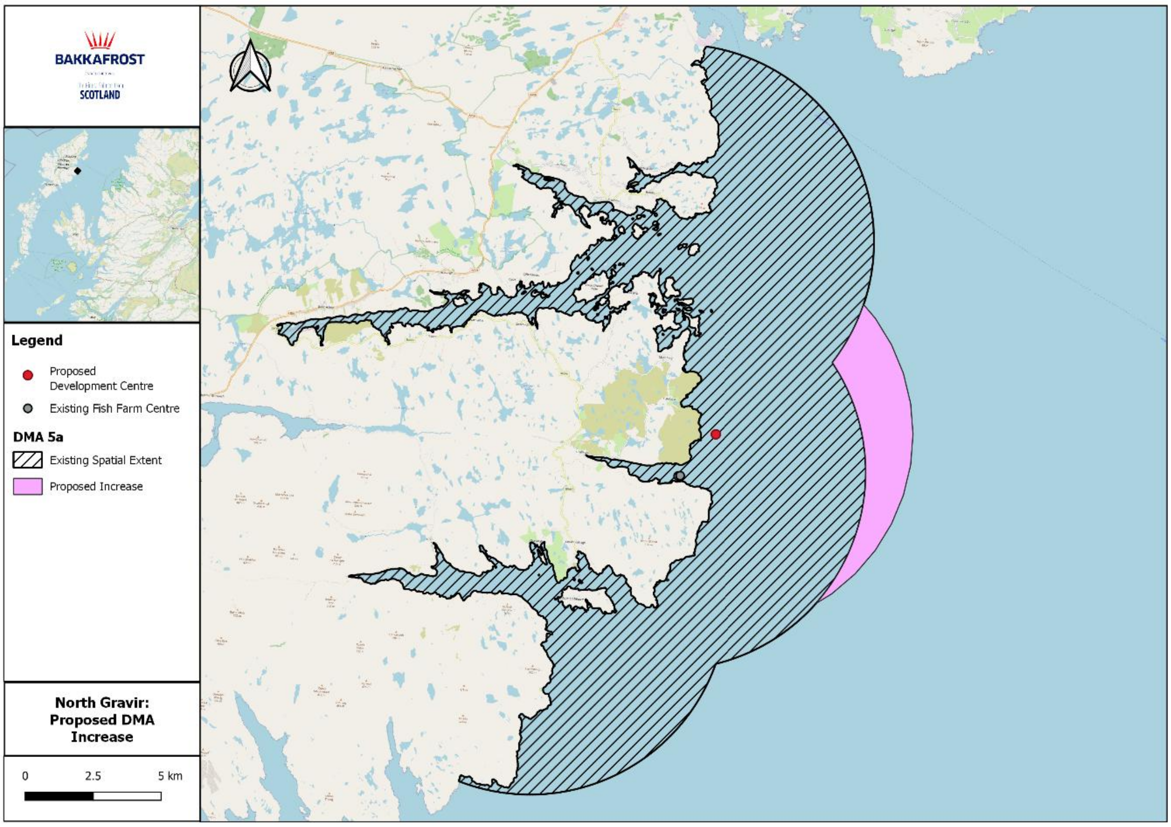


**Figure 10.29: Spatial extent of DMA 5a, along with the proposed increase as a result of the Proposed Development[17].**

## 10.4.7 BFS Historical Sea Lice Control Performance

Sea lice are ectoparasites that attach to the external surface of a fish host and feed on the host's mucus, blood, skin, and muscle. There are two distinct species of sea louse that may parasitise farmed Atlantic salmon, *Lepeophtheirus salmonis* and *Caligus elongatus*. *L. salmonis* are only found on salmonids whilst *C. elongatus* can parasitise a wide range of fishes. As the Proposed Development is a new fish farm, there are no historical data available. However, historic sea lice data for the existing BFS fish farm within CoGP FMA W-4 are available and are presented in **Figure 10.30**, below. The data indicates that sea lice control across the last complete production cycle has been effective at maintaining low levels of average adult female *L. salmonis*. This data only includes the last production cycle as this is representative of current lice mitigation practices in use by BFS. Whilst the CoGP suggested criteria for intervention was exceeded once during this production cycle, this incidence of CoGP criteria exceedances was a solitary event, indicating that effective feedback mechanisms are in place.

Furthermore, the MD notification threshold was not exceeded during this production cycle. As a result of effective sea lice control within CoGP FMA W-4, the MD intervention threshold was not exceeded at any time during the production cycle. **Figure 10.30** also displays the wild Atlantic salmon out-migration period (April through May) (orange bars). The data clearly indicates that during this sensitive out-migration period average *L. salmonis* levels at the existing farm are well below the MD notification and intervention threshold and also the CoGP suggested intervention threshold.

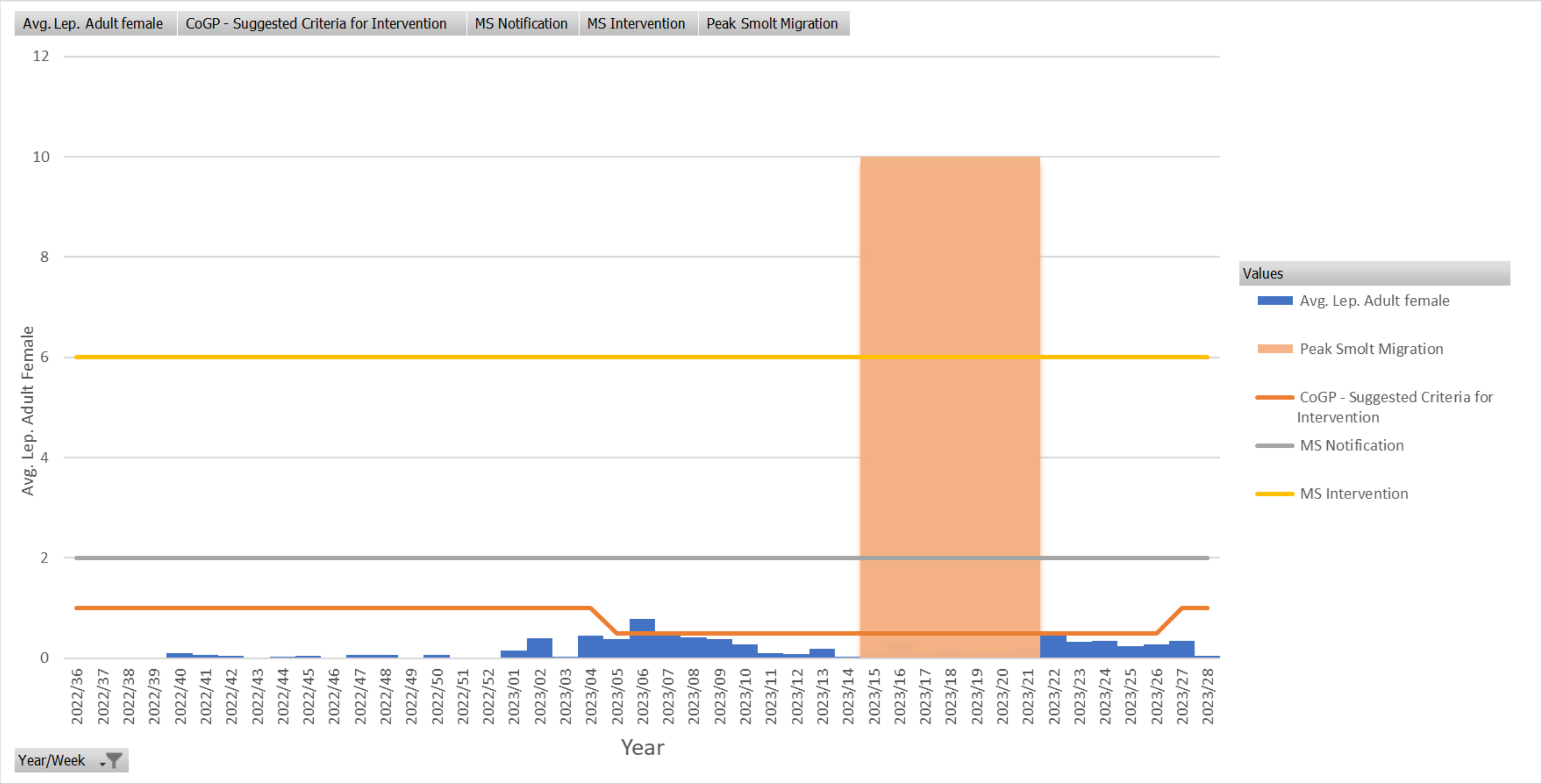


**Figure 10.30: Historical sea lice data for CoGP Management Area W-4 displayed on a weekly basis.**

### 10.4.8 Determination of Important Ecological Features

**Table 10.5**, below, summarises the baseline salmonid ecological features identified within the study area (**Sub-Section 10.4.1**), outlining whether or not each ecological feature has been classified as an IEF, with the rationale for the decision provided. The value of each ecological feature has been assessed on a project-specific basis. Therefore, **Table 10.5** first lists the value of the ecological features as implied by legislation and nature conservation designations. This value is then re-evaluated in the context of the Proposed Development, to provide a value for each ecological feature directly related to the Proposed Development and the immediate marine environment.

**Table 10.5: Summary of wild salmonid IEFs.**

| Ecological feature | General geographic importance | Project-specific geographic importance | Rationale for project-specific importance | IEF (Yes/No) |
|---|---|---|---|---|
| Atlantic salmon | International | Regional | • Atlantic salmon are listed on Appendix III of the Bern Convention, Annex II and V of Council Directive 92/43/EEC;<br>• Atlantic salmon are listed within the UK BAP list, the Scottish biodiversity list, and the IUCN Red List, where the Great Britain sub-population has been assessed as 'endangered';<br>• Atlantic salmon are included in the OSPAR List of Threatened and/or Declining Species and Habitats;<br>• At national, regional, and statistical district level Atlantic salmon have declined, with a notable decline over the last decade;<br>• Baseline assessment has identified a number of watercourses supporting Atlantic salmon within the study area; and<br>• As a result, a project-specific importance value of '**regional**' has been assigned. | **Yes** |
| Sea trout | National | Regional | • Sea trout are included in the UK BAP list, and the Scottish biodiversity list;<br>• Sea trout are listed as of 'least concern' within the IUCN Red List;<br>• Baseline assessment has identified a number of watercourses supporting sea trout within the study area;<br>• Sea trout catches at a national, regional, and district level show pattern of decline through time; and<br>• As a result, a project-specific importance value of '**regional**' has been assigned. | **Yes** |

### 10.4.9 Evolution of the Baseline Condition

The EIA Regulations require that; ***"A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge"*** (EIA Regulations, Schedule 4, Paragraph 3), is included within the EIAR. Therefore, this Sub-Section of the EIAR, provides a qualitative description of the evolution of the baseline condition on the assumption that the installation and subsequent long-term operation of the Proposed Development does not take place. The description is based on available information and scientific knowledge of the ecology of the IEFs identified within the baseline condition.

As highlighted throughout **Sub-Section 10.4**, there has been a decline in the number of returning Atlantic salmon to Scottish waters since the early 1970s. This trend of decline has also been mirrored throughout the Atlantic salmon's global range. Due to the Atlantic salmon's diadromous lifecycle, they are exposed to a range of threats and pressures in streams, rivers, lochs, coastal waters and the open oceans. As a result, in order for conservation policies to be effective, they must address anthropogenic usage across each of the component habitats utilised by Atlantic salmon[131].

It is acknowledged that the changing climate is already having an adverse impact and effect on wild salmonid populations, and, through time, these impacts and effects are likely to be exacerbated[132], unless significant steps are taken to limit further anthropogenically driven climate change. The direct adverse effects of climate change on Atlantic salmon populations have and will continue to render them more vulnerable to other stressors[132]. Atlantic salmon populations in the northern extreme of their range are considered to have more scope for acclimatisation, as temperatures are not expected to force physiological status towards or beyond the Atlantic salmons' upper thermal limit[133].

Future climate scenarios have predicted higher temperatures and increased hydrological variability[134, 135]. Precipitation is expected to increase in the Northern hemisphere, with wet areas becoming wetter, but with increased variability, meaning that the frequency and magnitude of flood and drought events is likely to increase[134]. As such, it is predicted that during the summer months periods of extreme low water levels and high water temperatures are likely to be experienced within freshwater environments. However, the increased variability and magnitude of precipitation has been predicted to result in increased flash flood events, which have the potential to cause significant habitat damage and riverbed alteration[132], potentially negatively affecting suitable salmonid habitat. Climate change is also predicted to continue altering the marine environment. Rising temperatures and changes in acidity, are likely to cause shifts in circulation, stratification, nutrient input, and oxygen content. This could have wide ranging effects on ocean productivity across trophic levels, food-web dynamics, and other ecosystem processes and functions[136, 137].

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[132] Thorstad, E.B., Bliss, D., Breau, C., Damon-Randall, K., Sundt-Hansen, L.E., Hatfield, E.M., Horsburgh, G., Hansen, H., Maoiléidigh, N.Ó., Sheehan, T. and Sutton, S.G., 2021. Atlantic salmon in a rapidly changing environment—Facing the challenges of reduced marine survival and climate change. Aquatic Conservation: Marine and Freshwater Ecosystems, 31(9), pp.2654-2665. [Online] Available at: https://onlinelibrary.wiley.com/doi/full/10.1002/aqc.3624

[133] Anttila, K., Couturier, C.S., Øverli, Ø., Johnsen, A., Marthinsen, G., Nilsson, G.E. and Farrell, A.P., 2014. Atlantic salmon show capability for cardiac acclimation to warm temperatures. Nature communications, 5(1), p.4252. [Online] Available at: https://www.nature.com/articles/ncomms5252

[134] Schneider, C., Laizé, C.L.R., Acreman, M.C. and Flörke, M., 2013. How will climate change modify river flow regimes in Europe? Hydrology and Earth System Sciences, 17(1), pp.325-339. [Online] Available at: https://hess.copernicus.org/articles/17/325/2013/

[135] Knouft, J.H. and Ficklin, D.L., 2017. The potential impacts of climate change on biodiversity in flowing freshwater systems. Annual Review of Ecology, Evolution, and Systematics, 48, pp.111-133. [Online] Available at: https://www.annualreviews.org/doi/abs/10.1146/annurev-ecolsys-110316-022803

[136] Hoegh-Guldberg, O. and Bruno, J.F., 2010. The impact of climate change on the world's marine ecosystems. Science, 328(5985), pp.1523-1528. [Online] Available at: https://www.science.org/doi/abs/10.1126/science.1189930

[137] Doney, S.C., Ruckelshaus, M., Emmett Duffy, J., Barry, J.P., Chan, F., English, C.A., Galindo, H.M., Grebmeier, J.M., Hollowed, A.B., Knowlton, N. and Polovina, J., 2012. Climate change impacts on marine ecosystems. Annual review of marine science, 4, pp.11-37. [Online] Available at: https://www.annualreviews.org/doi/abs/10.1146/annurev-marine-041911-111611

Whilst it is agreed that Atlantic salmon populations are vulnerable to the impacts and effects of climate change, there is uncertainty over the potential adaptability of Atlantic salmon, with populations throughout Europe displaying a similar degree of plasticity in physiology and acclimation capacities in response to acute warming events, despite the significant differences in acclimation history in the wild[133]. This indicates that, irrespective of spatial distribution, Atlantic salmon may have the capacity to acclimatise to increasing water temperature up to their upper lethal threshold.

Specifically in relation to hydrology, climate change is predicted to increase the average annual water flow in many regions. However, the flow pattern is likely to be significantly altered, with extreme low flows during the summer and extreme high flows in the autumn and winter. As a result, the wetted habitat available to Atlantic salmon fry and parr will vary greatly throughout the year[132], potentially leading to habitat fragmentation. These future scenarios of low river flow, in combination with elevated water temperature, have the potential to be a significant bottleneck for Atlantic salmon production and survival in specific parts of their range.

The diadromous Atlantic salmon is considered to be particularly vulnerable to warming environments, as the transitions between habitats (freshwater and seawater) are finely turned to specific environment cues[138]. Both the rate of ova development and hatching and the rate at which fry consume the nutrients of the yolk sac before emerging are controlled by water temperature[139, 140]. Therefore, with increased water temperatures, this process is likely to become more rapid, which may lead to the earlier emergence of fry and therefore a possible disconnect between fry emergence and food availability[132]. Increased water temperatures have also been linked to parr reaching smolt size earlier, with studies showing that over the past decades smolt age has decreased, whilst water temperatures have increased[141, 142].

Within future climate scenarios water temperatures within rivers are expected to periodically exceed the upper thermal tolerance limit for salmonids. During the summer months many Atlantic salmon populations already experience temperatures that are near to or in excess of laboratory derived lethal limits. Atlantic salmon are most sensitive to thermal stress during the embryonic stage[143]. For fry and parr, optimal growth is reported at temperatures between 16 and 20 °C[143]. The lethal limit is estimated to be 27.8 °C[143]. Therefore, as water temperatures rise, development and growth may be adversely impacted.

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[138] Crozier, L.G., Hendry, A.P., Lawson, P.W., Quinn, T.P., Mantua, N.J., Battin, J., Shaw, R.G. and Huey, R., 2008. Potential responses to climate change in organisms with complex life histories: evolution and plasticity in Pacific salmon. Evolutionary Applications, 1(2), pp.252-270. [Online] Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/j.1752-4571.2008.00033.x

[139] Crisp, D.T., 1981. A desk study of the relationship between temperature and hatching time for the eggs of five species of salmonid fishes. Freshwater biology, 11(4), pp.361-368. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2427.1981.tb01267.x

[140] Jensen, A.J., Johnsen, B.O. and Saksgård, L., 1989. Temperature requirements in Atlantic salmon (Salmo salar), brown trout (Salmo trutta), and Arctic char (Salvelinus alpinus) from hatching to initial feeding compared with geographic distribution. Canadian Journal of Fisheries and Aquatic Sciences, 46(5), pp.786-789. [Online] Available at: https://cdnsciencepub.com/doi/abs/10.1139/f89-097

[141] Russell, I.C., Aprahamian, M.W., Barry, J., Davidson, I.C., Fiske, P., Ibbotson, A.T., Kennedy, R.J., Maclean, J.C., Moore, A., Otero, J. and Potter, T., 2012. The influence of the freshwater environment and the biological characteristics of Atlantic salmon smolts on their subsequent marine survival. ICES Journal of Marine Science, 69(9), pp.1563-1573. [Online] Available at: https://academic.oup.com/icesjms/article/69/9/1563/634513

[142] ICES. (2009). Report of the Study Group on Biological Characteristics as Predictors of Salmon Abundance. ICES Document, CM 2009/DFC, 02, 1–119.

[143] Jonsson, B. and Jonsson, N., 2009. A review of the likely effects of climate change on anadromous Atlantic salmon Salmo salar and brown trout Salmo trutta, with particular reference to water temperature and flow. Journal of fish biology, 75(10), pp.2381-2447. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1095-8649.2009.02380.x

Furthermore, warmer water temperatures in the spring months have been documented to influence the timing of the spring out-migration of Atlantic salmon, with salmon migrating earlier in the year[144]. In combination with this potential earlier out-migration of salmon to the marine environment, there is also concern that changed environmental conditions in the oceans are creating a mismatch between smolt migration and optimal marine food availability that may be adversely impacting salmonid survival rates at sea[145, 146, 147]. More generally, marine ecosystems have already altered in response to climate change, this alteration is believed to have influenced the food availability for Atlantic salmon through both space and time. As a result, salmonid migration routes, distributions and marine survival are likely to be affected[132].

The results for the most recent UK assessment of favourable conservation status for Atlantic salmon are presented in **Table 10.6**. The assessment concluded that both the current range of, and habitat availability for, Atlantic salmon are favourable. However, the assessment also concluded that the population and future prospects for Atlantic salmon are unfavourable (inadequate). Therefore, an overall conservation status of the Atlantic salmon of unfavourable (inadequate) has been assigned.

**Table 10.6: Summary of the conservation status of Atlantic salmon.**

| Species Name | Range | Population | Habitat | Future Prospects | Conservation Status | Overall Trend |
|---|---|---|---|---|---|---|
| Atlantic salmon | FV* | U1* | FV | U1 | U1 | =* |

*FV = Favourable. U1 = Unfavourable – Inadequate. = = Stable.

For wild salmonids, the EcIA is therefore carried out in a context of declining baseline populations throughout Scotland, despite spatial variability. Where a species is declining, the assessment takes into account whether a given impact is likely to exacerbate a decline in the relevant reference population and prevent a species from recovery should environmental conditions become more favourable.

## 10.5 Identified Potential Impacts

Potential impacts on wild salmonids as a result of the operation of the Proposed Development have been determined to be limited to:

- Potential sea lice transfer from farmed to wild salmonids;
- Potential disease transfer from farmed to wild salmonids; and
- Potential genetic introgression and competition between farmed and wild salmonids.

## 10.6 Impact Assessment

### 10.6.1 Construction Impacts

It has been determined through professional judgement that the installation and decommissioning phase of the Proposed Development will not result in impacts on wild salmonids. Therefore, the construction phase has been scoped out of further assessment.

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[144] Otero, J., L'Abée-Lund, J.H., Castro-Santos, T., Leonardsson, K., Storvik, G.O., Jonsson, B., Dempson, B., Russell, I.C., Jensen, A.J., Baglinière, J.L. and Dionne, M., 2014. Basin-scale phenology and effects of climate variability on global timing of initial seaward migration of Atlantic salmon (Salmo salar). Global change biology, 20(1), pp.61-75. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/gcb.12363

[145] Beaugrand, G. and Reid, P.C., 2012. Relationships between North Atlantic salmon, plankton, and hydroclimatic change in the Northeast Atlantic. ICES Journal of Marine Science, 69(9), pp.1549-1562. [Online] Available at: https://academic.oup.com/icesjms/article/69/9/1549/640973

[146] Mills, K.E., Pershing, A.J., Sheehan, T.F. and Mountain, D., 2013. Climate and ecosystem linkages explain widespread declines in North American Atlantic salmon populations. Global Change Biology, 19(10), pp.3046-3061. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/gcb.12298

[147] Renkawitz, M.D., Sheehan, T.F., Dixon, H.J. and Nygaard, R., 2015. Changing trophic structure and energy dynamics in the Northwest Atlantic: implications for Atlantic salmon feeding at West Greenland. Marine Ecology Progress Series, 538, pp.197-211. [Online] Available at: https://www.int-res.com/abstracts/meps/v538/p197-211

### 10.6.2 Operational Impacts

#### 10.6.2.1 Potential Sea Lice Transfer from Farmed to Wild Salmonids

##### 10.6.2.1.1 Nature of the Impact

Within Scottish waters there are two predominant species of sea louse that are of interest to the salmonid aquaculture industry, these are; *L salmonis* and *C. elongatus*. Both of these species occur at natural background levels within Scottish waters. Whilst *L. salmonis* parasitises salmonid hosts only, *C. elongatus* is not host specific, and parasitises a wide range of fishes[148]. Infestations of farmed Atlantic salmon by *C. elongatus* are problematic but generally have less impact on the health and mortality of the farmed stock than *L. salmonis.*

Due to the high densities of large numbers of Atlantic salmon held on fish farms, farms have the potential to support large populations of sea lice, particularly if an uncontrolled or untreated outbreak occurs where the sea lice population could exponentially increase. In this instance the risk to wild salmonids is likely to be increased.

However, there is contemporary evidence[149] to suggest a lack of connectivity between sea lice from farmed origin and infestation of wild salmonids during the out-migration phase. The study found that median weekly farm counts of *L. salmonis* adult females, and the corresponding number of copepodids released, were highest in the non-migration period, defined as 01 July to 31 January, and lowest in the wild salmonid out-migration period, defined as 01 March to 30 June. This pattern was determined to reflect the combined influences of sea lice originating from returning wild salmonids in the late summer and autumn and environmental conditions allowing for increased population growth rates of sea lice. The low median sea lice values during the out-migration period were also considered to be influenced by effective management measures in place at the operating fish farm within the regions under assessment. The study found that copepodids and chalimus represented the life-stages of sea lice most commonly observed on wild out-migrating salmon.

However, despite, the presence of sea lice on wild out-migrating salmon, the study failed to identify statistically significant associations between infestation pressure attributable to Atlantic salmon farms and the probability of *L. salmonis* infestations on wild out-migrating salmonids within all five geographic regions assessed. Whilst a significant association could not be identified, the study did identify positive trends in all five regions. The lack of statistical significance in these trends, however, implies that the occurrence of *L. salmonis* infestation on wild out-migrating salmonids cannot be explained solely by infestation pressure from farm-source copepodids.

However, irrespective of the infestation mechanism, evidence from laboratory experiments suggests that mortality of individual Atlantic salmon smolts occurs at 0.2 mobile lice per gram of host fish, with the probability of mortality increasing as the density of infection increases above this value[150]. Whilst other laboratory studies indicate that wild salmonids display high tolerances to infection, with 11 attached/mobile *L. salmonis* on a 15 g Atlantic salmon post-smolt and 50 attached/mobile *L. salmonis* on a 60 g sea trout post smolt likely to cause mortality. Laboratory studies also indicate that the critical sub-lethal stress response is likely to be between 12 and 13 attached/mobile *L. salmonis* per 19 to 70 g

[148] Revie, C.W., Gettinby, G., Treasurer, J.W., Rae, G.H. and Clark, N., 2002. Temporal, environmental and management factors influencing the epidemiological patterns of sea lice (Lepeophtheirus salmonis) infestations on farmed Atlantic salmon (Salmo salar) in Scotland. Pest Management Science: formerly Pesticide Science, 58(6), pp.576-584. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1002/ps.476

[149] Canadian Government. Fisheries and Oceans Canada (DFO). Canadian Science Advisory Secretariat. Association Between Sea Lice from Atlantic Salmon Farms and Sea Lice Infestations on Wild Juvenile Pacific Salmon in British Columbia. January 2023. [Online] Available at: https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/41097476.pdf

[150] Fjelldal, P.G., Hansen, T.J. and Karlsen, Ø., 2020. Effects of laboratory salmon louse infection on osmoregulation, growth and survival in Atlantic salmon. Conservation physiology, 8(1), p.coaa023. [Online] Available at: https://academic.oup.com/conphys/article/8/1/coaa023/5811902

sea trout post smolt[151]. However, it is important to note that the degree to which laboratory threshold levels of infection intensity directly relate to field conditions is relatively undetermined[152]. Studies have, however, shown that sea lice infection may affect the numbers of wild Atlantic salmon returning to their natal river systems, with newly migrated post smolts being most at risk, due to their early movements through coastal waters and their smaller biomass in comparison to larger, more mature fish. One particular study looking at the impact of *L. salmonis* on out-migrating Atlantic salmon in Ireland[153] found that 11 out of the 28 release groups (39.29 %) showed a significant difference in return rate between SLICE treated and control group fish (untreated). Of the 352,142 migrating Atlantic salmon, 18,208 were recovered, this represents a sample proportion of 5.17 % of the total original migrating sample size. These findings suggest that of the population of Atlantic salmon represented by the sample provided (352,142), 5.17 % of the released fish are likely to return. Therefore, the average marine mortality over the study period is 94.83 %. A higher proportion of fish returned within the treated group (5.60 %) compared with the control group (4.80 %). This variance represented a difference of 0.80 % between the two groups, favouring the fish that had received SLICE. Therefore, this study indicates that the observed level of marine mortality attributable to sea lice infestation is very small, in absolute terms at 0.80 %. This observed level of sea lice mortality is also very small, when viewed as a proportion of the overall marine mortality of 94.83 %. Based on the outcomes of this comprehensive study, the authors concluded that, sea lice infestation and associated mortality are unlikely to influence the conservation status of stocks of wild Atlantic salmon and that sea lice infestation is not a significant driver of marine mortality of wild Atlantic salmon.

Unlike Atlantic salmon, sea trout remain in coastal waters for a longer period of time in spring and summer, before then migrating to the open sea in late June and July (sea trout are also know not to mitigate to open sea, but rather remain in coastal waters during the marine phase)[152]. As a result, it is believed that sea trout are more at risk of sea lice infection. Studies have suggested that sea trout are at risk of sea lice induced mortality, but there is no quantitative estimate on the population level effects on sea trout in fish farm intensive areas. Furthermore, sea trout have an evolutionary adaptation that allows them to return to freshwater environments prematurely to reduce sea lice loads, as sea lice cannot tolerate freshwater. In the short-term this can significantly lower individual sea lice loads but, in the longer-term, there may be consequences on individual reproductive success due to lost marine growth, that may have subsequent impacts of population dynamics.

Wild salmonids may also experience sub-lethal effects of sea lice infestation, these effects include a reduction in liver energy reserves, impaired cardiac muscle, elevated stress responses and osmoregulation problems. Therefore, the release of sea lice from the Proposed Development could have the potential to result in either mortality or sub-lethal effects on wild salmonids at an individual level.

Whilst the overall magnitude of sea lice induced impacts on wild salmonids is not fully known, it is possible that salmonid aquaculture either directly, or more likely indirectly, through cumulative additive impacts, in association with other anthropogenic impacts, as outlined with **Sub-Section 10.4.5**, may contribute to the pressures currently facing wild salmonid populations nationally.

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[151] Wells, A., Grierson, C.E., MacKenzie, M., Russon, I.J., Reinardy, H., Middlemiss, C., Bjørn, P.A., Finstad, B., Bonga, S.E.W., Todd, C.D. and Hazon, N., 2006. Physiological effects of simultaneous, abrupt seawater entry and sea lice (Lepeophtheirus salmonis) infestation of wild, sea-run brown trout (Salmo trutta) smolts. Canadian Journal of Fisheries and Aquatic Sciences, 63(12), pp.2809-2821. [Online] Available at: https://cdnsciencepub.com/doi/abs/10.1139/F06-160

[152] Thorstad, E.B. and Finstad, B., 2018. Impacts of salmon lice emanating from salmon farms on wild Atlantic salmon and sea trout. [Online] Available at: https://brage.nina.no/nina-xmlui/handle/11250/2475746

[153] Jackson, D., Cotter, D., Newell, J., McEvoy, S., O'Donohoe, P., Kane, F., McDermott, T., Kelly, S. and Drumm, A., 2013. Impact of Lepeophtheirus salmonis infestations on migrating Atlantic salmon, Salmo salar L., smolts at eight locations in Ireland with an analysis of lice-induced marine mortality. Journal of Fish Diseases, 36(3), pp.273-281. [Online] Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/jfd.12054

#### 10.6.2.1.2 Duration of Impact

The impact has been determined to be **long-term** and **temporary**. It is considered to be **long-term** as, during the operation of the Proposed Development, there is the potential, that throughout the production cycle, sea lice populations may be supported resulting in the dispersal of farm derived sea lice within the marine environment. It is considered to be **temporary** as, during the fallow period, between production cycles at the Proposed Development no farm derived sea lice populations will be supported due to the lack of host fish. Therefore, the impact is avoided during the fallow period.

#### 10.6.2.1.3 Importance of the IEF

Atlantic salmon and sea trout have been assigned a project-specific importance value of 'regional'.

#### 10.6.2.1.4 Magnitude of the Unmitigated Impact

There are several key factors that influence the overall magnitude of impact on wild salmonids, these include; wild salmonid migration routes and behaviour in relation to fish farm locations, sea lice dispersal, and farm management practices.

As identified within **Sub-Section 10.4.4**, there are 23 graded salmon rivers within the wider environment (35 km radius of the Proposed Development). A number of these rivers discharge into the marine environment along the east coast of the Isles of Lewis and Harris. Due to the location of these identified river systems in relation to the Proposed Development it is likely that, during the sea migration phase, both Atlantic salmon and sea trout will be present within the wider vicinity of the Proposed Development. Although, due to the lack of current scientific knowledge on the defined migration routes of wild salmonids during the marine phase of their lifecycle, it is not possible to accurately define migratory routes in relation to the spatial location of the Proposed Development.

Model outputs from existing studies indicate that viable sea lice larvae can be transported up to 15 km from their point source, with copepodid phase abundance peaking between 7 and 12 km seaward of their source[154]. However, nauplius phase abundance peaks within close proximity to the source (fish farm). As a result, there is the potential that sea lice propagating from the Proposed Development will be dispersed within waters utilised by sea migrating wild salmonids. Modelling also suggests that sea lice dispersal is influenced by sea lice behaviour, but also prevailing environmental conditions, where larvae may be transported into shallow coastal and estuarine waters by wind driven currents, particularly in inlets and bays[154]. However, a modelling study found that, even under optimal environmental conditions, peaks in larval densities at the head of inlets were relatively short lived, lasting about 6 to 18 hours. Under more variable environmental conditions the temporal peaks of larval density is likely to be even less[154]. Due to the limited temporal peak of sea lice densities, the frequency and probability of infection is reduced. As previously identified, nauplii instar phase abundance peaks within very close proximity to the source, this is most likely due to their strategy of maximising survival and dispersal, with the nauplii instars showing positive phototaxis within their diurnal vertical migrations (DVM), resulting in instars being dispersed widely at low abundance within the environment[155]. The Proposed Development will be located within an open and unconstrained marine environment, with considerable dispersal potential[45]. As a result, dispersal from the Proposed Development is not anticipated to result in concentrated areas of high sea lice density, but rather that sea lice will be dispersed to low levels over a large area.

[154] Gillibrand, P.A. and Willis, K.J., 2007. Dispersal of sea louse larvae from salmon farms: modelling the influence of environmental conditions and larval behaviour. Aquatic Biology, 1(1), pp.63-75. [Online] Available at: https://www.int-res.com/abstracts/ab/v1/n1/p63-75/

[155] Szetey, A., Wright, D.W., Oppedal, F. and Dempster, T., 2021. Salmon lice nauplii and copepodids display different vertical migration patterns in response to light. Aquaculture Environment Interactions, 13, pp.121-131. [Online] Available at: https://www.int-res.com/abstracts/aei/v13/p121-131

Sea lice dispersal modelling has been undertaken for the Proposed Development (**Appendix R**). The model set-up was based on the Proposed Development operating at peak biomass, 4,680 T, throughout the model run period. Sea lice releases were modelled from the Proposed Development over the migration period, to determine the potential magnitude of sea lice dispersal, and thus connectivity, with out-migrating wild salmonids. Lice input for the Proposed Development was calculated from the proposed biomass and on the assumption that the Proposed Development would experience the same proportion of gravid lice infection as Gravir based on BFS lice counts. It is important to note that whilst the modelling has assumed that throughout the migration period the Proposed Development would operate at peak biomass 4,680 T, in reality this is unlikely to be the case, as peak biomass would only be maintained for short temporal periods typically in the later stages of the production cycle. Therefore, the modelled scenario presented the worst-case scenario for farm derived sea lice loading and associated dispersal.

Initial dispersal of Nauplii I released from the Proposed Development trends northward, with a smaller portion being carried south, as can be seen from **Figure 10.31**. Of the northern mass, some Nauplii I get captured in currents around the Isle of Lewis and are transported away from the east coast of the island, where they remain and mature through the duration of the modelled scenario to copepodids. Concentrations of Nauplii were low with an average value 0.031 lice/m$^2$ over the north-eastward portion, and 0.083 lice/m$^2$ over the southward movement.

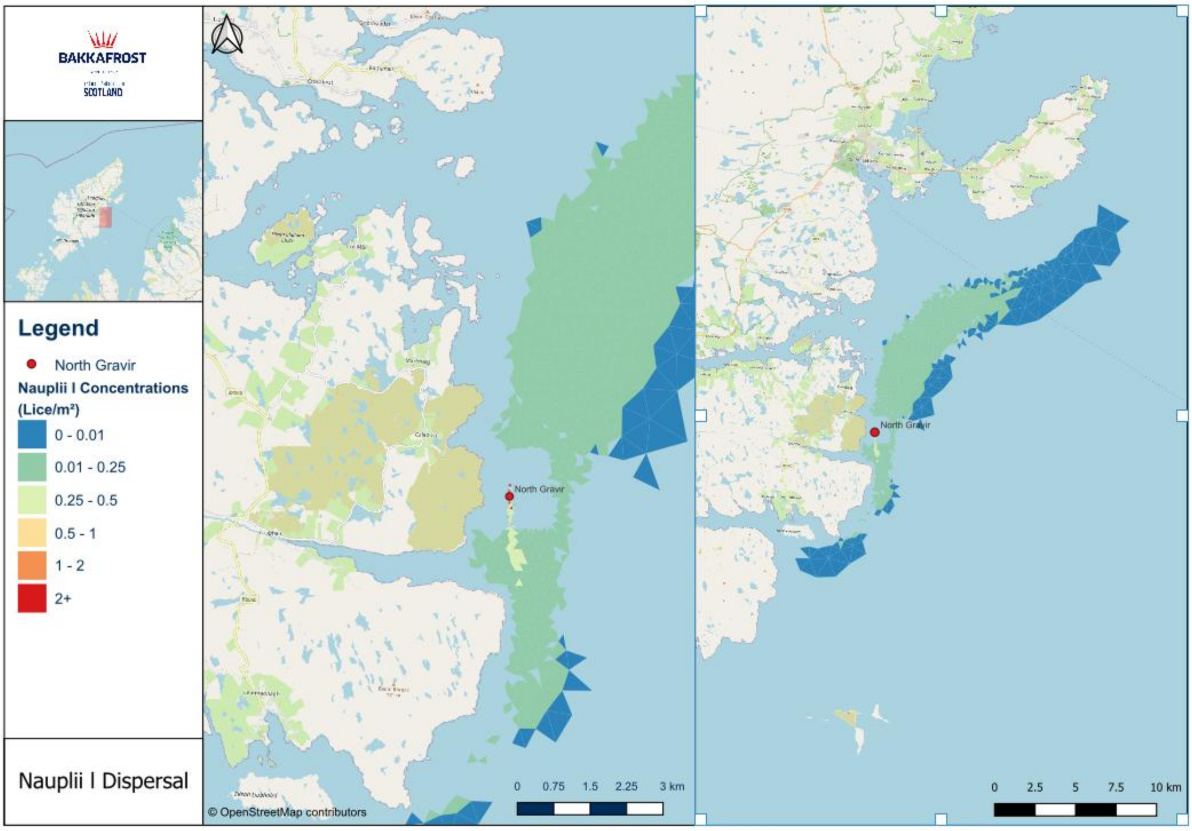


**Figure 10.31: Nauplii I dispersal from the Proposed Development, displaying the averaged concentrations of nauplii I throughout the model domain[17].**

Nauplii II dispersal shows the continued development of northward-bound Nauplii I dispersal, with nauplii II dispersing over a wider spatial area, as illustrated in **Figure 10.32**. Concentrations of Nauplii were very low with an average value 0.00002 lice/m$^2$ over the north-eastward portion. There is no further dispersion to the south of the Proposed Development.

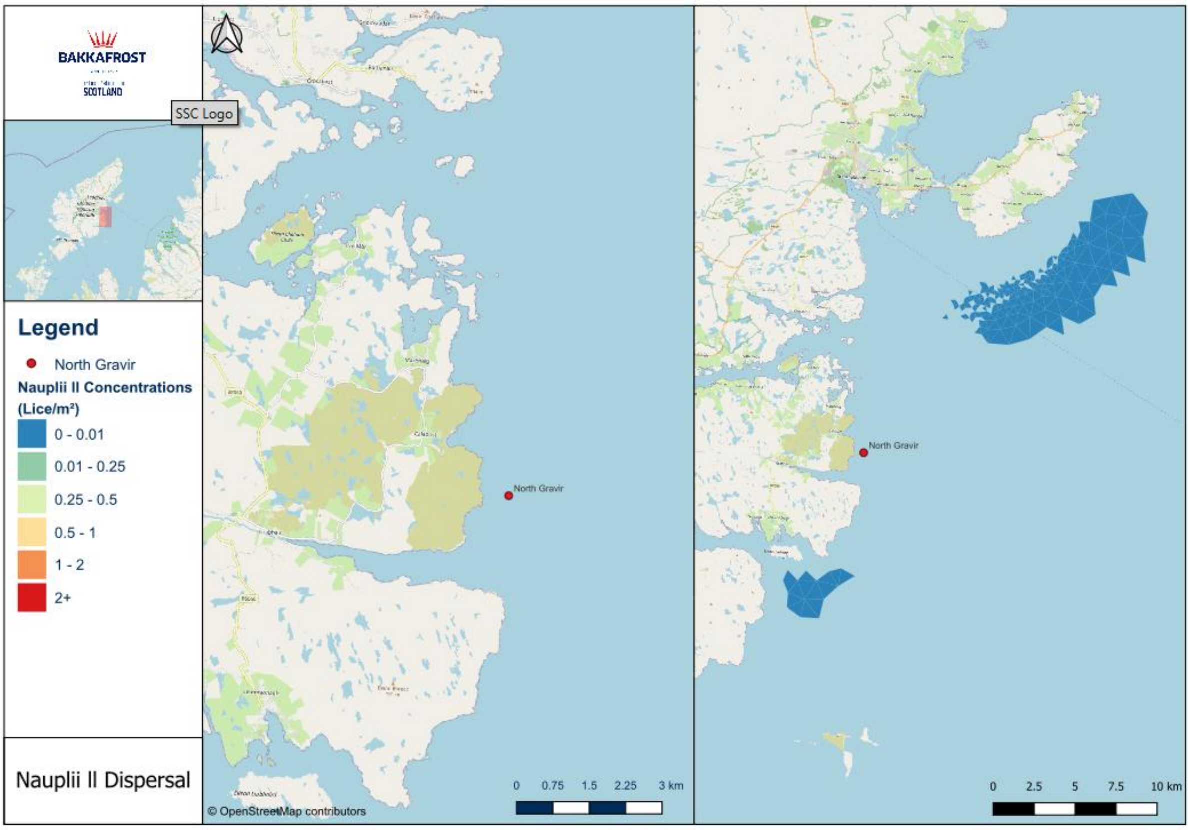


**Figure 10.32: Nauplii II dispersal from the Proposed Development, displaying the averaged concentrations of nauplii II throughout the model domain[17].**

The dispersal of copepodid lice was reviewed by averaging the distribution of infectious copepodid lice over the migration window, to determine the potential magnitude of the impact over the complete temporal period.

The model outputs for averaged copepodids throughout the model run period indicate that the majority of copepodids are transported northward, as illustrated in **Figure 10.33**, matching the dominant dispersal pattern seen for both Nauplii I and II**.** Concentrations of copepodids were low with an average value of 0.003 lice/m$^2$.

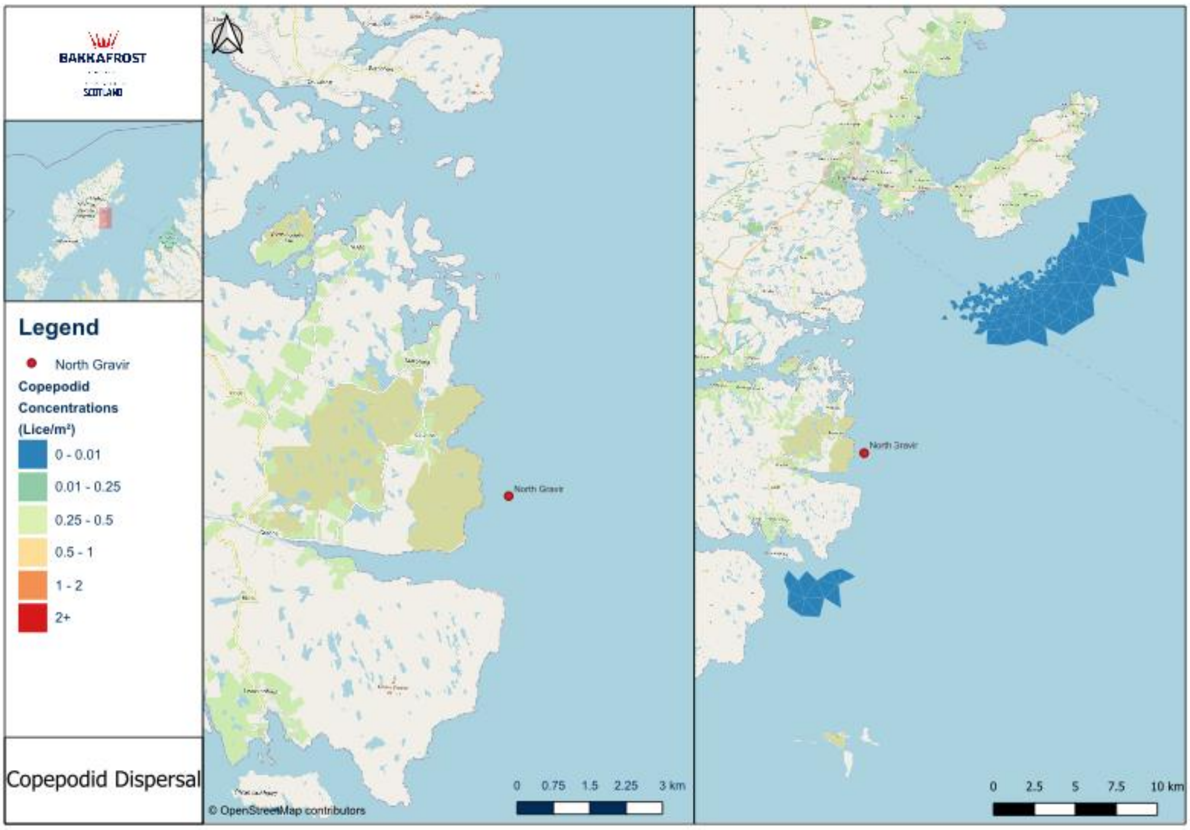


**Figure 10.33: Copepodid dispersal from the Proposed Development, displaying the averaged concentrations of copepodids throughout the model domain[17].**

Whilst the sea lice model indicates that sea lice, particularly copepodid stages, will be dispersed throughout the wider environment, with the primary dispersal in a northward direction, the concentrations of copepodid lice throughout the modelled domain are low. The majority of the model domain had an average copepodid concentration value of 0.003 lice/$m^2$. Therefore, the average copepodid concentrations are well below a threshold of 2.00 lice/$m^2$. This threshold of 2.00 lice/$m^2$ has been associated with high infestation pressure and sea lice burdens on wild salmonid in Norway and is considered representative of a sea lice burden of 10 lice per fish[156].

Wild salmonids are considered to be most at risk of sea lice infection during their post smolt out migration. However, their migratory behaviour helps to mitigate the frequency and probability of interactions. Atlantic salmon are known to display fast, directed migration from their natal river systems to the shelf currents, which then transports them to their oceanic feeding grounds[157]. Acoustic tracking of salmon smolts in Scotland indicates a mean migration speed of 0.5 km per hour[158], with some studies suggesting progression speeds of between 6 to 26 km per day[159]. These findings indicate that salmon

[156] Sandvik, A.D., Johnsen, I.A., Myksvoll, M.S., Sævik, P.N. and Skogen, M.D., 2020. Prediction of the salmon lice infestation pressure in a Norwegian fjord. ICES Journal of Marine Science, 77(2), pp.746-756. [Online] Available at: https://academic.oup.com/icesjms/article/77/2/746/5704435

[157] Ounsley, J.P., Gallego, A., Morris, D.J. and Armstrong, J.D., 2020. Regional variation in directed swimming by Atlantic salmon smolts leaving Scottish waters for their oceanic feeding grounds—a modelling study. ICES Journal of Marine Science, 77(1), pp.315-325. [Online] Available at: https://academic.oup.com/icesjms/article/77/1/315/5581804

[158] Middlemas, S., Stewart, D., Henry, J., Wyndham, M., Ballantyne, L. and Baum, D., 2017. Dispersal of post-smolt Atlantic salmon and sea trout within a Scottish sea loch system. In Sea Trout: Science and Management. Proceedings of the 2nd International Sea Trout Symposium (pp. 339-353). Dundalk, Ireland: Troubador.

[159] Holm, M., Holst, J.C., Hansen, L.P., Jacobsen, J.A., OMaoiléidigh, N. and Moore, A., 2003. Migration and distribution of Atlantic salmon post-smolts in the North Sea and North-East Atlantic. Salmon at the Edge, pp.7-23. [Online] Available at: https://books.google.co.uk/books?hl=en&lr=&id=Wc7EHnr82wkC&oi=fnd&pg=PA7&dq=Holm+M.,+Holst+J.C.,+Hansen+L.P.,+Jacobsen+J.A.,+%C3%93+Maoil%C3%A9idigh+N.,+Moore+A..+Mills+D..+Migration+and+distribution+of+Atlantic+salmon+post-smolts+in+the&ots=rtuwfTsRqd&sig=bcFJgXk2mV1yPPLI4AN7WTUNHQY&redir_esc=y#v=onepage&q&f=false

post smolts move quickly through the coastal environment and are unlikely to have sustained connectivity with coastally abundant sea lice.

Wild salmonids typically run to sea in April and May of each year when sea lice levels have not reached peak densities. As illustrated within **Figure 10.30**, average adult female *L. salmonis* have been below both the CoGP suggested criteria for intervention and the MD notification and intervention thresholds whilst wild salmonids underwent their seaward mitigation, over the production cycle at the existing fish farm. The low numbers of adult *L. salmonis* help to reduce the frequency and probability of sea lice transfer to **negligible** levels. Whilst wild salmonids are within coastal waters, they typically utilise the shallow sublittoral zone, with Atlantic salmon making use of shallow brackish waters, between 1 to 3 m in depth, however, depths of up to 6 m are also used whilst they migrate along the coastline in a seaward direction[160]. Sea trout largely remain in coastal waters and also typically utilise the upper portion of the water column. Whilst the survival of *L. salmonis* appears to be significantly compromised at salinities below 29 ppt[161], there is the potential for connectivity and thus impact on wild salmonids whilst they utilise the coastal environment.

A key embedded design mitigation is the selection of a development location in an open and unconstrained marine environment with strong tidal and wind generated currents. Whilst previous modelling studies have indicated that sea lice densities may increase in association with bays and inlets with weak currents, this is not expected to be representative of the development location, as prevailing currents are expected to disperse the sea lice (nauplii and copepodids) to low densities over large distances. The high energy nature of the development location is also anticipated to help reduce the potential for significant sea lice populations to develop in association with the Proposed Development.

A key factor to reducing the overall magnitude of the impact is effective farm management ensuring the maintenance of negligible sea lice loading at the Proposed Development and proactive and effective control measures. As outlined in **Sub-Section 3.3.2**, BFS operates an enhanced sea lice monitoring programme designed to identify increasing sea lice abundance before levels become elevated and reactive intervention is required. In the event that sea lice populations start to increase, there are a number of proactive intervention options available through the ISLM Plan, as listed within **Sub-Sections 3.3.2** and **10.3**, these options include biological control (cleanerfish), mechanical, freshwater, and medicinal intervention methods. However, the ISLM Plan proactively favours the use of non-medicinal options.

The ISLM Plan has enabled effective sea lice control at the existing fish farm on the east coast of the Isle of Lewis. **Figure 10.30,** indicates that sea lice levels were generally below CoGP suggested criteria for intervention, with exceedances only recorded on one occasion across the last production cycle. The figure indicates that whilst there were periods of increased sea lice, these events did not result in a loss of control, with timely and effective interventions ensuring that lice levels returned to below CoGP suggested criteria for intervention thresholds without any exceedance of the MD Notification threshold. As a result of this effective sea lice control, it is anticipated that sea lice control at the Proposed Development will be effective at proactively maintaining negligible sea lice levels. Moreover, as detailed within **Sub-Section 3.3.2** and **Appendix F**, BFS has recently invested heavily to increase freshwater and mechanical intervention capacity. Specific vessels are equipped with FLS and have the capacity to treat 200 T of salmon per hour. BFS also has internal access to wellboats that have the ability to carry

[160] Thorstad, E.B., Whoriskey, F., Uglem, I., Moore, A., Rikardsen, A.H. and Finstad, B., 2012. A critical life stage of the Atlantic salmon Salmo salar: behaviour and survival during the smolt and initial post-smolt migration. Journal of fish biology, 81(2), pp.500-542. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1095-8649.2012.03370.x

[161] Bricknell, I.R., Dalesman, S.J., O'Shea, B., Pert, C.C. and Luntz, A.J.M., 2006. Effect of environmental salinity on sea lice Lepeophtheirus salmonis settlement success. Diseases of aquatic organisms, 71(3), pp.201-212. [Online] Available at: https://www.int-res.com/abstracts/dao/v71/n3/p201-212/

out freshwater treatments within the wells, with a current freshwater treatment capacity of 500 T per hour. These freshwater wellboats are also equipped with FLS, enabling combined freshwater and FLS interventions to be conducted, which typically have clearance rates of greater than 95 %. This increase in capacity has resulted in greater sea lice control on operational BFS farms and is therefore expected to further ensure effective, proactive sea lice control at the Proposed Development.

In light of the above embedded mitigation, including the siting of the Proposed Development in an open and unconstrained, highly dispersive environment, and the negligible magnitude of sea lice dispersal and concentrations (as determined through sea lice modelling), it is considered that although low level effects on individual or small numbers of wild salmonids cannot be ruled out, the overall magnitude of impact on local wild salmonid populations is considered to be **negligible**.

##### 10.6.2.1.5 Significance of Effect without Mitigation

In light of the assessed **negligible magnitude**, the effect of sea lice transfer on the wild salmonid IEFs is assessed as **not significant** in relation to the EIA Regulations.

##### 10.6.2.1.6 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

##### 10.6.2.1.7 Significance of Residual Effect Post Mitigation

No mitigation is required, as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

#### 10.6.2.2 Potential Disease Transfer from Farmed to Wild Salmonids

##### 10.6.2.2.1 Nature of the Impact

Fish farms have been recognised as potential sources of disease pathogens within the marine environment, due predominantly to the concentration of farmed fish held within a highly localised area. Evidence indicates horizontal transmission of pathogens between fish farms, and potentially the transmittance of pathogens between farmed and wild fish[162]. Moreover, in the marine environment there are generally less barriers to the movement of pathogens. Both tidally-driven and wind-driven currents may transport both the pathogens and infected hosts over large spatial distances. The communal behaviour of a number of fishes may also facilitate transmission of disease between individuals[163]. There are several diseases that more commonly impact farmed Atlantic salmon within Scottish waters resulting in fish health and welfare challenges, these diseases include; Infectious Pancreatic Necrosis (IPN), Pancreas Disease (PD), Cardiomyopathy Syndrome (CMS), Heart and Skeletal Muscle Inflammation (HSMI), and Amoebic Gill Disease (AGD).

The above diseases are believed to be enzootic in nature, having initially originated in wild stocks, this complicates the assessment of impact as a result of aquaculture, since the normal, background level of prevalence of these diseases is not fully understood.

[162] Raynard, R., Wahli, T., Vatsos, I. and Mortensen, S., 2007. Review of disease interactions and pathogen exchange between farmed and wild finfish and shellfish in Europe. VESO project, 1655. [Online] Available at: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=review+of+disease+interactions+and+pathogen+exchange+between+farmed+and+wild+finfish+and+shellfish+in+Europe.&btnG=

[163] McCallum, H.I., Kuris, A., Harvell, C.D., Lafferty, K.D., Smith, G.W. and Porter, J., 2004. Does terrestrial epidemiology apply to marine systems?. Trends in Ecology & Evolution, 19(11), pp.585-591. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/S0169534704002435

Unlike in aquaculture, where disease is effectively managed and regulated through the use of vaccines and veterinary interventions, wild salmonid populations may experience uncontrolled disease outbreaks, which may impact upon both individual and population level survival[164].

#### 10.6.2.2.2 Duration of Impact

The impact is determined to be **long-term** and **temporary**. It is considered to be **long-term**, as farmed Atlantic salmon will be held at the Proposed Development throughout the production cycle, meaning there is the potential for the Proposed Development to act a reservoir for disease over a long temporal period. It is considered to be **temporary**, as the Proposed Development will observe a fallow period of at least 28 consecutive days between production cycles. During this time no farmed Atlantic salmon will be held onsite. Therefore, during the fallow periods the potential for disease transfer is avoided for temporary periods.

#### 10.6.2.2.3 Importance of the IEF

Atlantic salmon and sea trout have been assigned a project-specific importance value of 'regional'.

#### 10.6.2.2.4 Magnitude of the Unmitigated Impact

Studies have indicated that salmonid alphavirus (SAV) (causative agent of PD) is transmitted within water, with horizontal transmission between farms identified. SAV can survive within the water column without a host for several weeks thereby resulting in the potential for large-scale spatial distribution[165]. Whilst there is the potential for SAV infection and therefore clinical PD in wild Atlantic salmon and sea trout, there is very little evidence to support this. Studies have indicated that wild Atlantic salmon and sea trout are infected with SAV at very low levels[166], with sea trout appearing to be more resistant to SAV than Atlantic salmon[166, 167]. Furthermore, whilst evidence supports SAV infection in the wild, clinical PD has not been observed in wild fish[168].

Evidence also indicates that infectious pancreatic necrosis virus (IPNV), the causative agent of IPN, is actively shed by infected hosts into the water column thereby facilitating horizontal transmission between fish farms[169]. The prevalence of IPNV in wild fish found in close proximity to fish farms with clinical outbreaks of IPN was recorded at 0.58 %, in comparison the prevalence of IPNV within the Scottish marine environment more generally was 0.15 %[170]. Whilst these findings indicate that IPNV prevalence

[164] Taranger, G.L., Karlsen, Ø., Bannister, R.J., Glover, K.A., Husa, V., Karlsbakk, E., Kvamme, B.O., Boxaspen, K.K., Bjørn, P.A., Finstad, B. and Madhun, A.S., 2015. Risk assessment of the environmental impact of Norwegian Atlantic salmon farming. ICES Journal of Marine Science, 72(3), pp.997-1021. [Online] Available at: https://academic.oup.com/icesjms/article/72/3/997/686282
[165] Stene, A., Viljugrein, H., Yndestad, H., Tavornpanich, S. and Skjerve, E., 2014. Transmission dynamics of pancreas disease (PD) in a Norwegian fjord: aspects of water transport, contact networks and infection pressure among salmon farms. Journal of fish diseases, 37(2), pp.123-134. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/jfd.12090
[166] Biering, E., Madhun, A.S., Isachsen, C.H., Omdal, L.M., Einen, A.C.B., Garseth, Å.H., Bjørn, P.A., Nilsen, R. and Karlsbakk, E., 2013. Annual report on health monitoring of wild anadromous salmonids in Norway. [Online] Available at: https://imr.brage.unit.no/imr-xmlui/bitstream/handle/11250/116756/Annual%20report%20on%20health%20monitoring%20of%20wild%20anadromous%20salmonids%20in%20Norway%20(Rapport%20fra%20Havforskningen%20nr.%206-2013).pdf?sequence=1
[167] Madhun, A.S., Karlsbakk, E., Isachsen, C.H., Omdal, L.M., Eide Sørvik, A.G., Skaala, Ø., Barlaup, B.T. and Glover, K.A., 2015. Potential disease interaction reinforced: double-virus-infected escaped farmed A tlantic salmon, S almo salar L., recaptured in a nearby river. Journal of Fish Diseases, 38(2), pp.209-219. [Online] Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/jfd.12228
[168] Raynard, R., Wahli, T., Vatsos, I. and Mortensen, S., 2007. Review of disease interactions and pathogen exchange between farmed and wild finfish and shellfish in Europe. VESO project, 1655. [Online] Available at: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Raynard+R.%2C+Wahli+T.%2C+Vatsos+I.%2C+and+Mortensen+S.+2007.+DIPNET+%E2%80%93+review+of+disease+interactions+and+pathogen+exchange+between+farmed+and+wild+finfish+and+shellfish+in+Europe.+p.+452.+European+Commission%2FVeterin%C3%A6rmedisinsk+Oppdragssenter.&btnG=
[169] Johansen, L.H., Jensen, I., Mikkelsen, H., Bjørn, P.A., Jansen, P.A. and Bergh, Ø., 2011. Disease interaction and pathogens exchange between wild and farmed fish populations with special reference to Norway. Aquaculture, 315(3-4), pp.167-186. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/S0044848611001347
[170] Wallace, I.S., Gregory, A., Murray, A.G., Munro, E.S. and Raynard, R.S., 2008. Distribution of infectious pancreatic necrosis virus (IPNV) in wild marine fish from Scottish waters with respect to clinically infected aquaculture sites producing Atlantic salmon, Salmo salar L. Journal of fish diseases, 31(3), pp.177-186. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2761.2007.00886.x

is elevated in close proximity to IPN positive fish farms, the general prevalence of IPNV within the wild population is low. Furthermore, there is currently no evidence to indicate that IPNV infection in wild salmon has resulted in clinical disease[171,172].

A similar trend of potential transmission but limited clinical disease is also evidenced for piscine orthoreovirus (PRV), the causative agent of HSMI. Experimental studies have demonstrated that PRV may, alongside other routes, transfer between individuals as a result of co-habitation[173]. Indeed, the incidence of PRV has been confirmed in wild Atlantic salmon and sea trout populations[166]. The incidence of PRV infection varies between Atlantic salmon and sea trout, with Atlantic salmon appearing to be more widely infected (24.40 %) in comparison to sea trout (3.00 %)[166]. The origin of infection is also unclear, either coming from farmed or wild fish PRV reservoirs. Moreover, although wild salmonids have tested positive for PRV, studies have not observed lesions traditionally associated with clinical disease[174].

Piscine myocarditis virus (PMCV), the causative agent of CMS, also appears to be transmittible via co-habitation[175]. Unlike the previously discussed diseases, PMCV infection of wild salmon has been observed as clinical CMS[176]. However, CMS in wild salmon was documented prior to the first farmed outbreaks of the disease, indicating that CMS occurs at an unknown background level within wild salmonid stocks. Prevalence of PMCV in wild Atlantic salmon returning to natal river systems is believed to be limited, with one study determining PMCV prevalence to be just 0.22 % (3/1,350)[164]. This low prevalence indicates natural rather than fish farming related infection.

*Neoparamoeba perurans* is the amoeba responsible for AGD in Scottish farmed Atlantic salmon. The limited evidence currently available suggests that wild fish populations are not a significant reservoir of *N. perurans*. One study[177] found neither *N. perurans* nor lesions present on the gills of 325 wild fish despite a 100 % infection rate of farmed fish during the same period. Another study, in Scottish waters, also suggests very low prevalence of AGD in wild fish populations[178].

Based on the information reviewed above, in particular the limited evidence of clinical disease and generally very low to low prevalence of the viruses SAV, IPNV, PRV, PMCV, and the low prevalence of *N. perurans* in wild fish populations, the evidence indicates that the low observed disease prevalence represents natural transmission within the wild population and not significant farm to wild transmission.

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[171] McAllister, P.E., Newman, M.W., Sauber, J.H. and Owens, W.J., 1984. Isolation of infectious pancreatic necrosis virus (serotype Ab) from diverse species of estuarine fish. Helgoländer Meeresuntersuchungen, 37(1), pp.317-328. [Online] Available at: https://link.springer.com/article/10.1007/BF01989314

[172] Stephens, E.B., Newman, M.W., Zachary, A.L. and Hetrick, F.M., 1980. A viral aetiology for the annual spring epizootics of Atlantic menhaden Brevoortia tyrannus (Latrobe) in Chesapeake Bay. Journal of Fish Diseases, 3(5), pp.387-398. [Online Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2761.1980.tb00423.x

[173] Kongtorp, R.T., Kjerstad, A., Taksdal, T., Guttvik, A. and Falk, K., 2004. Heart and skeletal muscle inflammation in Atlantic salmon, Salmo salar L.: a new infectious disease. Journal of Fish Diseases, 27(6), pp.351-358. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2761.2004.00549.x

[174] Garseth, Å.H., Fritsvold, C., Opheim, M., Skjerve, E. and Biering, E., 2013. Piscine reovirus (PRV) in wild Atlantic salmon, Salmo salar L., and sea-trout, Salmo trutta L., in Norway. Journal of Fish Diseases, 36(5), pp.483-493. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2761.2012.01450.x

[175] Haugland, Ø., Mikalsen, A.B., Nilsen, P., Lindmo, K., Thu, B.J., Eliassen, T.M., Roos, N., Rode, M. and Evensen, Ø., 2011. Cardiomyopathy syndrome of Atlantic salmon (Salmo salar L.) is caused by a double-stranded RNA virus of the Totiviridae family. Journal of virology, 85(11), pp.5275-5286. [Online] Available at: https://journals.asm.org/doi/full/10.1128/JVI.02154-10

[176] Poppe, T.T. and Seierstad, S.L., 2003. First description of cardiomyopathy syndrome (CMS)-related lesions in wild Atlantic salmon Salmo salar in Norway. Diseases of Aquatic Organisms, 56(1), pp.87-88. [Online] Available at: https://www.int-res.com/abstracts/dao/v56/n1/p87-88/

[177] Douglas-Helders, G.M., Dawson, D.R., Carson, J. and Nowak, B.F., 2002. Wild fish are not a significant reservoir for Neoparamoeba pemaquidensis (Page, 1987). Journal of Fish Diseases, 25(10), pp.569-574. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1046/j.1365-2761.2002.00394.x

[178] Stagg, H.E.B., Hall, M., Wallace, I.S., Pert, C.C., Garcia Perez, S. and Collins, C., 2015. Detection of Paramoeba perurans in Scottish marine wild fish populations. Bull Eur Assoc Fish Pathol, 35, pp.217-226. [Online] Available at: https://eafp.org/download/2015-volume35/issue_6/35-6-217-stagg.pdf

As a result, it is unlikely that farm to wild transmission is regularly taking place, therefore, a frequency value of **negligible** has been assigned.

The embedded mitigation measures, that are outlined in **Sub-Section 10.3** will also further reduce the overall magnitude of the impact. Specifically, the VHWP outlines fish health standard operating procedures (SOPs) to ensure optimal fish health throughout the production cycle, whilst also clearly outlining effective monitoring and reporting structures to allow for an effective and proactive response, should disease be detected at the Proposed Development. As detailed within the FMS (**Appendix H**), all stocked Atlantic salmon receive vacations against Furunculosis, IPN, and PD as standard. This effective vaccination strategy helps to reduce the likelihood of disease outbreak across BFS marine operations.

It is therefore determined that the impact has an overall **negligible magnitude**.

##### 10.6.2.2.5 Significance of Effect without Mitigation

In light of the assessed **negligible magnitude**, the effect of disease transfer on the wild salmonid IEFs is assessed as **not significant** in relation to the EIA Regulations.

##### 10.6.2.2.6 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

##### 10.6.2.2.7 Significance of Residual Effect Post Mitigation

No mitigation is required as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

#### 10.6.2.3 Potential Genetic Introgression and Competition between Farmed and Wild Salmonids

##### 10.6.2.3.1 Nature of the Impact

The potential impact of escapee farmed Atlantic salmon on wild Atlantic salmon and sea trout populations is a function of the probability of escape, and the magnitude, inclusive of the frequency, of escape events[179]. In general, escapes from open pen salmon farms are the result of large episodic events, where significant numbers of farmed fish may be lost. These escape events are typically associated with extreme meteorological conditions and, therefore, the probability of escape increases during the autumn and winter months. Predation events and human error may also result in the increased risk of escape events.

Farmed Atlantic salmon have been selected and bred to enhance favourable traits for domestication, such as accelerated growth rate, resistance to disease and parasites, and delayed sexual maturation. This selection process has resulted in a reduction of the genetic variability within farmed Atlantic salmon stocks[180],whereas natural selection in wild Atlantic salmon populations selects for favourable biological traits that improve individual fitness and survival. Furthermore, wild Atlantic salmon populations are typically distinct from one another and potentially exhibit local-scale adaptations to the specific biotic and abiotic factors associated with their natal river systems, which further improves fitness and

[179] Naylor, R., Hindar, K., Fleming, I.A., Goldburg, R., Williams, S., Volpe, J., Whoriskey, F., Eagle, J., Kelso, D. and Mangel, M., 2005. Fugitive salmon: Assessing the risks of escaped fish from net-pen aquaculture. *BioScience*, *55*(5), pp.427-437. [Online] Available at: https://academic.oup.com/bioscience/article/55/5/427/226100

[180] Norris, A.T., Bradley, D.G. and Cunningham, E.P., 1999. Microsatellite genetic variation between and within farmed and wild Atlantic salmon (Salmo salar) populations. *Aquaculture*, *180*(3-4), pp.247-264. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/S0044848699002124

survival[181]. Due to the genetic divergence between farmed and wild Atlantic salmon, interbreeding has the potential to compromise the fitness of hybrid offspring[182]. This reduction in fitness of hybrid offspring could potentially result in a decrease in wild Atlantic salmon productivity. Moreover, the genetic introgression of farmed genes into the wild gene pool may also lead to an irreversible loss of unique genetic diversity of wild Atlantic salmon and thus their ability to adapt to environmental change.

However, in order for genetic introgression to occur, farmed Atlantic salmon need to successfully reproduce with wild Atlantic salmon to produce hybrid offspring. Evidence indicates that farmed Atlantic salmon have reduced survival rates in comparison to their wild counterparts[183]. The survival of farmed Atlantic salmon appears to be dependent on the timing of release, with post smolt Atlantic salmon showing poor survival during autumn months[184,185]. A study also found that escapee Atlantic salmon released in the autumn prior to sexual maturity may be transported large distances to the northern latitudes and subsequently suffer high mortality rates[183]. Farmed Atlantic salmon (both post smolts and larger fish) are believed to display very low homing instinct when released during the winter months. As such, it is thought that winter escapee fish are transported great distances from the escape location to high latitudes and subsequently suffer high levels of mortality[183]. However, it is believed that farmed Atlantic salmon released closer to sexual maturation may have a higher probability of entering freshwater systems and spawning than fish released in the year before they mature. Very low recovery rates (< 6 %) of mature fish suggest that these fish are still subject to significant mortality[183]. This evidence indicates that escapee farmed Atlantic salmon often face significant mortality within the marine environment, as they are considered less fit, than their wild counterparts. As such, escapee farmed Atlantic salmon are not likely to complete their lifecycle in the wild and therefore will not get the opportunity to spawn within freshwater systems. Moreover, in the event that escapee farmed Atlantic salmon do enter freshwater systems to spawn, evidence indicates that female farmed Atlantic salmon reproductive success is less than a third of that of female wild Atlantic salmon. The same study also found that male farmed Atlantic salmon were even less successful, with reproductive success being just 1 to 3 % of that of male wild Atlantic salmon[186].

Several studies have been undertaken to assess the potential for hybridisation and subsequent genetic introgression between farmed Atlantic salmon and wild Atlantic salmon in Scotland. The MD, following an escape event of 48,834 from a fish farm in Argyll in 2020, undertook a body of work[187] to determine the hybridisation that resulted from this isolated escape event. The work sought to identify first generation (F1) hybrid Atlantic salmon. Within Scotland, only one F1 Atlantic salmon was observed in

[181] Glover, K.A., Solberg, M.F., McGinnity, P., Hindar, K., Verspoor, E., Coulson, M.W., Hansen, M.M., Araki, H., Skaala, Ø. and Svåsand, T., 2017. Half a century of genetic interaction between farmed and wild Atlantic salmon: status of knowledge and unanswered questions. *Fish and Fisheries*, *18*(5), pp.890-927. [Online] Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/faf.12214

[182] McGinnity, P., Prodöhl, P., Ferguson, A., Hynes, R., Maoiléidigh, N.Ó., Baker, N., Cotter, D., O'Hea, B., Cooke, D., Rogan, G. and Taggart, J., 2003. Fitness reduction and potential extinction of wild populations of Atlantic salmon, Salmo salar, as a result of interactions with escaped farm salmon. Proceedings of the Royal Society of London. Series B: Biological Sciences, 270(1532), pp.2443-2450. [Online] Available at: https://royalsocietypublishing.org/doi/abs/10.1098/rspb.2003.2520

[183] Hansen, L.P., 2006. Migration and survival of farmed Atlantic salmon (Salmo salar L.) released from two Norwegian fish farms. ICES Journal of Marine Science, 63(7), pp.1211-1217. [Online] Available at: https://academic.oup.com/icesjms/article/63/7/1211/754971

[184] Hansen, L.P. and Jonsson, B., 1989. Salmon ranching experiments in the River Imsa: effect of timing of Atlantic salmon (Salmo salar) smolt migration on survival to adults. Aquaculture, 82(1-4), pp.367-373. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/0044848689904225

[185] Hansen, L.P. and Jonsson, B., 1991. The effect of timing of Atlantic salmon smolt and post-smolt release on the distribution of adult return. Aquaculture, 98(1-3), pp.61-67. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/004484869190371D

[186] Fleming, I.A., Jonsson, B., Gross, M.R. and Lamberg, A., 1996. An experimental study of the reproductive behaviour and success of farmed and wild Atlantic salmon (Salmo salar). Journal of Applied Ecology, pp.893-905. [Online] Available at: https://www.jstor.org/stable/2404960

[187] Scottish Government. Marine Directorate. Examination of levels of farm/wild hybridisation in south-west Scotland and north-west England following a large-scale farm salmon escape event in 2020. Scottish Marine and Freshwater Science Vol 13 No 2. [Online] Available at: https://www.gov.scot/publications/examination-levels-farm-wild-hybridisation-south-west-scotland-north-east-england-following-large-scale-farm-salmon-escape-event-2020/

the 2020 baseline cohort (prior to the escape event). In the 2021 cohort, which could have been impacted by the escape event, no F1 Atlantic salmon were observed from a sample size of 2,586 fish. These results not only indicate that no significant hybridisation took place as a result of the escape event, but they also highlighted that 2020 baseline hybridisation levels were negligible, with only one F1 fish identified from a sample size of 2,358 fish. The report, whilst finding that hybridisation immediately following this escape event was very limited, identified that escape events and the potential impact of genetic introgression should be considered on a case by case basis. Cognisance should be given to specific parameters that may influence the probability of successful interbreeding, such as escapee numbers, timing, wild stocks, and of particular importance, the maturation status of the escapee fish[187].

Another body of work[188] by the MD sought to assess the influence of farmed Atlantic salmon escapes on the genetic makeup of wild Atlantic salmon stocks on a national scale. Tissue samples of wild Atlantic salmon were analysed from 2,964 fish from 252 distinct sites across Scotland. A total of 237 sites were classified out of the 252 sites included in the study, with signs of genetic introgression found at 55 (23.20 %) of the sites. The proportion of wild and farmed (Norwegian) origin genetic material in each sample was used to classify sites consistent with an approach recently employed in Norway. The classifications are detailed within **Table 10.7**.

**Table 10.7: Classification system used to determine the genetic introgression at survey sites across Scotland.**

| Classification | Definition |
|---|---|
| Good | No genetic changes observed |
| Moderate | Weak genetic changes indicated |
| Poor | Moderate genetic changes detected |
| Very Poor | Major genetic changes detected |
| Unclassified | Fish numbers too low to classify |

Nationally, 182 sites out of the 237 sites classified were determined to be of 'Good' status, which means that no signs of genetic introgression were found. Of the sites (55) where genetic introgression was evident, sites classified as 'Moderate' represented the biggest proportion at 38.18 %. Within the Outer Hebrides 17.65 % (9/51) sites shows some level of genetic introgression, with 3 sites classified as Moderate, 3 as Poor, and 3 as Very Poor. The remaining 42 sites were classified as Good, as they showed no indication of genetic introgression.

Despite the majority of sites sampled indicating no evidence of genetic introgression, the study does indicate that genetic introgression with farmed Norwegian salmon has altered the genetic composition of some populations within Scotland[188]. The report concluded that the presence of marine aquaculture in an area has the potential to affect the overall genetic integrity of local salmon populations as data indicated that introgression of genetic material from Norwegian farmed Atlantic salmon strains has altered the genetic composition of some wild Atlantic salmon populations within rivers near marine aquaculture production. However, the report states that patterns of introgression were patchy, with nearby sampling sites often not showing signs of introgression. This patchiness may be influenced by the event specific variables associated with discrete escape events, as identified by the MD[187]. The MD recognise that even in regions characterised by high levels of genetic introgression, there are sites categorised as 'Very Poor' neighbouring sites classified as 'Good' (showing no signs of genetic

[188] Scottish Government. Marine Directorate. A national assessment of the influence of farmed salmon escapes on the genetic integrity of wild Scottish Atlantic salmon populations. Scottish Marine and Freshwater Science Vol 12 No 12. [Online] Available at:
https://data.marine.gov.scot/sites/default/files/Scottish%20Marine%20and%20Freshwater%20Science%20%28SMFS%29%20Vol%2012%20No%2012%20-%20A%20national%20assessment%20of%20the%20influence%20of%20farmed%20salmon%20escapes%20on%20the%20genetic%20integrity%20of%20wild%20Scottish%20Atlantic%20salmon%20populations.pdf

introgression). As such, the MD propose the use of spatial regression modelling to assess factors including distance from fish farms, history of escape, density of marine fish farms in an area, river size and flow characteristics, marine geography and bathymetry characteristics, distance upstream, population size and population health to identify major determinants of site classification. Therefore, it is reasonable to conclude that, whilst there is the potential for genetic introgression to take place, there is no certainty that a discrete escape event will result in significant introgression but, rather, key variables will increase the risk posed to wild salmonid populations. Genetic introgression only compromises a population if the introduced genes are expressed and cause phenotypic changes, but these impacts are typically short-lived as natural selection eliminates maladaptive traits over generations, allowing the genetic stock to stabilise with the return of successful spawning individuals.

Hybridisation between Atlantic salmon and sea trout occurs at very low background levels in the wild[189], the average proportion of hybrids can be as low as 1 % or less, but with variation between some rivers, where hybrids can account for as much as 10 %. These hybrids are known to display good survival, but they are largely sterile, therefore, these interspecific hybrids may reduce the overall productivity of wild Atlantic salmon and sea trout populations. However, due to the lower reproductive success rates of escapee farmed Atlantic salmon in comparison to wild Atlantic salmon the influence of escapee farmed Atlantic salmon on hybridisation rates is unlikely to be significant.

The potential also exists for farmed Atlantic salmon to compete with their wild conspecifics over food resource and habitat availability. These interactions may occur both in the marine and freshwater environment. Within the freshwater environment the larger farmed adults, farmed juveniles or hybrid Atlantic salmon may outcompete their wild counterparts. This may result in displacement of smaller wild individuals to sub-optimal habitat which may increase mortality[190]. Within the marine environment, evidence indicates that farmed Atlantic salmon diet composition is similar to that of wild Atlantic salmon[191]. Moreover, farmed Atlantic salmon have been caught and identified within the Arctic Ocean and northeast Atlantic Ocean feeding grounds, which suggests that escapee farmed Atlantic salmon may compete with wild conspecifics for food resource during the at-sea stage of their lifecycle [192,193,]. However, their survival in the marine environment is highly variable, with escapee farmed Atlantic salmon known to suffer high levels of mortality dependent on the timing of escape[183].

#### 10.6.2.3.2 Duration of Impact

The impact is determined to be **short-term** and **temporary**. It is considered to be **short-term**, as any episodic escape event, due to infrastructure failure would result in the immediate release of escapee Atlantic salmon into the marine environment, with corrective actions being taken to repair infrastructure limiting the temporal extend of the impact. Furthermore, any inbreeding that may occur would also be short-term in nature. It is considered to be **temporary**, as the release of escapee fish, is not permanent, with escapee fish only being released if a discrete episodic escape event occurs and not under normal

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[189] Youngson, A.F., Webb, J.H., Thompson, C.E. and Knox, D., 1993. Spawning of escaped farmed Atlantic salmon (Salmo salar): hybridization of females with brown trout (Salmo trutta). Canadian Journal of Fisheries and Aquatic Sciences, 50(9), pp.1986-1990. [Online] Available at: https://cdnsciencepub.com/doi/abs/10.1139/f93-221

[190] Fleming, I.A., Hindar, K., MjÖlnerÖd, I.B., Jonsson, B., Balstad, T. and Lamberg, A., 2000. Lifetime success and interactions of farm salmon invading a native population. Proceedings of the Royal Society of London. Series B: Biological Sciences, 267(1452), pp.1517-1523. [Online] Available at: https://royalsocietypublishing.org/doi/abs/10.1098/rspb.2000.1173

[191] Jacobsen, J.A. and Hansen, L.P., 2001. Feeding habits of wild and escaped farmed Atlantic salmon, Salmo salar L., in the Northeast Atlantic. ICES Journal of Marine Science, 58(4), pp.916-933. [Online] Available at: https://academic.oup.com/icesjms/article/58/4/916/630230

[192] Jensen, A.J., Karlsson, S., Fiske, P., Hansen, L.P., Hindar, K. and Østborg, G.M., 2013. Escaped farmed Atlantic salmon grow, migrate and disperse throughout the Arctic Ocean like wild salmon. Aquaculture Environment Interactions, 3(3), pp.223-229. [Online] Available at: https://www.int-res.com/abstracts/aei/v3/n3/p223-229

[193] Hansen, L.P., Jacobsen, J.A. and Lund, R.A., 1993. High numbers of farmed Atlantic salmon. Salmo salar L., observed in oceanic waters north of the Faroe Islands. Aquaculture Research, 24(6), pp.777-781. [Online] Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2109.1993.tb00657.x

operational conditions. In addition, the return of wild spawning stock will allow natural selection to eliminate maladaptive traits over generations, allowing the genetic stock to stabilise.

#### 10.6.2.3.3 Importance of the IEF

Atlantic salmon and sea trout have been assigned a project-specific importance value of 'regional'.

#### 10.6.2.3.4 Magnitude of the Unmitigated Impact

The probability of successful feral population establishment by farmed Atlantic salmon is increased with repeat introduction events and is frequently preceded by numerous failures to establish feral populations[179]. Therefore, the frequency of escape events, and the total number of farmed Atlantic salmon escaping, are important considerations when determining the magnitude of this impact. In general, escape events across BFS marine operations are rare. Across BFS's marine fish farm portfolio, the last confirmed major escape event occurred in December 2020 at the Portree fish farm in the Highland Council region, in CoGP FMA M-26. There has been no escape event in CoGP FMA W-4 (area covering North Gravir). Due to the low frequency of escape events across marine operations and the lack of escape events within W-4 in particular, along with the reduced survival and reproductive success of escapee farmed fish, as outlined in **Sub-Section 10.6.2.3.1**, the probability of successful establishment of a population of escapee farmed Atlantic salmon is significantly reduced.

The embedded mitigation measures that are outlined in **Sub-Section 10.3** will also further reduce the overall magnitude of the impact. A primary cause of escape events is damage to containment netting as a result of predator damage, usually associated with seal depredation. The deployment of high rigidity netting (Seal-Pro netting (or similar)) with a high-level of bite and cut resistance, in combination with correct tensioning, will significantly reduce the potential for containment net failure and therefore escape events. The potential for predator interactions is further mitigated through the PCP (**Appendix E**), which details best practice control measures to limit the potential for predator interactions and the magnitude of interactions.

Another cause of large-scale escape events is infrastructure failure as a result of extreme meteorological conditions, such as specific storm events or longer periods of elevated sea state. In order to sufficiently avoid and reduce the potential for infrastructure failure, the grid and pen mooring system has been designed based on the specific environmental conditions of the development location. The pens will also be held in 120 m x 120 m grid cells, which will reduce the vertical loading on the bridles and will result in better load distribution during high stress events.

The Proposed Development will also have a specific ECP (**Appendix E**). The ECP outlines the mechanisms for maintaining containment infrastructure, along with the steps to be taken in the event of an escape event and details on the post-escape event notification procedure.

As a result of the proposed embedded mitigation measures, the probability and frequency of the impact are both determined to be **negligible**.

As a result of the historic low frequency of escape events across BFS marine fish farms and specifically no records of escapes within CoGP FMA W-4, in combination with the outlined embedded mitigation, it is determined that the impact has an overall **negligible magnitude**.

#### 10.6.2.3.5 Significance of Effect without Mitigation

In light of the assessed **negligible magnitude**, the effect of genetic introgression and competition on the wild salmonid IEFs is assessed as **not significant** in relation to the EIA Regulations.

#### 10.6.2.3.6 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

#### 10.6.2.3.7 Significance of Residual Effect Post Mitigation

No mitigation is required, as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

## 10.7 Cumulative Impacts

### 10.7.1 Potential Sea Lice Transfer from Farmed to Wild Salmonids

The approval of the Proposed Development would result in an increase in the number of fish farms located within CoGP FMA W-4 from one to two, all of which are owned and operated by BFS. It will also result in an increase in the number of farms located in DMA 5a from four to five, with two sites operated by both BFS (Proposed Development and Gravir) and MOWI (North Shore West, North Shore East and Tabhaigh). This would result in an increase in the number of Atlantic salmon farmed within the region. As a result, there would be an increase in the number of potential host salmonids for *L. salmonis* and *C. elongatus* to parasitise. Therefore, sea lice densities within the wider marine environment may increase if sea lice populations become established at the five fish farms.

However, with the effective suite of embedded mitigation, as outlined within **Sub-Section 10.3**, it is anticipated that sea lice loading across BFS operated fish farms will be low to negligible. While BFS embedded mitigations cannot be assigned to other operators, they likely implement similar measures to ensure high levels of fish health and welfare which will limit sea lice levels on their farms. **Figure 10.30**, indicates that Gravir has a record of effective sea lice control, with no exceedances of the MD notification threshold documented across the last production cycle. Both BFS farms will be proactively monitored for sea lice abundance changes, with various intervention options available in the event that abundance starts to increase. As documented within the ISLM Plan, intervention options, such as biological control and mechanical removal of sea lice, will be prioritised and proactively administered. The management of the two BFS farms under one FMS (**Appendix H**) will also allow for pro-active and adaptive management within MA-W4. Sea lice treatments will be synchronised, where applicable, so as to best utilise local water movements to ensure greatest efficiency.

Modelling has been undertaken to assess the cumulative dispersal potential for the Proposed Development and the currently active BFS Gravir farm and the three MOWI farms (North Shore W, North Shore E and Tabhaigh). Similarly to the sea lice dispersal model for the Proposed Development in isolation, the cumulative modelling applied a highly conservative value for sea lice input of 0.5 gravid female lice per fish. The cumulative sea lice dispersal model assessed the spatial dispersal and concentrations of sea lice throughout the sensitive wild salmonid out-migration period.

To understand the sea lice concentrations modelled throughout the domain for the out-migration period, average copepodid concentrations were examined, as average concentrations for the complete temporal period are anticipated to be more representative of the infestation pressure faced by out-migrating wild salmonids, in comparison to the short-lived maximum copepodid concentrations that are very restricted temporally, this is shown in **Figure 10.34.** The model outputs for averaged copepodids throughout the model run period indicate that the majority of copepodids are transported north-eastward, matching the dominate dispersal pattern seen for the Proposed Development in isolation (**Sub-Section 10.6.2.1.4**). The average concentrations of copepodids located within this region is 0.023 lice/$m^2$. The average copepodid outputs also indicate that copepodids are dispersed to the south of the Isle of Lewis, albeit at lesser concentrations than the primary north-eastward dispersion. The southern plume of copepodids, extending along the southern coast of the Isle of Lewis, showed average concentrations of

0.003 lice/m$^2$. There was also some movement west from the MOWI sites which resulted in higher concentrations. There are isolated hotspots with concentrations higher than 5 - 10 lice/m$^2$, which are consistently identified at all spatial mappings of suspended copepodid along the coastlines of Loch Liurboist and Eireasort (**Figure 10.34**) These are locations in small inlets along the coastline with shallow bathymetry which act as particle "traps". This is partly because of under-represented hydrodynamic conditions due to the computational mesh coarseness at these locations. The result is weak recirculation dynamics which has the overall effect of increased particle concentrations on those coastal computational cells.

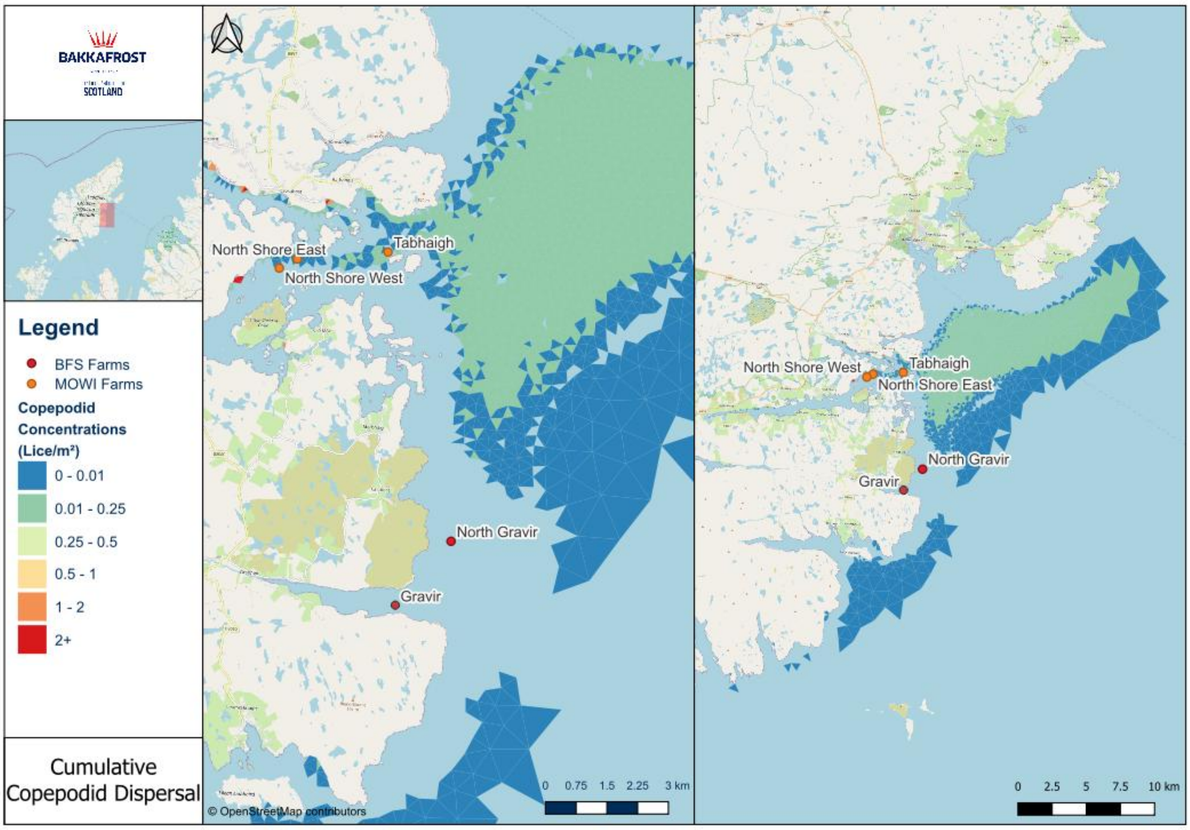


**Figure 10.34: Cumulative copepodid dispersal from the Proposed Development, existing BFS farms and MOWI sites, displaying the average concentrations of copepodids throughout the model domain[17].**

Whilst the cumulative sea lice model indicates that sea lice, specifically copepodid lice, are likely to be dispersed throughout the wider environment, with the primary dispersal transporting lice in a north-eastward direction, the concentrations of copepodid lice throughout the modelled domain are low. Average copepodid concentration, which is considered representative of the potential infestation pressure experienced by wild out-migrating salmonids, peaked at 0.17 lice/m$^2$. The majority of the model domain had average copepodid concentrations below 0.023 lice/m$^2$. Therefore, the average copepodid concentrations are well below a threshold of 2.0 lice/m$^2$. This threshold of 2.0 lice/m$^2$ has been associated with high infestation pressure and sea lice burdens on wild salmonid in Norway and is considered representative of a sea lice burden of 10 lice per fish[156].

As a result of the embedded mitigation (both design and operational at the Proposed Development), the existing mitigation measures in place at the existing BFS Gravir fish farm, the evidence of effective sea lice control, and the cumulative sea lice dispersal modelling that indicates insignificant copepodid concentrations, it is anticipated that the overall cumulative impact will be **negligible**. As a result, the cumulative effect of sea lice transfer from farmed to wild salmonids is determined to be **not significant**, in relation to the EIA Regulations.

### 10.7.2 Potential Disease Transfer from Farmed to Wild Salmonids

The approval of the Proposed Development would result in an increase in the number of fish farms located within CoGP MA W-4 from one to two, all of which are owned and operated by BFS. It will also result in an increase in the number of farms located in DMA 5a from four to five, with two sites operated by both BFS (Proposed Development and Gravir) and MOWI (North Shore West, North Shore East and Tabhaigh). This would result in an increase of the number of Atlantic salmon farmed within the region. An increase in the concentration of farmed Atlantic salmon along with an increase in the number of fish farms and the total tonnage and number of Atlantic salmon farmed may cumulatively increase the potential for impact on wild salmonid populations.

However, the same embedded mitigation that will be implemented at the Proposed Development as outlined under **Sub-Section 10.3** is already implemented at the existing fish farm. While BFS embedded mitigations cannot be assigned to other operators, they likely implement similar measures to ensure high levels of fish health and welfare which will limit sea lice levels on their farms. This embedded mitigation sufficiently avoids and reduces the magnitude of the impact to the extent that the overall cumulative magnitude of the impact is **negligible**. Moreover, due to the limited prevalence of disease in wild salmonid populations, which suggests limited farm to wild transmission and the lack of evidence of clinical disease within wild salmonid populations, it is determined that **no cumulative significant effects** on wild salmonid populations are likely.

### 10.7.3 Potential Genetic Introgression and Competition between Farmed and Wild Salmonids

The Proposed Development would result in an increase in the number of fish farms within CoGP FMA W-4 from one to two fish farms, both of which are owned and operated by BFS. The approval of the Proposed Development would result in an increase in the number of fish farms located within CoGP FMA W-4 from one to two, both of which are owned and operated by BFS. It will also result in an increase in the number of farms located in DMA 5a from four to five, with two sites operated by both BFS (Proposed Development and Gravir) and MOWI (North Shore West, North Shore East and Tabhaigh). There will therefore be an increase in the number of farmed Atlantic salmon within the FMA and a cumulative increase in the volume of potential escapee fish. However, it is unlikely that multiple fish farms within the same region will experience simultaneous escape events, but distinct fish farms may experience escape events over an extended temporal period, thereby increasing the frequency and cumulative volume of escapee fish above baseline levels. Under these circumstances, the probability of successful establishment of a feral population by the escapee fish will increase[179] and therefore the magnitude of the potential impacts on wild salmonid populations will increase.

However, the same embedded mitigation that will be implemented at the Proposed Development, as outlined under **Sub-Section 10.3**, is already implemented at the existing Gravir fish farm. The deployment of high rigidity netting (Seal-Pro netting (or similar)), in particular, will avoid and reduce the potential for predator damage that results in containment breaches. Each of the fish farms also has a specific ECP (**Appendix E**), which details the mechanisms for ensuring effective containment, including a comprehensive maintenance schedule for containment infrastructure. Furthermore, the last major escape event in BFS's marine farm portfolio occurred within FMA M-46 in December 2020, indicating that BFS's containment procedures are effective, and that the baseline frequency of escape events within the FMA is **negligible**.

As a result of the embedded mitigation the overall cumulative magnitude of the impact of escapee fish on wild salmonid populations is determined to be **negligible**. Therefore, it is determined that **no cumulative significant effects** on wild salmonid populations are likely to occur.

## 10.8 Statement of Significance

The findings of the impact assessment on wild salmonids are summarised below, with the full detailed assessment provided in **Section 10** of the EIAR. This section utilised the EcIA methodology, as described within **Sub-Section 2.4.2**.

**T**he EIA assessed the potential impact of the Proposed Development on wild salmonid populations. This assessment focused on three potential impacts:

- Potential for sea lice transfer;
- Potential for disease transfer; and
- Potential for genetic introgression and competition.

To inform the baseline condition a detailed DBA was undertaken. The DBA sought to identify the existing condition of anadromous salmonid fishes within the local area. The DBA utilised rod catch data from the wild salmonid fishery statistics to determine the historic and contemporary trends in salmonid abundance, at a national, regional, and district level. The DBA also sought to identify important salmonid river systems with potential connectivity with the Proposed Development, this focused on the identification of SACs designated for wild salmonids and graded salmon rivers, under the Conservation of Salmon (Scotland) Regulations 2016.

Review of rod catch returns data for Atlantic salmon fisheries identified patterns of decline at national, regional and district level. However, these patterns of decline varied in their strength. Review of the trout fishery statistics also identified declining trends at national, regional and district level. These patterns varied with the geographical context of the analysis.

A total of 23 graded salmon rivers were identified within the study area, the closest being the Eishken Estate - Loch Stiomrabhaigh system, at 8.94 km from the Proposed Development.

A number of embedded mitigation measures have been incorporated into both the design and operation of the Proposed Development, including:

- Development location (design);
- Containment net strategy (design);
- Mooring and grid system (design);
- Best Practice Husbandry Procedures (operational);
- Draft Farm Management Statement (FMS) (operational);
- Veterinary Health and Welfare Plan (VHWP) (operational);
- Escapes Contingency Plan (ECP) (operational);
- Predator Control Plan (PCP) (operational);
- Environmental Management Plan (EMP) (operational);
- Integrated Sea Lice Management (ISLM) Plan (operational); and
- Health Intervention Capacity (operational).

Due to the higher densities of Atlantic salmon held on fish farms, they have the potential to support large populations of sea lice, with *Lepeophtheirus salmonis* the most prolific species affecting the salmonid aquaculture industry. In the event of the establishment of a substantial population of *L. salmonis* there is the potential for increased risk to wild salmonids utilising the marine environment. However, there are a number of factors that influence the overall magnitude of the potential sea lice impact of wild salmonids, including wild salmonid migration routes and behaviour, sea lice dispersal, and farm management practices.

Existing sea lice dispersal modelling studies indicate that copepodid abundance typically peaks at distances of 7 to 12 km from the source fish farm, with the dispersal influenced by sea lice behaviour and environmental conditions. As a result, larval densities and concentrations have been found to peak in bays and inlets where prevailing currents and winds influence dispersal. A key embedded design mitigation measure is the selection of a development location in an open and unconstrained marine environment with strong tidal and wind generated currents. As a result, it is expected that sea lice propagating from the Proposed Development will be dispersed to low levels over a large area and therefore areas of high sea lice densities in bays and inlets are not anticipated. The sea lice dispersal modelling undertaken for the Proposed Development supports this hypothesis, with dispersal from the Proposed Development resulting in low concentrations of sea lice per $m^2$.

A number of other embedded mitigation measures, centred around effective farm management are anticipated to further reduce the overall magnitude of the impact. These measures include the ISLM Plan, which details the health intervention strategy that will be implemented at the Proposed Development to ensure effective and proactive sea lice management throughout the production cycle with a preference for freshwater, biological and mechanical intervention over traditional medicinal intervention. The Proposed Development will also operate under a FMA W-4 wide EMP. This document outlines the proposed actions to ensure farming activity does not result in negative impacts on local wild salmonid populations and includes a commitment to undertake wild fish monitoring to further understand the potential for interactions. As a result of the full assessment carried out in the EIAR, it has been determined that the overall magnitude of the impact is **negligible**, and therefore the effect is assessed as **not significant** in terms of the EIA Regulations.

In regard to the potential impact of disease transfer from farmed to wild salmonids, fish farms are recognised as potential reservoirs of disease pathogens, primarily due to the volume and density of Atlantic salmon held on farms. There are a number of diseases that more commonly impact farmed Atlantic salmon within Scottish waters, including; Infectious Pancreatic Necrosis (IPN), Pancreas Disease (PD), Cardiomyopathy Syndrome (CMS), Heart and Skeletal Muscle Inflammation (HSMI), and Amoebic Gill Disease (AGD).

Current scientific evidence indicates that there is limited incidence of clinical disease within wild salmonids with very low to low prevalence of the causative viruses of the above diseases and low prevalence of *Neoparamoeba perurans*, the amoeba which causes AGD, documented. This low prevalence of disease within wild fish populations indicates that transmission is likely natural within wild populations, with no significant farm to wild transmission taking place.

The embedded mitigation measures will also further reduce the overall magnitude of the impact. Specifically, the VHWP outlines standard operating procedures to ensure optimal fish health throughout the production cycle, whilst also clearly outlining effective monitoring and reporting structures to allow for an effective and proactive response, should disease be detected at the Proposed Development. As detailed within the FMS (**Appendix H**), all stocked Atlantic salmon receive vacations against Furunculosis, IPN, and PD as standard. This effective vaccination strategy helps to reduce the likelihood of disease outbreak across BFS marine operations.

A full assessment has been carried out in the EIAR, which has determined that the overall magnitude of the impact is **negligible**, and therefore the effect is assessed as **not significant** in terms of the EIA Regulations.

The potential for genetic introgression and competition to occur is related to the potential for escape of farmed Atlantic salmon into the marine environment. The potential impact of escapee farmed Atlantic salmon on wild salmonid populations is dependent on the probability of escape and the magnitude, inclusive of the frequency of escape events. In general, escapes from open pen salmon farms are the result of large episodic events, where significant numbers of farmed fish may be lost.

Farmed Atlantic salmon have been artificially selected and bred to enhance economically valuable traits, this process has resulted in the reduction in genetic variability within farmed Atlantic salmon stocks. Conversely, natural selection in wild salmonid populations selects for favourable biological traits that improve individual fitness and survival. There is also evidence to suggest that Atlantic salmon populations are distinct from one another and potentially exhibit local-scale adaptations to the specific biotic and abiotic factors associated with their natal river systems. Therefore, as a result of the genetic divergence between farmed and wild salmonid populations, interbreeding has the potential to compromise the fitness of hybrid offspring. However, current scientific evidence suggests that farmed Atlantic salmon survival and breeding success is much reduced in comparison to their wild counterparts, which inherently reduces the overall magnitude of the impact. Competition for food resources between farmed and wild salmonids, in both the freshwater and marine environment has the potential to impact survival at an individual level.

The embedded design and operational mitigation measures are anticipated to further reduce the overall magnitude of the impact, through significantly reducing the probability and frequency of escape events. High rigidity containment netting, with higher bite and cut resistance, in combination with an effective tensioning system will significantly reduce the potential for containment net failure as a result of predator interactions and extreme weather events. The Proposed Development will be held within a 120 m x 120 m grid, which has been selected specifically to reduce the potential for failure during high stress events. BFS containment measures have proven to be highly effective, with no escape events recorded within FMA W-4.

The full assessment carried out in the EIAR has determined that the overall magnitude of impact is **negligible**, and therefore the effect is assessed as **not significant** in terms of the EIA Regulations.

Cumulative impacts on wild salmonids as a result of the Proposed Development in combination with the existing BFS Gravir farms within FMA W-4 and the three existing farms within DMA 5a have been assessed. Embedded mitigation measures proposed for the Proposed Development are already implemented at the existing Gravir fish farm. The Gravir wide EMP, under which the Proposed Development will be operated, also covers the existing Gravir fish farm. As a result, the cumulative impacts are determined to be sufficiently avoided or reduced to overall **negligible magnitude**. In light of this negligible magnitude, the potential cumulative effects are determined to be **not significant** in relation to the EIA Regulations.

## 10.9 Data Limitations and Uncertainties

There are a number of limitations and uncertainties associated with the overall evaluation of impact and effect on wild salmonid populations. However, it is determined that these limitations do not undermine the robustness of the assessment. These include aspects such as:

- **MD salmonid fishery statistics connectivity:** The salmonid rod fishery statistics are influenced by the fishery statistics for fixed engine and net fisheries. With the decline of both the net and fixed engine fisheries throughout the period 1952 to 2023, there has been reduced exploitation within the coastal environment, which has likely resulted in the increasing trend in rod fishery statistics seen, particularly between 1952 and 2010, as the rod fishery statistics represent an increasing proportion of total salmonid catches across the fisheries;
- **MD salmonid rod fishery statistics:** The rod catch statistics provide raw catch numbers only and, therefore, do not account for fishing effort or river conditions (such as flow rate) that may

affect the numbers of fish caught. As a result, the rod statistics do not directly equate to returning salmon numbers;

- **Wild salmonid migration routes:** Data collected over several decades indicates that Atlantic salmon from southern Europe (including Scotland) follow the major ocean currents, migrating north along the Norwegian coast, before then following the east Greenland coast. These Atlantic salmon are believed to overwinter in the Norwegian sea, with evidence also suggesting that Atlantic salmon also continue westward to the Newfoundland coast in the summer months. However, whilst this large-scale migratory pattern is partially understood, the local and regional scale migratory behaviour of wild salmonids is far less well understood. Therefore, it is not known to what extent the waters around the Proposed Development are utilised by migrating wild salmonids. Therefore, connectivity with wild salmonids is assumed, as representing the worst-case scenario;
- **Pressures impacting wild salmonids:** As highlighted within **Sub-Section 10.4.5**, there are a number of discrete pressures acting on wild salmonids throughout their lifecycle. However, it is generally accepted that these pressures are cumulatively impacting wild salmonid survival. Therefore, it is very difficult to determine the absolute influence of a single pressure on wild salmonid populations; and
- **Connectivity between fish farms and wild salmonids:** There is great heterogeneity in evidence suggesting the potential for connectivity between fish farm derived sea lice numbers and the infestation pressure on wild salmonids. Most recently, a study was undertaken, reviewing data over multiple years showing no significant relationship between fish farm sea lice numbers and the sea lice burden observed on wild salmonids[149].

# 11 Impacts on Species and Habitats of Conservation Importance

## 11.1 Introduction

This technical assessment considers the potential impacts on species and habitats of conservation importance. This Section follows EcIA methodology and therefore assesses the impact of the Proposed Development on identified IEFs within the baseline condition.

For the purpose of this assessment, species and habitats of conservation importance are defined as species and habitats that are nationally or internationally designated or are afforded additional statutory protection under national or European legislation, for example through the Habitats Directive (92/43/EEC) or Birds Directive (2009/147/EC). Benthic features that did not meet the threshold for inclusion within this Section are assessed within **Section 7**. Wild salmonids are assessed within **Section 10**. A number of ecological features identified within **Section 9** are also identified and assessed within this Section. Where this is the case, this has been outlined.

## 11.2 Scoping

The potential for significant effects on species and habitats of conservation importance was raised by consultees in their specific Scoping advice, in response to the Screening and Scoping Request submitted to CnES. A brief summary of the requirements of the consultees is provided below in **Table 11.1**. However, for a full review of the Scoping information requirements please see **Section 5**.

**Table 11.1: Summary of required information relevant to potential impacts on species and habitats of conservation importance.**

| Consultee | Information Requirement | Cross Reference |
|---|---|---|
| NS | • Request consideration of impacts on the Inner Hebrides and the Minches SAC;<br>• Request that the assessment focuses on entanglement, disturbance, displacement, and loss of or damage to supporting habitats;<br>• Request that impacts on birds that are not protected features of designated sites under assessment, should also be considered; and<br>• Request confirmation on ADD use at the Proposed Development. | Section 11;<br><br>Appendix E (EMP, including PCP and ECP); and<br><br>Appendix O (RIAA). |
| CnES | • Request confirmation on ADD use at the Proposed Development;<br>• Request that consideration be given to potential impacts on seal species present in Gairbh-Eilean Ronaigh Seal Haul-Out (HOS) site;<br>• Request for benthic survey to assess the presence of PMF habitats and species within the mooring area. | Section 7;<br><br>Section 9;<br><br>Section 11;<br><br>Appendix E (EMP, including PCP and ECP); and<br><br>Appendix I (Benthic Survey Report). |

## 11.3 Embedded Mitigation

### 11.3.1 Design Mitigation

Detailed below is an outline of the key design aspects that may help mitigate impacts on species and habitats of conservation importance.

#### 11.3.1.1 Development Location

The development location was selected based on HG data indicating that the location is a well flushed and highly energetic site[45]. These conclusions were supported by SEPA, who stated in the Modelling Screening and Risk Identification Report[45] that the Proposed Development:

***"Is in an area of very high dispersion and has a very high capacity for erosion of material on the seabed".***

This very high dispersion potential of the development location will allow for waste discharges to be diffused to low levels over a large area. As a result, it is unlikely that sediments will be consolidated underneath the pens. Therefore, the intensity of sediment deposition will be significantly reduced within the defined Mixing Zone.

#### 11.3.1.2 NewDEPOMOD Modelling

NewDEPOMOD modelling for the Proposed Development has been undertaken for both organic (carbon) deposition and in-feed residue deposition. NewDEPOMOD organic deposition model runs were iterated up in biomass in order to calculate the maximum passing biomass in relation to the SEPA Mixing Zone criteria. NewDEPOMOD model outputs and the accompanying NewDEPOMOD Modelling Report (**Appendix K**) for a maximum passing biomass of 4,680 T have been submitted to, and approved by, SEPA. The NewDEPOMOD outputs indicate that, at a biomass of 4,680 T, the average depositional intensity within the Mixing Zone will be 360.16 $g/m^2/yr^{-1}$ and the Mixing Zone will cover 117.17 % of the permissible 120 %. The NewDEPOMOD standard default method (SDM) is a risk assessment tool and is considered to be conservative in nature.

#### 11.3.1.3 Containment Net Strategy

BFS will install enhanced, high rigidity primary netting at the Proposed Development. This high rigidity netting (Sapphire Seal Pro netting (or similar)) is constructed out of different combinations of polyolefins and co-polymers and, as such, it is highly compact, resulting in a final product that displays greater rigidity than that of regular PE braided netting. This netting also has a higher bite and cut resistance than traditional containment netting and, therefore, provides an additional level of predator deterrence. High rigidity netting (Sapphire Seal Pro netting (or similar)) also has a knotted mesh, with large rough knots on the outer surface of the netting and a smooth inner surface, presented to the stocked fish. These large rough knots have been documented to help reduce seal depredation incidence, as the knot structures irritate the noses of seals (the skin in this area is highly sensitive).

An effective net tensioning system will ensure that all pen nets are correctly tensioned and thereby hold their volume and structure within the water column, sinker tubes will be installed to achieve this. Correct tensioning of the primary netting will help reduce the impact of entanglement, as a uniformly taut pen net presents as a 'wall'. As such, there will be no slack areas in the netting for entanglement or purchase through which seals can grab or bite stocked fish.

#### 11.3.1.4 Bird Nets

The Proposed Development will use pole-mounted top nets, and this netting will have a ceiling mesh size of ceiling and sidewall mesh size of 75 mm. This pole-mounted system will prevent avian predators from aggregating on the top netting in order to access fish feed or stocked fish. The top netting will be correctly tensioned to ensure maximum effectiveness by minimising the potential for ingress into pens by avian predators and by reducing the risk of both entanglement and entrapment. The deployment of 75 mm (ceiling and sidewall) mesh for pole-mounted top netting is in line with current guidance from NS and, therefore, mitigates the potential for entanglement and entrapment.

Top netting will be inspected and re-tensioned on a daily basis, as part of the site containment checks, records of which will be held onsite. Maintenance will be conducted as and when required, based on the findings of the daily containment checks. The combination of daily containment checks, and maintenance will ensure that the top netting is effective at both deterring avian predator interactions and reducing the likelihood of entanglement and entrapment.

#### 11.3.1.5 Feed Storage and Feeding

Feed will be stored in the purpose-built feed silos on the feed-barge, these silos are securely sealed from the external environment. This will help prevent avian attraction to the Proposed Development. Feed will be delivered to the feed-barge via feed-delivery vessels, where feed will be emptied straight into the silos, no feed bags will be stored on the deck of the feed-barge.

Feed will be pumped, via a high-pressure air system, from the feed silos to a feed spreader in each pen, through sealed feed pipes. The feed spreaders will face downwards to ensure feed is not sprayed into the air. High-definition cameras will be used to monitor the feeding operations to ensure that the feed spreaders are working correctly.

### 11.3.2 Operational Mitigation

An outline of the key operational measures related to mitigating the impact of the Proposed Development on species and habitats of conservation importance is presented below.

#### 11.3.2.1 Acoustic Deterrent Devices (ADDs)

BFS has committed to not use ADDs as standard practice at the Proposed Development. In circumstances of exceptional welfare concern for stocked fish, BFS will consult with NS, the LPA, and the MD-LOT to discuss how best to proceed and to obtain approval for any ADD use. It is likely that an EPS licence will be required for all currently available ADDs unless it can be demonstrated that the device proposed for use will not cause disturbance to cetaceans. An EPS licence can be applied for via the MD-LOT who will consult with NS on any applications.

#### 11.3.2.2 Anti-Predator Nets

BFS will not use anti-predator netting at the Proposed Development, in the interests of nature conservation. In circumstances of exceptional welfare concern for stocked fish, BFS will consult with NS and the LPA on the feasibility of alternative options.

#### 11.3.2.3 Pellet Detection Software

BFS is implementing 'Observe' pellet detection software across all marine farms, including the Proposed Development. This software is intended to improve the efficiency of feeding operations, with the aim of reducing the amount of feed pellets used allowing BFS to be more sustainable both economically and environmentally.

#### 11.3.2.4 Feed Control and Monitoring

Fish feed used by BFS across all marine farming operations has been developed to mimic the natural diet of Atlantic salmon and is highly digestible, helping to improve FCRs. BFS focuses on ensuring an optimal diet is produced and provided to the stocked fish. This optimised feed ensures efficient nutrient conversion, meaning that the amount of soluble nutrients released as waste is minimised.

Feeding will be in accordance with established guides and staff will be able to adapt the feeding regime as necessary, for example, if weather conditions are temporarily affecting feeding behaviour.

Feeding operations will be conducted from the feed barge or a shorebase where feed input can be adjusted as required. High-definition cameras within each pen allow for close monitoring of the feed response, allowing for real-time adjustments and cessation of feeding when required. This reduces feed wastage and minimises the potential for organic deposition beneath the pens.

Site staff will also receive specific in-house training as part of the ‘feed, feeding, fish growth and development’ section of the Marine Competency Framework.

#### 11.3.2.5 Fallowing

Fallowing between production cycles is best practice within the Scottish finfish aquaculture industry. Fallowing provides an opportunity for benthic communities within the Mixing Zone of a fish farm to recover. Alterations to benthic faunal communities within the Mixing Zone as a result of organic deposition during a production cycle are anticipated to be temporary and reversible in nature. Furthermore, residues from in-feed treatments also have further opportunity to degrade during the fallow period. At present SEPA require that there must be a minimum period of 28 consecutive days between every production cycle during which no commercial species shall be kept on site.

#### 11.3.2.6 Enforcement

Existing regulation, in place through the Water Environment (Controlled Activities) (Scotland) Regulations 2011, provides an effective method of controlling the use of sea lice medicines, whilst promoting the use of biological and mechanical treatment methods.

SEPA require benthic monitoring on all operational fish farms, once per production cycle as standard. This monitoring regime is designed to ensure that the fish farm’s operational Mixing Zone complies with the Mixing Zone criteria and no do not exceed the modelled Mixing Zone extent as defined by NewDEPOMOD modelling.

SEPA has extensive enforcement powers and, in the worst-case scenario, can decrease the licenced maximum biomass if a fish farm is deemed to continuously not comply with benthic EQSs.

#### 11.3.2.7 Best Practice Husbandry Procedures

Best practice husbandry procedures will be employed at the Proposed Development to ensure fish health and welfare are maintained at a high standard throughout each production cycle. Full details of fish health and welfare husbandry procedures are outlined in **Sub-Section 3.3.2**.

The presence of mortalities building up at the base of pens is a known attractant to seal species. Therefore, an effective mortality removal procedure, such as the one proposed in **Sub-Section: 3.3.3**, can reduce the potential for predatory interactions.

#### 11.3.2.8 Predator Control Plan (PCP)

The Proposed Development’s PCP (**Appendix E**) outlines the adaptive management measures in place to mitigate against predatory interactions. The various measures are detailed within the PCP. However, a summary is provided below:

- Wildlife assessment;
- Wildlife logbook;
- Net tensioning and seal blinds; and

- Effective husbandry.

#### 11.3.2.9 Mooring Installation Micro-Siting

During the installation process of the grid and feed barge mooring system, ROVs may be utilised, if deemed necessary, to allow for micro-siting of anchors and mooring chains. The ROVs may be used to check the proposed anchor positions for specific benthic features. If benthic features of conservation importance are identified at the proposed anchor position, the anchor deployment position can be altered slightly to ensure that the identified features are not impacts by direct physical disturbance.

#### 11.3.2.10 Monitoring and Reporting

BFS will monitor and report any incidences of entanglement and entrapment at the Proposed Development, as is currently undertaken at BFS farms using pole-mounted top nets. The requirements of the monitoring and reporting programme will be in line with those outlined by NS, through the Interim Technical Briefing Note: Pole-mounted Top Nets and Birds at Finfish Farms[194]. A summary of the requirements is presented below:

- Maintain daily records of wildlife entanglements or entrapment at the development and submit six-monthly returns to the LPA and to NS; and
- Provide written immediate notification to the LPA and NS of the occurrence of any entrapment or entanglement of any single bird species in the event that in relation to a single bird species:
    - Three or more birds become entangled or entrapped on a single day; or
    - Ten or more birds become entangled or entrapped in any seven-day period; or
    - One or more birds become entangled or entrapped on four or more consecutive days.

# 11.4 Baseline Condition

## 11.4.1 Designated Sites

### 11.4.1.1 European Sites

Full consideration of the potential connectivity between the Proposed Development and European Sites (SPAs, SACs, and Ramsar sites) is provided within the separate RIAA (**Appendix O**). The RIAA has been informed through the CnES Scoping Opinion and the Scoping advice provided by NS.

Although the RIAA (**Appendix O**) is separate from the requirements of the EIA, the European Site screening assessment carried out is also considered to be appropriate in terms of identifying potential connectivity between ecological features (the qualifying features of the respective European Sites) and the Proposed Development under the EIA process. A summary of the identified European Sites along with their qualifying features is presented in **Table 11.2**. Where there is potential for connectivity, the qualifying feature is highlighted in bold text within **Table 11.2.**

**Table 11.2: Screened in statutory designations.**

| Site Name | Designation | Qualifying Features | Distance and Direction from Proposed Development | Rationale |
|---|---|---|---|---|
| Inner Hebrides and the Minches | SAC | **Harbour porpoise** (*Phocoena phocoena*) | Site is located within the SAC | Potential connectivity between the SAC and the Proposed Development was |

[194] NatureScot: Interim Technical Briefing Note: Pole-mounted Top Nets and Birds at Finfish Farms. [Online] Available at: https://www.nature.scot/doc/interim-technical-briefing-note-pole-mounted-top-nets-and-birds-finfish-farms

| Site Name | Designation | Qualifying Features | Distance and Direction from Proposed Development | Rationale |
|---|---|---|---|---|
| | | | | identified in the Scoping Report. |
| St Kilda | SPA | **Northern fulmar** (*Fulmarus glacialis*) breeding, **northern gannet** (*Morus bassanus*) breeding, **great skua** (*Stercorarius skua*) breeding, common guillemot (*Uria aalge*) breeding, **black-legged kittiwake** (*Rissa tridactyla*) breeding, **Leach's petrel** (*Hydrobates leucorhous*) breeding, **manx shearwater** (*Puffinus puffinus*) breeding, Atlantic puffin (*Fratercula arctica*) breeding, razorbill (*Alca torda*) breeding, seabird assemblages breeding, **storm petrel** (*Hydrobates pelagicus*) breeding. | 123.36 km (straight-line), west-northwest. | In response to the formal Screening and Scoping Request, NS's Scoping Advice stated that there is the potential for significant effects on the northern gannet qualifying feature. |
| Seas off St Kilda | SPA | **Northern fulmar** (*Fulmarus glacialis*) breeding, **northern gannet** (*Morus bassanus*) breeding, common guillemot (*Uria aalge*) breeding, **Atlantic puffin** (*Fratercula arctica*) breeding, seabird assemblages breeding, **storm petrel** (*Hydrobates pelagicus*) breeding. | 73.69 km (straight-line), west-northwest. | In response to the formal Screening and Scoping Request, NS's Scoping Advice stated that there is the potential for significant effects on the northern gannet qualifying feature. |
| North Rona and Sule Sgeir | SPA | **Northern fulmar** (*Fulmarus glacialis*) breeding, **northern gannet** (*Morus bassanus*) breeding, common guillemot (*Uria aalge*) breeding, black-legged kittiwake (*Rissa tridactyla*) breeding, **Leach's petrel** (*Hydrobates leucorhous*) | 112.17 km (straight-line) north | In response to the formal Screening and Scoping Request, NS's Scoping Advice stated that there is the potential for significant effects on the northern gannet qualifying feature. |

| Site Name | Designation | Qualifying Features | Distance and Direction from Proposed Development | Rationale |
|---|---|---|---|---|
| | | breeding, Atlantic puffin (*Fratercula arctica*) breeding, razorbill (*Alca torda*) breeding, **storm petrel** (*Hydrobates pelagicus*) breeding. | | |
| Sule Skerry and Sule Stack | SPA | **Northern gannet** (*Morus bassanus*) breeding, **Leach's petrel** (*Hydrobates leucorhous*) breeding, **storm-petrel** (*Hydrobates pelagicus)* breeding, European shag (*Gulosus aristotelis)* breeding, common guillemot (*Uria aalge*), breeding, Atlantic puffin (*Fratercula arctica*) breeding. | 148.64 km (straight-line) north-east | In response to the formal Screening and Scoping Request, NS's Scoping Advice stated that there is the potential for significant effects on the northern gannet qualifying feature. |

#### 11.4.1.2 Nature Conservation Marine Protected Areas (NCMPA)

The Scoping Report, submitted as part of the formal Screening and Scoping Request in June 2022, identified the potential for connectivity between the Proposed Development and the North East Lewis MPA. This potential for connectivity was also highlighted within the CnES Scoping Opinion and the Scoping advice provided by NS in response to the Screening and Scoping Request.

Under Section 83 of the Marine (Scotland) Act 2010, where developments have the potential to impact, other than insignificantly, the protected features of a NCMPA, the LPA must notify the Scottish Ministers and NS and take into account their guidance and advice prior to making a determination on the development proposal. A summary of the identified NCMPAs along with their qualifying features is presented in **Table 11.3**. Where there is potential for connectivity, the qualifying feature is highlighted in bold text within **Table 11.3.**

Where an ecological feature, that is a qualifying feature of an NCMPA, listed in **Table 11.3**, is scoped in for assessment in relation to a potential impact, the potential for connectivity with that NCMPA is considered in the assessment.

**Table 11.3: Summary of connectivity with identified NCMPAs.**

| Site Name | Designation | Qualifying Features (Ecological Features in Bold have Potential Connectivity) | Distance and Direction from Proposed Development | Rationale |
|---|---|---|---|---|
| North East Lewis | NCMPA | Risso's Dolphins (*Grampus griseus*), Sandeels (*Ammodytes marinus* / *Ammodytes tobianus*), and geological features | 3.96 km North | Potential connectivity between the North East Lewis NCMPA and the Proposed Development due to the proximity of the NCMPA boundary to the Proposed Development along with the highly mobile nature of the Risso's dolphin qualifying feature. Due to its position outside the NCMPA, the development will not interact with the designated sandeel habitat and geological features of the NCMPA. |

### 11.4.1.3 Designated Sites Scoped Out of Further Assessment

The designated sites listed within **Table 11.4**, below, have been 'screened out' of this EcIA and HRA RIAA. The decision to screen the below sites out of the assessment was based on the assessments conducted within the Scoping Report and the Scoping advice received from various consultees through the formal Screening and Scoping Request.

**Table 11.4: Screened out statutory designations.**

| Site Name | Designation | Qualifying Feature | Distance and Direction from Proposed Development | Rationale |
|---|---|---|---|---|
| Lewis Peatlands | SAC | Otters (*Lutra lutra*) | 8.93km west | The Scoping Advice received from NS agreed with the conclusions of the Scoping Report. As such the Lewis Peatlands SAC has been scoped out of further assessment. |
| Lewis Peatlands | SPA | Black-throated diver (*Gavia arctica*), Red-throated diver (*Gavia stellata*), and | 8.93 km northwest | The Scoping Report concluded that this designated site could be scoped out of further assessment as significant effects were not predicted. No comments to the contrary were made by consultees in their Scoping Advice. Therefore, the Lewis |

| Site Name | Designation | Qualifying Feature | Distance and Direction from Proposed Development | Rationale |
|---|---|---|---|---|
| | | Golden eagle (*Aquila chrysaetos*) | | Peatlands SPA has been scoped out of further assessment. |
| Shiant Isles | SPA | Fulmar (*Fulmarus glacialis*), Guillemot (*Uria aalge*), Kittiwake (*Rissa tridactyla*), Puffin (*Fratercula arctica*), Razorbill *(Alca torda)* and Shag (*Gulosus aristotelis*). | 14.01 km south | The Scoping Report concluded that this designated site could be scoped out of further assessment as significant effects were not predicted. No comments to the contrary were made by consultees in their Scoping Advice. Therefore, the Shiant Isles SPA has been scoped out of further assessment. |
| Shiant Isles SSSI | SSSI | Razorbill (*Alca torda*), Puffin (*Fratercula arctica*), Shags (*Gulosus aristotelis)* | 16.08 km south | The Scoping Report concluded that this designated site could be scoped out of further assessment as significant effects were not predicted. No comments to the contrary were made by consultees in their Scoping Advice. Therefore, the Shiant Isles SSSI has been scoped out of further assessment. |

### 11.4.2 Protected Species

#### 11.4.2.1 Confidential Species

A protected species resides within the potential disturbance distance of the Proposed Development, impacts and mitigation measures are considered in a separate confidential appendix **(Appendix V)**.

#### 11.4.2.2 Ornithological Features

**Section 9** of this EIAR considers the ornithological features that are known to predate Atlantic salmon marine farms. As such, the predatory ornithological features considered within **Section 9** have been excluded from review within this sub-section to avoid unnecessary repetition.

Therefore, the ornithological baseline condition represented below is limited in scope to ornithological features that are not recognised as predatory species in relation to Atlantic salmon marine farms.

A DBA was undertaken to determine the ornithological baseline within a 10 km study area around the Proposed Development (focused along the east coast of the Outer Hebrides). The DBA was informed through review of the Gravir operational wildlife logbook. Data obtained through the SMP[195] were also reviewed to help establish the ornithological baseline condition. The SMP is an ongoing annual monitoring programme established in 1986, covering 25 species of seabird. However, to ensure the data assessed is of relevance, only data from the year 2000 onwards has been included (under normal survey effort SMP data would be reviewed from 2010 onwards, however, due to the reduced survey effort in the region the temporal period has been increased to capture a larger sample size). In addition, ornithological data held within the NBN and were also integrated as part of the DBA.

A summary of the non-predatory ornithological features identified through the DBA is provided in **Table 11.5**.

**Table 11.5: Summary of the non-predatory ornithological features identified through the DBA.**

| Common Name | Scientific Name | Number of Records | Dates Recorded | Data Source |
|---|---|---|---|---|
| Arctic tern | *Sterna paradisaea* | 1 IND | 2014 | NBN |

### 11.4.2.2.1 Arctic Tern

Arctic tern are the most common tern species breeding in the UK. However, the geographic distribution of the population is skewed, with 73 % of the population occurring in the Northern Isles. In both the west of Scotland and the Outer Hebrides there have been declines and geographic redistribution of the population. This has occurred as a result of predation by the American mink (*Neovision vison*). Therefore, future population trends are likely to be dependent on the success of mink eradication programmes across Scotland.

The Scottish arctic tern population experienced significant growth between the Operation Seafarer (1969 – 1970) surveys and the Seabird Colony Register (1985 – 1988), going from 46,385 AONs to 71,178 AONs, representing a 53.45 % increase in the breeding population. However, by the time of the Seabird 2000 surveys (1998 – 2000) arctic tern breeding numbers had declined by 33.54 %, to a total of 47,306 AONs. Since the Seabird 2000 surveys, the index of abundance has declined considerably, and in 2019 was 57 % below the 1986 baseline. These declines are thought to be the result of American mink predation, as noted above, and very low productivity over a 30 year period in the Northern Isles (since 1986)[196]. This very low level of productivity is believed to be linked to sandeel shortages, which have been driven by oceanographic changes[197, 198].

The DBA identified 1 IND within the 10 km study area in 2014.

### 11.4.2.2.2 Scottish Seabird Populations

In order to provide context to the records of non-predatory ornithological features identified within the baseline condition, national (Scotland) seabird census data has been collated and presented to show the estimated Scottish population size of each non-predatory ornithological feature, along with the general population trend. **Table 11.6** displays these data for seabirds surveyed under the Operation Seafarer (1969 – 1970), Seabird Colony Register (1985 – 1988), and the Seabird 2000 (1998 – 2002) surveys, with numbers highlighted in green showing an increase in population and those highlighted in yellow showing a decrease.

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[195] Joint Nature Conservation Committee (JNCC): Seabird Monitoring Programme (SMP). [Online] Available at: https://jncc.gov.uk/our-work/seabird-monitoring-programme/

[196] JNCC. Arctic tern. [Online] Available at: https://jncc.gov.uk/our-work/arctic-tern-sterna-paradisaea/

[197] Furness, R.W., 1982. Population, breeding biology and diets of seabirds on Foula in 1980. Seabird Rep, 6, pp.5-11. [Online] Available at: http://seabirdgroup.org.uk/journals/seabird-6/seabird-6.pdf#page=6

[198] Beaugrand, G., 2004. The North Sea regime shift: evidence, causes, mechanisms and consequences. Progress in Oceanography, 60(2-4), pp.245-262. [Online] Available at:

Table 11.6: Summary of seabird national census data for Scottish seabird populations[199].

| Species Name | Population Estimate Unit | Operation Seafarer (1969 - 1970) | | Seabird Colony Register (1985 - 1988) | | Seabird 2000 (1998 - 2002) | |
|---|---|---|---|---|---|---|---|
| | | Population Estimate | Percentage Change Since Previous Census (%) | Population Estimate | Percentage Change Since Previous Census (%) | Population Estimate | Percentage Change Since Previous Census (%) |
| Arctic tern | AON | 51,411 | N/A | 76,886 | 50 | 53,380 | -31 |
| Atlantic puffin | AOB | 424,318 | N/A | 488,763 | 15 | 580,714 | +19 |
| Black-legged kittiwake | AON | 346,097 | N/A | 359,425 | 3.85 | 282,213 | -21.48 |
| Great skua | AOT | 3,079 | N/A | 7,645 | 148.29 | 9,634 | +26.02 |
| Leach's petrel | AOS | N/A | N/A | N/A | N/A | 48,047 | N/A |
| Manx shearwater | AOS | N/A | N/A | N/A | N/A | 126,545 | N/A |
| Northern Fulmar | AOS | 291,294 | N/A | 516,609 | 77 | 501,609 | -3 |
| Storm petrel | AOS | N/A | N/A | N/A | N/A | 21,370 | N/A |

[199] JNCC. Seabird Monitoring Programme Report 1986 to 2019. [Online] Available at: https://jncc.gov.uk/our-work/smp-report-1986-2019/

### 11.4.2.2.3 Biogeographic Populations of Ornithological Species

In addition to the information presented above, in **Sub-Sections 11.4.1 and 11.4.2.2**, the biogeographic population of each identified ornithological feature has also been considered in the determination of the baseline condition and the subsequent impact assessment. The relevant biogeographic populations are outlined in **Table 11.7** below.

**Table 11.7: Biogeographic population size of the ornithological species identified within the baseline condition (taken from Furness (2015)[200]).**

| Species Name | Biogeographic population with connectivity to UK waters (adults and immatures) |
|---|---|
| Arctic tern | 628,000 |
| Atlantic puffin | 11,840,000 |
| Great skua | 73,000 |
| Black-legged kittiwake | 5,100,000 |
| Leach’s petrel | Not in Furness (2015) |
| Manx shearwater | 2,000,000 |
| Northern fulmar | 8,055,000 |
| Storm petrel | Not in Furness (2015) |

## 11.4.2.3 Elasmobranchs

A review of the operational wildlife logbook for the Gravir fish farm was undertaken to assess the presence and abundance of elasmobranchs within the baseline condition. There were no elasmobranchs sighted in the waters surrounding the existing farms.

### 11.4.2.3.1 Basking Shark (*Cetorhinus maximus*)

The wildlife logbook assessment failed to identify any sightings of basking sharks, which indicates that the area supports negligible to low abundance. This is supported by NMPi spatial data, with observed adjusted densities[201] (displayed on a 5 km grid) showing an absence of basking sharks and aggregated annual effort sightings per km[202] indicating the presence of one individual basking shark between 2003 and 2011 from the waters surrounding the Proposed Development. However, whilst the modelled presence of basking sharks above mean density also indicates the negligible values of basking sharks in the waters adjacent to the Proposed Development, there are areas to the south and northeast of the Isle of Lewis with higher modelled abundance[203]; however, these are reasonably isolated 5 km grid cells. The ‘Hebridean Marine Mammal Atlas’[204] indicates the off-effort presence of basking sharks within the wider environment of the Proposed Development. Based on the available data, it is determined that the waters around the Isle of Lewis are of **negligible to low importance** to basking sharks.

## 11.4.2.4 Cetaceans

Scottish waters are known to support more than twenty species of cetacean. However, NS state that there are seven primary cetacean species that are relatively common around the coasts of Scotland[205]. These species include:

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[200] Furness, R.W., 2015. Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Reports, (164). [Online] Available at: https://publications.naturalengland.org.uk/publication/6427568802627584

[201] NMPi: Observed adjusted densities of Basking shark all seasons 2000 to 2012. [Online] Available at: https://marine.gov.scot/maps/982

[202] NMPi: Aggregated annual effort related Basking shark sightings per kilometre (Hebridean Whale and Dolphin Trust Effort Related Sightings data 2003 to 2011). [Online] Available at: https://marine.gov.scot/maps/984

[203] NMPi: Modelled persistence of above mean density of Basking shark summers 2001 to 2012. [Online] Available at: https://marine.gov.scot/maps/983

[204] Hebridean Whale and Dolphin Trust (2018). Hebridean Marine Mammal Atlas.
Part 1: Silurian, 15 years of marine mammal monitoring in the Hebrides. A Hebridean Whale and Dolphin Trust Report (HWDT), Scotland, UK. 60 pp. [Online] Available at: https://hwdt.org/hebridean-marine-mammal-atlas

[205] NatureScot: Dolphins, whales and porpoises. [Online] Available at: https://www.nature.scot/plants-animals-and-fungi/mammals/marine-mammals/dolphins-whales-and-porpoises

- Bottlenose dolphin (*Tursiops truncatus*);
- Harbour porpoise (*Phocoena phocoena*);
- Minke whale (*Balaenoptera acutorostrata*);
- White-beaked dolphin (*Lagenorhynchus albirostris*);
- Risso's dolphin (*Grampus griseus*);
- Short-beaked common dolphin (*Delphinus delphis*); and
- Orca (*Orcinus orca*).

The DBA sought to determine the relative abundance and density and, therefore, the importance of the development location and wider marine environment around the Isle of Lewis to these common cetacean species.

A review of the operational wildlife logbook for the Gravir fish farm was undertaken to assess the presence and abundance of cetaceans within the baseline condition. A summary of the cetaceans identified within the logbooks is provided in **Table 11.8** As can be seen within the table, unspecified dolphin spp. were recorded with the highest abundance, followed by minke whale. There was only a single recorded sighting of a harbour porpoise and orca.

**Table 11.8: Summary of cetacean species identified through the wildlife logbook assessment (2016 to 2021).**

| Common Name | Species Count | Year Sighted |
|---|---|---|
| Dolphin spp. | 26 | 2021, 2023 |
| Minke Whale | 2 | 2021, 2023 |
| Harbour porpoise | 1 | 2021 |
| Orca | 1 | 2020 |

### 11.4.2.4.1 Bottlenose Dolphin (*Tursiops truncatus*)

The Inter Agency Marine Mammal Working Group (IAMMWG) have identified the 'Coastal West Scotland and the Hebrides' (CWSH, to 12 nm) as one of the seven recognised Management Units (MUs) for bottlenose dolphin within UK waters[206]. It has been estimated that this MU has an abundance of 45 individual bottlenose dolphin (33 – 66 at 95 % confidence interval)[206]. The CWSH MU is comprised of two small and socially segregated populations. One resident population of approximately 15 individuals is associated with the Sound of Barra and has not been recorded anywhere else. The second population of approximately 30 individuals is coastal and ranges more widely throughout the Inner Hebrides and the mainland coast of western Scotland.

The wildlife logbook assessment did not identify any sightings of this species. Assessment of NMPi spatial data, along with the 'Hebridean Marine Mammal Atlas'[204], indicates low abundance levels of bottlenose dolphin within the wider environment to the north of the Proposed Development. Annual distribution and abundance data indicates the absence of the species in the waters east of the Isle of Lewis. Review of the 'Hebridean Marine Mammal Atlas' also indicates that bottlenose dolphin were not recorded within the immediate vicinity of the Proposed Development, despite the area being included within the visual survey effort. Data from the 'Hebridean Marine Mammal Atlas' also supports the findings of increased abundance in association with the Sound of Barra, with bottlenose dolphin sightings per unit effort (km) values peaking at 0.02 – 0.04.

Based on the available data, it is determined that the waters to the east of Isle of Lewis are of **low importance** to bottlenose dolphin.

[206] IAMMWG. 2015. Management Units for cetaceans in UK waters (January 2015). JNCC Report No. 547, JNCC Peterborough. [Online] Available at: https://hub.jncc.gov.uk/assets/f07fe770-e9a3-418d-af2c-44002a3f2872

#### 11.4.2.4.2 Harbour Porpoise (*Phocoena phocoena)*

The harbour porpoise is listed in Appendix 2 of the Bern Convention as well as Appendix 2 of the Convention on Migratory Species. They are also listed as an Annex II species under the Habitats Directive (92/43/EEC), as such they are the qualifying feature of the Inner Hebrides and the Minches SAC. They are also included within ASCOBANS. They are also listed on the UK BAP list and the Scottish Biodiversity List. Harbour porpoise are also classified as an EPS, due to their inclusion in Schedule 2 of the Habitats Regulations.

The IAMMWG have identified the 'West Scotland' MU for harbour porpoise, as one of three recognised MUs for harbour porpoise within UK waters. Estimates suggest that the 'West Scotland' MU supports a population of 21,462 individuals (9,740 – 47,289 at 95 % CI)[207]. However, it is important to note that harbour porpoise within the eastern North Atlantic are generally considered a continuous population that extends from the French coasts north to the waters of Norway and Iceland, therefore interchange of individuals is likely between the 'West Scotland' MU and adjacent 'North Sea' and 'Celtic and Irish Seas' MUs.

The Proposed Development is located within The Hebrides and the Minches SAC, for which harbour porpoise is the qualifying feature. Therefore, it is likely that individuals from the SAC population will transit past the Proposed Development, resulting in the potential for connectivity. A total species count of 1 was identified from the wildlife logbook assessment between 2016 and 2021, which indicates that harbour porpoise utilise the waters surrounding the Proposed Development.

Assessment of NMPi spatial data supports this assumption. Review of areas of predicted high density, based of acoustic detections, indicates that the environment immediate to the Proposed Development supports top 15 % densities of harbour porpoise, with the deeper water further offshore, and further to the east supporting top 50 to 20 % densities[208].

Annual distribution and relative abundance data (1979 to 1997) also indicate that harbour porpoise utilise the waters immediate to the Proposed Development. The grid cell that overlaps with the Proposed Development has an animals per standard hour value of 0.136, which represents moderate abundance.

As a result of the available data, it is determined that the waters around the Isle of Lewis are of **moderate to high importance** to harbour porpoise within the 'West Scotland' MU.

#### 11.4.2.4.3 Minke Whale (*Balaenoptera acutorostrata)*

Minke whale within UK waters are grouped within a single MU, known as the 'Celtic and Greater North Seas' MU. This MU is estimated to support a population of 23,528 individuals (13,989 – 39,572 at 95 % confidence interval)[206]. Minke whale abundance within UK waters is highly seasonal, with peak abundance associated with migration into UK waters during the summer months.

A total species count of 2 were identified from the wildlife logbook assessment, in 2021 and 2023. Whilst these sightings are incidental, this low value indicates that minke whale are present in the wider environment at least at negligible abundance. Assessment of NMPi spatial data supports the assumption that they are present within the area, with observed adjusted densities[209] (displayed on a 5 km grid)

[207] IAMMWG. 2015. Management Units for cetaceans in UK waters (January 2015). JNCC Report No. 547, JNCC Peterborough. [Online] Available at: https://hub.jncc.gov.uk/assets/f07fe770-e9a3-418d-af2c-44002a3f2872
[208] MD: National Marine Plan interactive (NMPi). Areas of predicted high density of harbour porpoise (acoustic) (2003 to 2010). [Online] Available at: https://marine.gov.scot/maps/1106
[209] Marine Directorate: National Marine Plan interactive (NMPi). Observed adjusted densities of minke whale (all seasons 2000 to 2012). [Online] Available at: https://marine.gov.scot/maps/869

indicating their presence in the cell directly adjacent to the cell containing the Proposed Development. In addition, the annual distribution and abundance data (1979 to 1997)[210] shows the presence of minke whale in the waters surrounding to the Proposed Development, with a value of 0.0526. Modelled persistence of minke whale above mean density[211] indicates that the waters in the wider environment may support low to moderate densities.

Based on the available data, it is determined that the waters surrounding the Isle of Lewis are of **low to moderate importance** to minke whale within the 'Celtic and Greater North Seas' MU.

#### *11.4.2.4.4* White-Beaked Dolphin (*Lagenorhynchus albirostris)*

The IAMMWG has identified a single MU for white-beaked dolphin within UK waters, known as the 'Celtic and Greater North Seas' MU, with an estimated population size of 15,895 individuals (9,107 – 27,743 at 95 % confidence interval)[206]. Evidence, through photo-identification[212], supports the interchange of individuals between Scottish waters and Danish waters indicating that the white-beaked dolphin population within the MU is highly mobile and transient in nature.

The wildlife logbook assessment did not identify any sightings of white-beaked dolphin. Whilst the wildlife logbook sightings are incidental, the lack of sightings indicates that white-beaked dolphin do not routinely utilise these waters in high abundance. Further assessment of observed adjusted densities[213] (displayed on a 5 km grid) indicate the absence from the vicinity directly surrounding the Proposed Development, however, it does show high observation levels further north of the Isle of Lewis with values as high as 98.21. The annual distribution and abundance data (1979 to 1997)[214] indicates the presence of this species from the waters surrounding the Proposed Development, with a value of 0.562 indicating medium abundance levels.

Modelled persistence of above mean density[215] indicates that there is a low presence in the waters surrounding the Proposed Development with an average encounter rate of 12. Within the wider context, these data indicate higher persistence of above mean densities off the north and northeast coast of the Isle of Lewis. Based on the available data, it is determined that the waters surrounding the Isle of Lewis are of **moderate importance** to white-beaked dolphin within the 'Celtic and Greater North Seas' MU.

#### 11.4.2.4.5 Risso's Dolphin (*Grampus griseus*)

The IAMMWG have identified a single MU for Risso's dolphin within UK waters known as the 'Celtic and Greater North Seas' MU. This MU encompasses all UK waters and extends to the seaward boundary used by the European Commission for Habitats Directive reporting. There are no abundance estimates for Risso's dolphin within this MU. However, Risso's dolphin are most commonly sighted in the west, particularly around the Hebrides. They are also sighted, seasonally, within the Celtic and Irish Seas.

The wildlife logbook assessment did not identify any sightings of Risso's dolphin in association with the existing fish farm to the east of the Isle of Lewis, indicating negligible abundance and density of Risso's dolphin within the wider marine environment.

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[210] Marine Directorate: National Marine Plan interactive (NMPi). Annual distribution and relative abundance of minke whale (1979 to 1997). [Online] Available at: https://marine.gov.scot/maps/872
[211] Marine Directorate: National Marine Plan interactive (NMPi). Modelled persistence of above mean density of minke whale (summers 2001 to 2012). [Online] Available at: https://marine.gov.scot/maps/870
[212] Kinze, C.C., 2009. White-beaked dolphin: Lagenorhynchus albirostris. In Encyclopedia of marine mammals (pp. 1255-1258). Academic Press. [Online] Available at: https://www.sciencedirect.com/science/article/pii/B9780123735539002856
[213] Marine Directorate: National Marine Plan interactive (NMPi). Observed adjusted densities of white-beaked dolphin (all seasons 1994 to 2012). [Online] Available at: https://marine.gov.scot/maps/904
[214] Marine Directorate: National Marine Plan interactive (NMPi). Annual distribution and relative abundance of white-beaked dolphin (1979 to 1997). [Online] Available at: https://marine.gov.scot/maps/907
[215] Marine Directorate: National Marine Plan interactive (NMPi). Modelled persistence of above mean density of white-beaked dolphin (summers 1994 to 2012). [Online] Available at: https://marine.gov.scot/maps/905

Further assessment of observed adjusted densities of Risso's dolphin between 1994 and 2012[216] indicate negligible densities within the waters directly surrounding the Proposed Development. High densities are identified off the northeast coast of the Isle of Lewis, just north of the Proposed Development. Modelled persistence of above mean density of Risso's dolphin[217] indicate high persistent densities above the mean density for Scottish territorial waters, with a persistence – certainty score of 5016 for the cell containing the Proposed Development. These areas of high abundance off the Isle of Lewis coast are in associated with the North-East Lewis NCMPA located 4km north of the Proposed Development, for which Risso's dolphin is a qualifying feature.

Annual distribution and relative abundance of Risso's dolphin (1879 to 1997)[218] further supports the assumption of high utilisation of the waters around the Isle of Lewis with an animals per standard hour value of 1.16. The 'Hebridean Marine Mammal Atas' indicates a single record of off effort presence of Risso's dolphin in the waters adjacent to the Isle of Lewis.

Based on the available data, it is determined that the waters surrounding the Isle of Lewis are of high **importance** to Risso's dolphin within the 'Celtic and Greater North Seas' MU.

### *11.4.2.4.6* Short-Beaked Common Dolphin (*Delphinus delphis)*

Short-beaked common dolphin within Scottish water form part of the 'Celtic and Greater North Seas' MU. This MU is estimated to support a population of 56,556 individuals (33,014 – 96,920 at 95 % confidence interval). Evidence indicates there is a single population within this MU, ranging from the waters off Scotland to Portugal.

The wildlife logbook assessment did not identify any sightings of short-beaked common dolphins. Further assessment of annual distribution and abundance data[219] indicate the absence of short-beaked common dolphin from the waters surrounding the Proposed Development. Further afield, within the Minch and the coastal waters of the Scottish mainland common dolphin presence was identified. Areas of higher relative abundance include, the Little Minch, the Small Isles and the northwest coast of the Isle of Mull.

Therefore, based on the available data (discussed above), it is determined that the Proposed Development, and the immediate marine environment, are of lower importance to short-beaked common dolphin, in comparison to other areas within the 'Celtic and Greater North Seas' MU. As a result, the waters surrounding the Proposed Development are determined to be of **negligible** importance to short-beaked common dolphin within the 'Celtic and Greater North Seas' MU.

### 11.4.2.4.7 Orca (*Orcinus orca*)

Orca are one of the most widespread cetacean species, ranging from the tropics to the polar regions. Within the Hebrides there is a small group known as the West Coast Community, which is now believed

[216] NMPi. Observed adjusted densities of Risso's dolphin (all seasons 1994 - 2012). [Online] Available at: https://marine.gov.scot/maps/883
[217] NMPi. Modelled persistence of above mean density of Risso's dolphin (summers 1994 - 2012). [Online] Available at: https://marine.gov.scot/maps/884
[218] NMPi. Annual distribution and relative abundance of Risso's dolphin (1979 - 1997). [Online] Available at: https://marine.gov.scot/maps/886
[219] Marine Directorate: National Marine Plan interactive (NMPi). Annual distribution and relative abundance of short-beaked common dolphin (1979 to 1997). [Online] Available at: https://marine.gov.scot/maps/900

NMPi. Annual distribution and relative abundance of Killer whale (1979 - 1997). [Online] Available at: https://marine.gov.scot/maps/866 to contain just two male individuals. Orca from Shetland, Orkney, Iceland and Norway have been known to visit mainland Scottish waters on rare occasions.

The single sighting of this species was recorded in the wildlife logbook in 2020. Whilst sightings in the logbook are incidental, the low number of sightings indicates negligible utilisation of the area by orca. However, further assessment of annual distribution and relative abundance data (1979 and 1997) indicate low abundance (0.023 animals per standard hour) of orca within the grid cell that overlaps with the Proposed Development. These data illustrate that the waters of the Minch, particularly around South Uist, the Isle of Mull and the Isle of Skye support medium relative abundance of orca. The 'Hebridean Marine Mammal Atas'[220]also identified the presence of orca in the waters off the coast of the Isle of Mull and the Isle of Skye, with no sightings in association with the Proposed Development.

Therefore, based on the available data (discussed above), it is determined that the Proposed Development, and the immediate marine environment, are not of unique high importance to orca, when considered in the wider context. As a result, the waters surrounding the Proposed Development are determined to be negligible importance to orca within Scottish waters.

#### 11.4.2.5 Marine Mammals (excluding cetaceans)

The marine mammal (excluding cetaceans) features identified through the DBA are all recognised as potential primary or secondary predators of Atlantic salmon marine farms. As such, these features have been considered separately within **Section 9**.

#### 11.4.2.6 Benthic Species

##### 11.4.2.6.1 Tall Seapens (*Funiculina quadrangularis*)

Tall seapens are a component of the PMF habitat 'Burrowed mud', they have a stiff central axis, which supports a colony of miniature sea anemones (polyps). The tall seapen is the largest of the seapens in Britain, occasionally reaching 2 m in height. The polyps are soft bodied, white or pale pink in colour, and grow in irregular rows at angles to the hard chalky white axis. Found in muddy substrata in deep sheltered waters, within sea lochs they have been recorded as shallow as 20 m; however, on the open coast and further offshore, they are found in water deeper than 100 m and down to 2,000 m. In the UK, the tall seapen is almost entirely restricted to western Scotland and to deep, undisturbed muddy sediments. The brittle nature of the axial rod and the inability of this species to withdraw into the sediment make it extremely sensitive to physical disturbance [221]. Fishing with static gears (creels) can reduce tall seapen density but the impacts are not as severe as those seen with mobile gear (bottom trawling). Fragmented populations are vulnerable to local extinction and inshore Scottish populations are of global importance[222].

During the benthic visual survey carried out at the development location the majority of the proposed site was found to be characterised by soft sediment habitats, including circalittoral fine mud and sandy mud, with some areas found to support seapens. The PMF habitat 'Burrowed mud' was identified along all transects across the site where BSH A5.3 was present. Within the burrowing mud habitat, the PMF species tall seapens was identified in two images along T03 and 8 images along T07 (**Appendix I**). A burrowing assessment was conducted on all images where image quality was assigned as poor or

[220] NMPi. Annual distribution and relative abundance of Killer whale (1979 - 1997). [Online] Available at: https://marine.gov.scot/maps/866

[221] www.marlin.ac.uk. (n.d.). The tall sea pen (Funiculina quadrangularis) - MarLIN - The Marine Life Information Network. [online] Available at: https://www.marlin.ac.uk/species/detail/1154

[222] Wilding, C., Durkin, O., Lacey, C., Philpott, E., Adams, L., Chaniotis, P., Wilkes, P.T.V., Seeley, R., Neilly, M., Dargie, J. and Crawford-Avis, O.T. (2016). Descriptions of Scottish Priority Marine Features (PMFs). [online] marine.gov.scot. Available at: https://marine.gov.scot/sma/content/descriptions-scottish-priority-marine-features-pmfs [Accessed 8 Feb. 2024].

higher. The assessment was undertaken on 361 images across all transects except T04. The highest density of burrows was observed along T03 (10.2 $m^2$) and the lowest (2.7 $m^2$) along T02. The density of tall seapens was low compared to the density of burrows, where density was higher along T07 (0.32 $m^2$) than T03 (0.05 $m^2$). No tall seapens were found along the transect possessing the highest density of burrows. This could indicate that while there is wide spread burrowed mud habitat associated with tall seapens, they are not present in high numbers **(Appendix I)**.

Further afield from the Proposed Development, GeMS[223] records indicate the presence of three areas supporting tall seapens.

Therefore, based on the available data (discussed above), it is determined that the Proposed Development, and the immediate marine environment, are of moderate importance to tall seapens, when considered in the wider context. As a result, the waters surrounding the Proposed Development are determined to be of **moderate** importance to tall seapens within Scottish waters.

##### 11.4.2.6.2 European Spiny Lobster (*Palinurus elephas*)

The European spiny lobster, also known as crayfish or crawfish, are predominantly found off the west coasts of Britian and Ireland towards Shetland. They are occasionally found off the north-east coast of Scotland, in addition to the Canary Isles and in the Mediterranean. Characterised by its robust exoskeleton adorned with pronounced spines and intricate colouration, this species is a notable component of Scotland's marine biodiversity. They typically inhabit rocky substrates and crevices along coastlines, where their diet consists of benthic invertebrates, including molluscs and crustaceans. Fisheries employ various techniques, including lobster pots and traps in order to target this species. Biologically, the European spiny lobster plays a crucial role in marine food webs and ecosystem dynamics, serving as both predator and prey. Its significance extends beyond its ecological role, as it holds economic and cultural importance within Scotland's maritime industries and culinary traditions.

SEPA identified the presence of PMF species European spiny lobster to the north of the Proposed Development, which they deemed could be at risk from bath and sediment influence. However, no presence of the species was found during the benthic visual survey.

Therefore, based on the available data (discussed above), it is determined that the Proposed Development, and the immediate marine environment, are of low importance to European spiny lobster, when considered in the wider context. As a result, the waters surrounding the Proposed Development are determined to be of **low** importance to European spiny lobster within Scottish waters.

### 11.4.3 Protected Habitats

#### 11.4.3.1 Priority Marine Features (PMFs)

Within the Modelling Screening and Risk Identification Report[45], published by SEPA, one broadscale PMF habitat was identified.

- Burrowed mud.

Within the refined study area based on the ZoI of the NewDEPOMOD modelled deposition, the benthic visual survey identified the presence of two broadscale PMFs, as detailed below:

- Burrowed mud; and
- Northern sea fan and sponge communities.

[223] Geodatabase of Marine Features Adjacent to Scotland (GeMS). [Online] Available at: https://data.gov.uk/dataset/39ac6703-66fb-40eb-a408-adc0b2997b45/gems-species-point-dataset

#### 11.4.3.1.1 Burrowed mud

Burrowed muds are areas of fine mud, sandy mud and muddy sand in water depths ranging from 10 m to greater than 500 m. The habitat is found in a range of environments, including sheltered muddy basins of sea lochs and voes, in full or variable salinities, and in deep water on the open coast. Scottish sea lochs and the northern North Sea support an estimated 95% of British records of burrowed mud habitat. Scottish records of this habitat are of international importance. Marine fish farms within sea lochs may have direct effects on the habitat but the scale of threat is considered low. Bottom trawling for Nephrops is likely to cause severe physical disturbance and a decline in species richness, with large slow growing species such as seapens and fireworks anemones particularly at risk[206].

SEPA identified a conspicuous area of the broadscale PMF burrowed mud to the east of the Proposed Development[34], however this area is not shown in the GeMS dataset. As a result of not being able to identify this area, nor the respective component biotope, the subsequent assessment will focus on the component biotopes identified through the visual survey as described below.

Throughout the visual survey area there were minor variations in seabed characteristics which were dominated by soft sediments, with sandy mud and fine mud accounting for the majority of the sediments. Within the broader area of these soft sediments two component biotopes of the broadscale burrowed mud PMF were observed, these included:

- SS.SMu.CFiMu.SpnMeg (Seapens and burrowing megafauna in circalittoral fine mud); and
- SS.SMu.CFiMu.SpnMeg.Fun (Seapens, including *Funiculina quadrangularis*, and burrowing megafauna in undisturbed circalittoral fine mud).

SS.SMu.CFiMu.SpnMeg was found along all transects surveyed. SS.SMu.CFiMu.SpnMeg.Fun was found along transects 3 and 7.

#### 11.4.3.1.2 Northern Sea Fan and Sponge Communities

This habitat is typically restricted to the West Coast of Scotland in UK waters. These communities grow on bedrock, boulders, and cobbles in areas with sufficient water movement to prevent smothering by the settling of fine sediments but sheltered from excessive wave action. They are threatened by organic enrichment, physical damage, and changes in local current flow[224]. Physical damage from the use of bottom gear on rocky seabed areas, such as potting, some fixed nets and trawling, may lead to the detachment of sessile species within this habitat.

Throughout the survey area a single component biotope (CR.MCR.EcCr.CarSwi) of the broadscale northern sea fans and sponge communities PMF was observed in three of the still images collected along transect T04A.

### 11.4.3.2 92/43/EEC Annex I Habitat Features

The visual survey conducted at the Proposed Development identified evidence of the presence of Annex I reef habitats as previously described in **Section 7**, and detailed below:

- CR.MCR.EcCr.CarSwi (*Caryophyllia smithii* and *Swiftia pallida* on circalittoral rock); and
- CR.HCR.XFa (Mixed faunal turf communities).

Annex I reef habitat is afforded protection under the Habitats Directive (92/44/EEC) when designated as a feature within an SAC. Geogenic reefs can be variable in terms of both their structure and the communities that they support. They provide a suitable substrate for many sessile species such as

[224] www.gov.scot. (n.d.). *Scotland's Marine Atlas: Information for The National Marine Plan*. [online] Available at: https://www.gov.scot/publications/scotlands-marine-atlas-information-national-marine-plan/pages/28/.

corals, sponges and sea squirts, and algal species, as well as providing shelter to fish, and crustaceans such as lobsters and crabs. These reefs can be classified as either bedrock or stony reefs depending on the nature of the substrate.

Evidence of Annex I bedrock and medium stony reef was observed at T04A. The mapped Annex I bedrock and medium stony reef corresponded to CR.MCR.EcCr.CarSwi (*Caryophyllia smithii* and *Swiftia pallida* on circalittoral rock).

# 11.5 Identify Potential Impacts

## 11.5.1 Zone of Influence (ZoI)

As defined by CIEEM, the ZoI for a project is the area over which ecological features may be affected by biophysical changes as a result of the project and the associated impact pathways. This is likely to extend beyond the project, for example where there are ecological or hydrological links beyond the project boundary. The ZoI is also likely to vary dependent on specific ecological feature sensitivity to a specific impact pathway. As such it is likely that the Proposed Development will give rise to multiple ZoI. A summary of the impact pathways considered relevant to the Proposed Development, and the associated ZoI for each impact pathway is provided in **Figure 10.8**.

**Table 11.9: Summary of the ZoI of the Proposed Development in relation to the ecological features identified within the baseline condition.**

| Qualify Feature Type | Maximum ZoI | Rationale |
|---|---|---|
| Benthic habitats and sessile benthic species or benthic species of low mobility. | **Primary ZoI (spatial extent of potential impacts):**<br>**Organic material deposition:** Spatial extent of the NewDEPOMOD Mixing Zone.<br><br>**Physical abrasion:** Specific location of anchors and mooring chains within the mooring area.<br><br>**Secondary ZoI (spatial extent of potential effects):**<br>Due to the highly limited mobility of benthic features, the primary ZoI is considered to represent the spatial extent over which effects are likely to occur. | NewDEPOMOD model outputs for the Proposed Development have identified a Mixing Zone extent, within which organic deposition is modelled to exceed 250 $g/m^2/yr^{-1}$.<br><br>Outwith this Mixing Zone SEPA have stated that organic deposition is likely to be at acceptable levels[45].<br><br>The mooring anchors and associated chains have the potential to impact benthic communities through direct physical abrasion. Therefore, outwith the area directly contacted by the mooring anchors and chains, ecological features are unlikely to be impacted. |

| Qualify Feature Type | Maximum ZoI | Rationale |
|---|---|---|
| **Bird Species** | **Primary ZoI (spatial extent of potential impacts):**<br>**Infrastructure:** Surface area of the pens, top netting, and feed barge.<br><br>**Vessel Transit Route (VTR):** Length of the VTR. (species specific disturbance buffers are applicable).<br><br>**Organic material deposition:** Spatial extent of the NewDEPOMOD Mixing Zone.<br><br>**In-feed Medicines:** Spatial extent of the NewDEPOMOD Mixing Zone**.**<br><br>**Secondary ZoI (spatial extent of potential effects):**<br>Due to the highly mobile nature of seabird species, that typically forage over large areas, the potential impacts of the Proposed Development may have an effect over a large area, related to the connectivity of the feature and the Proposed Development, this is typically based on mean foraging range[43]. | Whilst seabirds often forage across large spatial extents, the Proposed Development is only likely to interact with seabirds within the spatial extent on the surface infrastructure (pens, top netting, and feed barge), the VTR (between the shorebase and the Proposed Development), and the Mixing Zones for organic material deposition and in-feed medicine deposition.<br><br>However, due to the highly mobile nature of seabird species, the Proposed Development may affect seabirds over a greater spatial extent. |

| Qualify Feature Type | Maximum ZoI | Rationale |
|---|---|---|
| **Cetacean Species** | **Primary ZoI (spatial extent of potential impacts):**<br>**Infrastructure:** Surface area of the pens and feed barge.<br><br>**Netting (sub-surface):** Lateral surface area of netting – total)<br><br>**VTR:** Length of the VTR, plus a 1 km disturbance buffer.<br><br>**Organic material deposition:** Spatial extent of the NewDEPOMOD Mixing Zone.<br><br>**In-feed Medicines:** Spatial extent of the NewDEPOMOD Mixing Zone.<br><br>**Secondary ZoI (spatial extent of potential effects):**<br>Due to the highly mobile nature of cetaceans, there is the potential for the Proposed Development to affect cetaceans over a larger spatial area, as individuals from far afield may transit through the primary ZoI of the Proposed Development. As such a precautionary secondary ZoI of 15 km has been applied. | Whilst cetaceans are highly mobile, the Proposed Development is only likely to interact with cetaceans within the spatial extent on the surface infrastructure (pens and feed barge), sub-surface netting, and mooring extent, the VTR and associated disturbance buffers (between the shorebase and the Proposed Development), and the Mixing Zones for organic material deposition and in-feed medicine deposition.<br><br>However, due to the highly mobile nature of cetaceans, the Proposed Development may affect cetaceans over a greater spatial extent. |
| **Terrestrial species/Habitats** | Scoped Out | The Proposed Development will be constructed and operated solely in the marine environment. |

## 11.5.2 Important Ecological Features

In order to better focus the assessment of potential impacts on the ecological features within the baseline condition, and to help determine whether an ecological feature qualifies as an IEF, a screening assessment was undertaken to identify the distinct impact pathways most likely to result in significant effects on the ecological features.

The screening assessment considered the behavioural sensitivity of each ecological feature to the identified impact pathways, each ecological feature's ecological traits, the determined abundance and density of each ecological feature within the environment surrounding the Proposed Development, and the proposed embedded design and operational mitigation. Where impacts on each ecological feature were not predicted to be significant, that ecological feature was screened out of further assessment within this EcIA. Where the determination of significant effect was uncertain, the precautionary principle was applied, and the ecological feature was screened as an IEF.

**Table 11.10** below, summarises the baseline ecological features (designated sites, protected species, and protected habitats) identified within the ZoI of the Proposed Development, outlining whether or not each ecological feature has been classified as an IEF, with the rationale for the decision provided. The value of the ecological features has been assessed on a project-specific basis.

**Table 11.10: Potential impact pathway screening assessment for IEFs identified within the baseline condition.**

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| **Designated Sites** | | | | | | |
| SACs | International | Local | Marine vessel activity, with the potential to cause disturbance, injury or mortality.<br><br>Underwater noise, with the potential to cause disturbance and exclusion.<br><br>Entanglement in fish farm infrastructure, with the potential to cause injury or mortality.<br><br>Loss of, or damage to, prey supporting habitats. | The Inner Hebrides and Minches SAC was the only identified SAC within the baseline condition.<br><br>Whilst harbour porpoise are potentially sensitive to the four identified impact pathways BFS has committed to a suite of effective embedded mitigation to avoid, prevent, and reduce the identified impacts.<br><br>Full details of the embedded mitigation measures and their relevance to the identified impact pathways are provided in **Sub-Section 11.3**.<br><br>Based upon the characteristics of the Proposed Development, the nature of the potential impact pathways, and the embedded mitigation it is determined that the impact pathways are unlikely to give rise to significant effects. | **Screened Out** | **No** |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| SPAs | International | Local | Entanglement or entrapment in top, pen, or anti-predator netting<br>Disturbance in the vicinity of the Proposed Development and Vessel Transit Route (VTR)<br>Direct displacement from the footprint of the Proposed Development<br>Loss of, or damage to prey-supporting habitats | Four SPAs were identified within the baseline condition, with the Sea of St. Kilda SPA being the closest at 73.69 km.<br><br>Whilst the identified ornithological qualifying features are potentially sensitive to the four identified impact pathways BFS has committed to a suite of effective embedded mitigation to avoid, prevent, and reduce the identified impacts.<br><br>Full details of the embedded mitigation measures and their relevance to the identified impact pathways are provided in **Sub-Section 11.3**.<br><br>Based upon the characteristics of the Proposed Development, the nature of the potential impact pathways, and the embedded mitigation it is determined that the impact pathways are unlikely to give rise to significant effects. | **Screened Out** | **No** |
| NCMPA | National | Local | Marine vessel activity, with the potential to cause | The North East Lewis was the only identified NCMPA within the baseline condition. | **Screened Out** | **No** |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | disturbance, injury or mortality.<br>Underwater noise, with the potential to cause disturbance and exclusion.<br>Entanglement in fish farm infrastructure, with the potential to cause injury or mortality.<br>Loss of, or damage to, prey supporting habitats. | Whilst the identified qualifying features are potentially sensitive to the four identified impact pathways BFS has committed to a suite of effective embedded mitigation to avoid, prevent, and reduce the identified impacts.<br><br>Full details of the embedded mitigation measures and their relevance to the identified impact pathways are provided in **Sub-Section 11.3**.<br><br>Based upon the characteristics of the Proposed Development, the nature of the potential impact pathways, and the embedded mitigation it is determined that the impact pathways are unlikely to give rise to significant effects. | | |
| **Confidential Species** | | | | | | |
| Confidential Species | Confidential | Confidential | Confidential | Confidential (**See Appendix V**) | **Screened In** | **Yes** |
| **Ornithological Features** | | | | | | |
| Arctic tern | International | Local | Marine vessel activity, with the potential to cause | The baseline assessment determined that the waters around the Proposed | **Screened Out** | **No** |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | disturbance, injury or mortality<br>Underwater noise, with the potential to cause disturbance and exclusion<br>Entanglement in fish farm infrastructure, with the potential to cause injury or mortality<br>Loss of, or damage to, prey-supporting habitats | Development support negligible to low abundance.<br><br>As such, the development location and wider marine environment are determined to be of negligible to low importance to arctic tern.<br><br>Due to the negligible to low abundance, the nature of the impact-inducing activities associated with the Proposed Development, and the embedded mitigation measures outlined within **Sub-Section 11.3**, it is determined that the Proposed Development is unlikely to result in a breach of legislation concerning this feature. As such this feature is not considered an IEF.<br><br>The identified impact pathways are therefore unlikely to significantly affect this feature. | | |
| **Elasmobranchs** | | | | | | |
| Basking shark | International | Local | Marine vessel activity, with the potential to cause | The baseline assessment determined that the waters around the Proposed | **Screened Out** | **No** |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | disturbance, injury or mortality<br>Underwater noise, with the potential to cause disturbance and exclusion<br>Entanglement in fish farm infrastructure, with the potential to cause injury or mortality<br>Loss of, or damage to, prey-supporting habitats | Development support negligible to low abundance.<br><br>As such, the development location and wider marine environment are determined to be of negligible to low importance to basking sharks (**Sub-Section 11.4.2.3.1**).<br><br>Due to the negligible to low abundance, the nature of the impact-inducing activities associated with the Proposed Development, and the embedded mitigation measures outlined within **Sub-Section 11.3**, it is determined that the Proposed Development is unlikely to result in a breach of legislation concerning this feature. As such this feature is not considered an IEF.<br><br>The identified impact pathways are therefore unlikely to significantly affect this feature. | | |
| **Cetaceans** | | | | | | |
| Bottlenose dolphin | International | Regional | Marine vessel activity, with the potential to cause | The baseline assessment determined that the waters around the Proposed | **Screened Out** | **No** |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | disturbance, injury or mortality<br><br>Underwater noise, with the potential to cause disturbance and exclusion<br><br>Entanglement in fish farm infrastructure, with the potential to cause injury or mortality<br><br>Loss of, or damage to prey-supporting habitats | Development support negligible to low abundance.<br><br>As such, the development location and wider marine environment are determined to be of negligible to low importance to bottlenose dolphin<br><br>Due to the negligible to low abundance, the nature of the impact-inducing activities associated with the Proposed Development, and the embedded mitigation measures outlined within **Sub-Section 11.3**, it is determined that the Proposed Development is unlikely to result in a breach of legislation concerning this feature. As such this feature is not considered an IEF.<br><br>The identified impact pathways are therefore unlikely to significantly affect this feature. | | |
| Harbour porpoise | International | International | Marine vessel activity, with the | Harbour porpoise are reportedly at risk of collision with marine vessels[225]. | **Screened Out** | **No** |

[225] NatureScot. Conservation and Management Advice. Inner Hebrides and the Minches SAC. [Online] Available at: https://sitelink.nature.scot/site/10508

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | potential to cause disturbance, injury or mortality | However, there is little evidence available in the literature to suggest a high frequency of collision between marine vessels and harbour porpoise within UK waters[226].<br><br>The evidence available suggests only incidental levels of collision, with the UK Cetacean Strandings and Investigation Programme (CSIP) only identifying 0.48 % of harbour porpoise (5/1,041 necropsies) with injuries consistent with fatal collision with marine vessels between 2000 and 2010.<br><br>The Proposed Development would result in a negligible increase in marine vessel activity, with up to two additional vessels (9 m RIB and up to 23 m workboat) undertaking a single return journey per working day. | | |

[226] IAMMWG, Camphuysen, C.J. & Siemensma, M.L. 2015. A Conservation Literature Review for the Harbour Porpoise (Phocoena phocoena). JNCC Report No. 566, Peterborough. 96pp. [Online] Available at: https://data.jncc.gov.uk/data/e3c85307-1294-4e2c-9864-f4dd0f195e1e/JNCC-Report-566-FINAL-WEB.pdf

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | | The identified impact pathway is unlikely to significantly affect this feature. | | |
| | | | Underwater noise, with the potential to cause disturbance and exclusion. | ADDs will not be utilised at the Proposed Development.<br><br>There is emerging evidence suggesting that harbour porpoise are sensitive to the high frequency (HF) component of engine noise. Development may impact minke whales. However, due to the short distance between the shorebase and the Proposed Development and the infrequent transit of vessels between these two locations, this impact is unlikely to significantly impact harbour porpoise utilising the area. | **Screened Out** | |
| | | | Entanglement in fish farm infrastructure, with the potential to cause injury or mortality | Harbour porpoise are considered to be sensitive to entanglement[225].<br><br>High rigidity netting will be used at the Proposed Development, limiting the potential for entanglement. The Inner Hebrides and the Minches SAC harbour porpoise population is part of the wider West Scotland Management Unit, which | **Screened Out** | |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | | has an estimated population of 21,462 (9,740 to 47,289).<br><br>In addition, the harbour porpoise feature was assessed as 'favourable maintained' in 2018, suggesting that population level effects would only be realised following significant sustained net entanglement leading to serious injury or death.<br><br>The identified impact pathway is unlikely to significantly affect this feature. | | |
| | | | Loss of, or damage to prey-supporting habitats | Harbour porpoise are considered sensitive to habitat and prey species loss.<br><br>They feed on a variety of prey species with sandeel, whiting, herring, and sprat being of particular importance.<br><br>Spatial assessment indicates that the waters around the Proposed Development are spawning and nursey grounds for sandeel, whiting, but not for herring.<br><br>Marine modelling indicates no organic deposition over 250 $g/m^2/yr^{-1}$, therefore, | **Screened Out** | |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | | significant effects on benthic habitats are not predicted..<br><br>The identified impact pathway is unlikely to significantly affect this feature. | | |
| Minke whale | National | Regional | Marine vessel activity, with the potential to cause disturbance, injury or mortality | Minke whales are thought to be less at risk of collision than other baleen whales, with marine vessel collision being identified as the cause or probable cause in 4.3 % (17 out of 396 strandings)[227] of stranding events.<br><br>The waters surrounding the Proposed Development are of low to moderate importance to minke whales from the Celtic and Greater North Seas MU.<br><br>The identified impact pathway is unlikely to significantly affect this feature. | **Screened Out** | **No** |
| | | | Underwater noise, with the potential to cause disturbance and exclusion | ADDs will not be utilised at the Proposed Development.<br><br>There is the potential that underwater noise generated from the marine vessels | **Screened Out** | |

[227] Van Der Hoop, J.M., Moore, M.J., Barco, S.G., Cole, T.V., DAOUST, P.Y., Henry, A.G., McAlpine, D.F., McLellan, W.A., Wimmer, T. and Solow, A.R., 2013. Assessment of management to mitigate anthropogenic effects on large whales. Conservation Biology, 27(1), pp.121-133. [Online] Available at: https://conbio.onlinelibrary.wiley.com/doi/full/10.1111/j.1523-1739.2012.01934.x

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | | associated with the Proposed Development may impact minke whales. However, due to the short distance between the shorebase and the Proposed Development and the infrequent transit of vessels between these two locations, this impact is unlikely to significantly impact minke whales utilising the area. | | |
| | | | Entanglement in fish farm infrastructure, with the potential to cause injury or mortality | Entanglement in commercial fishing gear has been identified as the largest anthropogenic cause of minke whale mortality in Scottish waters. With entanglement in the groundlines of creel gear representing 82 % of minke whale entanglement[228].<br><br>These entanglement events are associated with 'floating loops', loosely tensioned sections of ground line between creels, where sufficient slack in the rope exists to result in entanglement[228].<br><br>High rigidity netting will be used at the Proposed Development, along with an | **Screened Out** | |

[228] MacLennan, Ellie & Leaper², Russell & Brownlow, Andrew & Calderan, Susannah & Jarvis, Dan & Hartny-Mills, Lauren & Ryan, Conor & Yamada, Chika. (2020). Estimates of humpback and minke whale entanglements in Scotland. [Online} Available at: https://www.researchgate.net/publication/345146035_Estimates_of_humpback_and_minke_whale_entanglements_in_Scotland/citation/download

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | | effective tensioning system. This will significantly reduce the potential for entanglement should any minke whales come into contact with the netting.<br><br>The identified impact pathway is unlikely to significantly affect this feature. | | |
| | | | Loss of, or damage to prey-supporting habitats | The waters surrounding the Proposed Development have been determined to be of low to moderate importance to minke whales within the Celtic and Greater North Seas MU.<br><br>Marine modelling indicates no organic deposition above 250 $g/m^2/yr^{-1}$, therefore significant effects on benthic habitats are not predicted.<br><br>The identified impact pathway is unlikely to significantly affect this feature. | **Screened Out** | |
| White-beaked dolphin | International | Local | Marine vessel activity, with the potential to cause disturbance, injury or mortality | The baseline assessment determined that the waters around the Proposed Development support **a high** abundance. As such, the development location and wider marine environment are determined | **Screened Out** | **No** |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | Underwater noise, with the potential to cause disturbance and exclusion<br>Entanglement in fish farm infrastructure, with the potential to cause injury or mortality<br>Loss of, or damage to prey-supporting habitats | to be of **moderate to high** importance to white-beaked dolphin (**Sub-Section 11.4.2.4.4**).<br><br>Due to the embedded mitigation measures outlined within **Sub-Section 11.3**, it is determined that the Proposed Development is unlikely to result in a breach of legislation concerning this feature. As such this feature is not considered an IEF.<br><br>The identified impact pathways are unlikely to significantly affect this feature. | | |
| Risso's dolphin | International | Local | Marine vessel activity, with the potential to cause disturbance, injury or mortality<br>Underwater noise, with the potential to cause disturbance and exclusion<br>Entanglement in fish farm infrastructure, with the potential to | The baseline assessment determined that the waters around the Proposed Development support high abundance.<br><br>As such, the development location and wider marine environment are determined to be of high importance to Risso's dolphin (**Sub-Section 11.4.2.4.5**).<br><br>Due to the embedded mitigation measures outlined within **Sub-Section 11.3**, it is determined that the Proposed | **Screened Out** | **No** |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | cause injury or mortality<br>Loss of, or damage to prey-supporting habitats | Development is unlikely to result in a breach of legislation concerning this feature. As such this feature is not considered an IEF.<br><br>The identified impact pathways are unlikely to significantly affect this feature. | | |
| Short-beaked common dolphin | International | Local | Marine vessel activity, with the potential to cause disturbance, injury or mortality<br>Underwater noise, with the potential to cause disturbance and exclusion<br>Entanglement in fish farm infrastructure, with the potential to cause injury or mortality<br>Loss of, or damage to prey-supporting habitats | The baseline assessment determined that the waters around the Proposed Development support negligible abundance.<br><br>As such, the development location and wider marine environment are determined to be of negligible to low importance to short-beaked common dolphin (**Sub-Section 11.4.2.4.6**).<br><br>Due to the negligible abundance of this feature, the nature of the impact-inducing activities associated with the Proposed Development, and the embedded mitigation measures outlined within **Sub-Section 11.3**, it is determined that the Proposed Development is unlikely to result in a breach of legislation concerning this | **Screened Out** | **No** |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | | feature. As such this feature is not considered an IEF.<br><br>The identified impact pathways are unlikely to significantly affect this feature. | | |
| Orca | International | Local | Marine vessel activity, with the potential to cause disturbance, injury or mortality<br>Underwater noise, with the potential to cause disturbance and exclusion<br>Entanglement in fish farm infrastructure, with the potential to cause injury or mortality<br>Loss of, or damage to prey-supporting habitats | The baseline assessment determined that the waters around the Proposed Development support negligible abundance.<br><br>As such, the development location and wider marine environment are determined to be of negligible importance to orca (**Sub-Section 11.4.2.4.7**).<br><br>Due to the negligible abundance of this feature, the nature of the impact-inducing activities associated with the Proposed Development, and the embedded mitigation measures outlined within **Sub-Section 11.3**, it is determined that the Proposed Development is unlikely to result in a breach of legislation concerning this feature. As such this feature is not considered an IEF. | **Screened Out** | **No** |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | | The identified impact pathways are unlikely to significantly affect this feature. | | |
| **Benthic Features (Habitat and Species)** | | | | | | |
| Northern sea fan and sponge communities | International | Local | Abrasion / disturbance of the surface of the substratum or seabed | The component biotope CR.MCR.EcCr.CarSwi of the broadscale PMF northern sea fan and sponge communities was identified in three images within the benthic survey area. These examples of this biotope are located within the mooring area ZoI, however, they are considered sufficiently distanced from the mooring points to ensure that they are not impacted by direct physical abrasion and disturbance.<br><br>The identified impact pathway is unlikely to significantly affect this feature. | **Screened Out** | **No** |
| | | | Organic material deposition as result of the operation of the Proposed Development | Detailed three dimensional marine modelling indicates that organic deposition within the area of this biotope will be negligible and well below the SEPA threshold of 250 $g/m^2$.<br><br>The identified impact pathway is unlikely to significantly affect this feature. | **Screened Out** | |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | In-feed residue deposition as a result of the operation of the Proposed Development | The biotope is outwith the ZoI for in-feed medicines and as such this impact pathway is unlikely to significantly affect this feature. | **Screened Out** | |
| Burrowed mud | International | Regional | Abrasion / disturbance of the surface of the substratum or seabed | Two component biotopes of burrowed mud were identified within the visual survey area, SS.SMu.CFiMu.SpnMeg and SS.SMu.CFiMu.SpnMeg.Fun. In addition, the component species tall seapen (*F. quadrangularis)* was identified in association with SS.SMu.CFiMu.SpnMeg.Fun.<br><br>SS.SMu.CFiMu.SpnMeg overlaps with the mooring system for the Proposed Development, and therefore may be impacted by this impact pathway. Further assessment will be required to determine the magnitude of the overall impact.<br><br>However, the other biotope does not occur within the vicinity of the mooring lines and anchors, and therefore this biotope has been screened out of further assessment. | **Screened In** | **Yes** |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | Organic material deposition as result of the operation of the Proposed Development | Both component biotopes overlaps with the organic deposition ZoI and therefore may be impacted by this impact pathway. Further assessment will be required to determine the magnitude of the overall impact. | **Screened In** | |
| | | | In-feed residue deposition as a result of the operation of the Proposed Development | Both component biotopes overlaps with the in-feed residue deposition ZoI and therefore may be impacted by this impact pathway. Further assessment will be required to determine the magnitude of the overall impact. | **Screened In** | |
| European spiny lobster (*Palinurus elephas*) | | | Abrasion / disturbance of the surface of the substratum or seabed | Due to the low abundance of this feature, the nature of the impact-inducing activities associated with the Proposed Development, and the distance of the feature from the Proposed Development, it is determined that the Proposed Development is unlikely to result in a breach of legislation concerning this feature. As such this feature is not considered an IEF. | **Screened Out** | **No** |
| | | | Organic material deposition as result of the operation of the Proposed Development | | | |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | In-feed residue deposition as a result of the operation of the Proposed Development | The identified impact pathways are therefore unlikely to significantly affect this feature. | | |
| Annex 1: Reefs | Regional | Local | Abrasion / disturbance of the surface of the substratum or seabed | Evidence of Annex I bedrock and medium stony reef was observed at T04A. However, they are considered sufficiently distant from the mooring points to ensure that they are not impacted by direct physical abrasion and disturbance. Therefore, connectivity is not predicted. | **Screened Out** | **No** |
| | | | Organic material deposition as result of the operation of the Proposed Development | Detailed three-dimensional marine modelling indicates that organic material deposition within the area covered by the biotope is below the 250 $g/m^2$ threshold, as defined by SEPA.<br><br>The identified impact pathways are unlikely to significantly affect this feature. | **Screened Out** | |
| | | | In-feed residue deposition as a result of operation of the | The biotope is outwith the ZoI for in-feed medicines and as such this impact pathway is unlikely to significantly affect this feature. | **Screened Out** | |

| IEF Name | General geographic importance | Intrinsic Value of the Feature in the Context of the Proposed Development | Potential Impact Pathway | Rationale | Screening Outcome | IEF (Yes / No) |
|---|---|---|---|---|---|---|
| | | | Proposed Development | | | |

### 11.5.3 Identified Potential Impacts

Based upon the conclusions presented in **Sub-Section 11.5.2**, the following potential impact pathways will be assessed in relation to:

Benthic Features:

- Abrasion / disturbance of the surface of the substratum or seabed;
- Organic material deposition as result of the operation of the Proposed Development; and
- In-feed residue deposition as a result of the operation of the Proposed Development.

## 11.6 Evolution of the Baseline Condition

The EIA Regulations require that; ***"A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge"*** (EIA Regulations, Schedule 4, Paragraph 3), is included within the EIAR. Therefore, this Sub-Section of the EIAR, provides a qualitative description of the evolution of the baseline condition, on the assumption that the installation and subsequent long-term operation of the Proposed Development does not take place. The description is based on available information and scientific knowledge of the ecology of the IEFs identified within the baseline condition.

#### 11.6.1.1 Benthic Features

Benthic habitats and communities are known to experience significant natural variation. However, the potential impacts of climate change of these benthic features must also be considered. Variability and longer-term changes of physical processes and influences may bring both direct and indirect changes to benthic habitats and communities over the medium to long-term[48]. Current scientific literature presents a strong case indicating that long-term changes to the ecology of the benthic environment may be related to long-term trends in the climate and trends in nutrient availability[48]. There is also evidence indicating that climate change is driving shifts in the abundance and composition of benthic communities[49]. Literature relating to benthic ecology and communities indicate that, over the previous three decades, benthic biomass has increased by 250 %. This increase in benthic biomass has coincided with the increase in short-lived, opportunistic r-selected species, and the decline in long-lived, sessile k selected species[50,51].

Sea surface temperature modelling has shown that, over the last 50 years, the rate of temperature increase has been lower in waters on the west of the UK in comparison to the east coast, this trend is predicted to continue over the next 50 year period[52]. Within Scottish waters, sea temperatures have risen in line with the global trend. Scottish coastal and oceanic water have warmed by between 0.05 and 0.07 °C per decade across the long-term period 1870 to 2016. However, temperature increases have not been constant across this period, with spatial variation also noted across Scottish waters. Within Scottish waters natural variability in sea temperature over decadal and multi-decadal temporal periods has been observed, but the warming trend in Scottish sea temperatures over the most recent 30 year period has been greater than the long-term period (1870 to 2016). The warming in the last 30 year period has been approximately 0.2 °C per decade. The warming has been greatest in the region of the Faroe-Shetland Channel and further northwards, with trends here reaching 0.4 °C per decade[53].

In addition, whilst the majority of climate change literature has focused on the potential impacts of temperature change, sea temperature rise, climate change also causes deoxygenation of the water column. The oxygen content of marine waters in believed to have decreased by 0.06 to 0.43 % over the previous 50 years[54], this is expected to reduce by a further 7 % by the year 2100[55]. The long-term monitoring of a benthic community, within the Firth of Clyde, illustrated that that the community had been adversely affected by decreasing oxygen levels through time. This finding correlates with a number of studies conducted over shorter temporal periods[56, 57].

Based on the above, the baseline condition described for the Proposed Development should be viewed as a snapshot in time of the present benthic ecosystem and character within a marine environment that displays natural and anthropogenically induced change. Therefore, any changes that may occur to benthic ecosystems during the construction (and decommissioning) and the operation of the Proposed Development should be considered and assessed in the context of variability and sustained trends occurring at a national and international scale, and the changes that would be expected to occur naturally in the absence of the Proposed Development.

## 11.7 Impact Assessment

### 11.7.1 Construction Impacts

Based on the outcomes of the impact pathway screening conducted within **Sub-Section 11.5.2**, the majority of impacts on IEFs associated with the construction and installation of the Proposed Development have been excluded from further assessment. This is due to the short-term and relatively low impact nature of the construction and installation phase. However, the screening exercise did highlight that due to the proposed timing on the construction and installation works, one IEF, may display increased sensitivity to potential impacts, this is covered in a separate assessment (See **Appendix V**).

### 11.7.2 Operational Impacts

#### 11.7.2.1 Benthic Habitat IEFs

##### 11.7.2.1.1 Abrasion / Disturbance of the Surface of the Substratum or Seabed

###### 11.7.2.1.1.1 Nature of Impact

There is the potential that the Proposed Development may cause abrasion and disturbance, resulting in damage to, or mortality of, characterising benthic communities that form discrete benthic habitats. Whilst the majority of finfish infrastructure floats upon the surface (pens and feed barge), the mooring lines and anchors of the grid and mooring system, do contact the benthos.

The mooring analysis for the Proposed Development has specified that 27 plough anchors are required to hold the grid system and pens in place. These anchors will be embedded within the substrate. Therefore, once they have been placed and fixed in place, they are likely to represent a static object, meaning that repeated abrasion and disturbance in the vicinity of each anchor is unlikely. Due to the mooring system utilising catenary mooring lines, a small portion of the mooring line will also be in contact with the benthos. Again, the spatial extent of any abrasion and disturbance associated with these sections of the mooring line is likely to be limited to the immediate proximity of the mooring lines, themselves.

###### 11.7.2.1.1.2 Duration of Impact

This impact is determined to be **short-term** and **temporary**. It is considered **short-term** as the installation phase is anticipated to take 26 days (worst-case scenario) to complete, meaning that any impact on the IEF will be temporally constrained. It is considered **temporary** as, once the installation process is complete and the mooring system embedded within the benthos, it is anticipated that there will be no large-scale, macro movement of the infrastructure that could result in continuous abrasion or disturbance.

###### 11.7.2.1.1.3 Burrowed Mud PMF

###### 11.7.2.1.1.3.1 Importance of IEF

SS.SMu.CFiMu.SpnMeg has been assigned a project-specific importance value of ‘**regional**’.

#### 11.7.2.1.1.3.2 Magnitude of Unmitigated Impact

As detailed in **Sub-Section 11.5** only the component biotope SS.SMu.CFiMu.SpnMeg of the burrowed mud PMF was identified to occur within the ZoI of this impact pathway.

SS.SMu.CFiMu.SpnMeg is a biotope typically dominated by burrowing crustaceans, including langoustine (*Nephrops norvegicus*), the mud shrimps (*Calocaris macandreae*, *Callianassa subterranean*, or *Maera loveni)* and the crab (*Goneplax rhomboides)*. The burrowing action of these species makes burrows and mounds a prominent feature of this habitat. Areas of fine mud, sandy mud and muddy sand in water depths ranging from 10 m to greater than 500 m within Scottish sea lochs and the northern North Sea support an estimated 95 % of British records of burrowed mud habitat. In some areas, burrowed mud may support conspicuous populations of seapens (*Pennatula phosphorea* and *Virgularia mirabilis*). Seapens are typically epifaunal and therefore are likely to be negatively impacted by abrasion. Significant damage can be caused by fishing with varying levels of damage occurring based on the method used. Static equipment such as creels can cause damage, but it is minimal when compared to mobile gear (bottom trawling). Fishing for multiple species occurs within the area utilising a number of methods including trawling and creels. Based on this it is likely that burrowed mud habitats in this area have already been impacted by this activity, which may be why in an area of high burrowed mud distribution no seapens were identified [229] (**Appendix I**). However, the visual survey did not identify any of the characterising seapens within SS.SMu.CFiMu.SpnMeg, and therefore this biotope is not considered to be a high quality example of this component biotope.

A bespoke mooring system has been developed for the Proposed Development based on the prevailing environmental conditions of the development location (**See Figure 11.1**). The mooring system will be comprised of 27 plough anchors for the pens and eight for the feed barge, of these, 21 plough anchor will be positioned and secured within a patch of SS.SMu.CFiMu.SpnMeg. Available evidence indicates that the impact of abrasion on this biotope is primarily related to repetitive mobile fishing activity (scallop dredging and bottom trawling), where abrasion occurs over large areas of the biotope. In contrast, the abrasion and disturbance impact from the plough anchors will be constrained through both space and time as the impact will only influence the IEF within close proximity to the contact location and, once the anchor is embedded, repeat abrasion and disturbance is unlikely.

[229] Natural Heritage, S. (n.d.). Descriptions of Scottish Priority Marine Features (PMFs). [online] Available at: https://www.nature.scot/sites/default/files/Publication%202016%20-%20SNH%20Commissioned%20Report%20406%20-%20Descriptions%20of%20Scottish%20Priority%20Marine%20Features%20%28PMFs%29.pdf

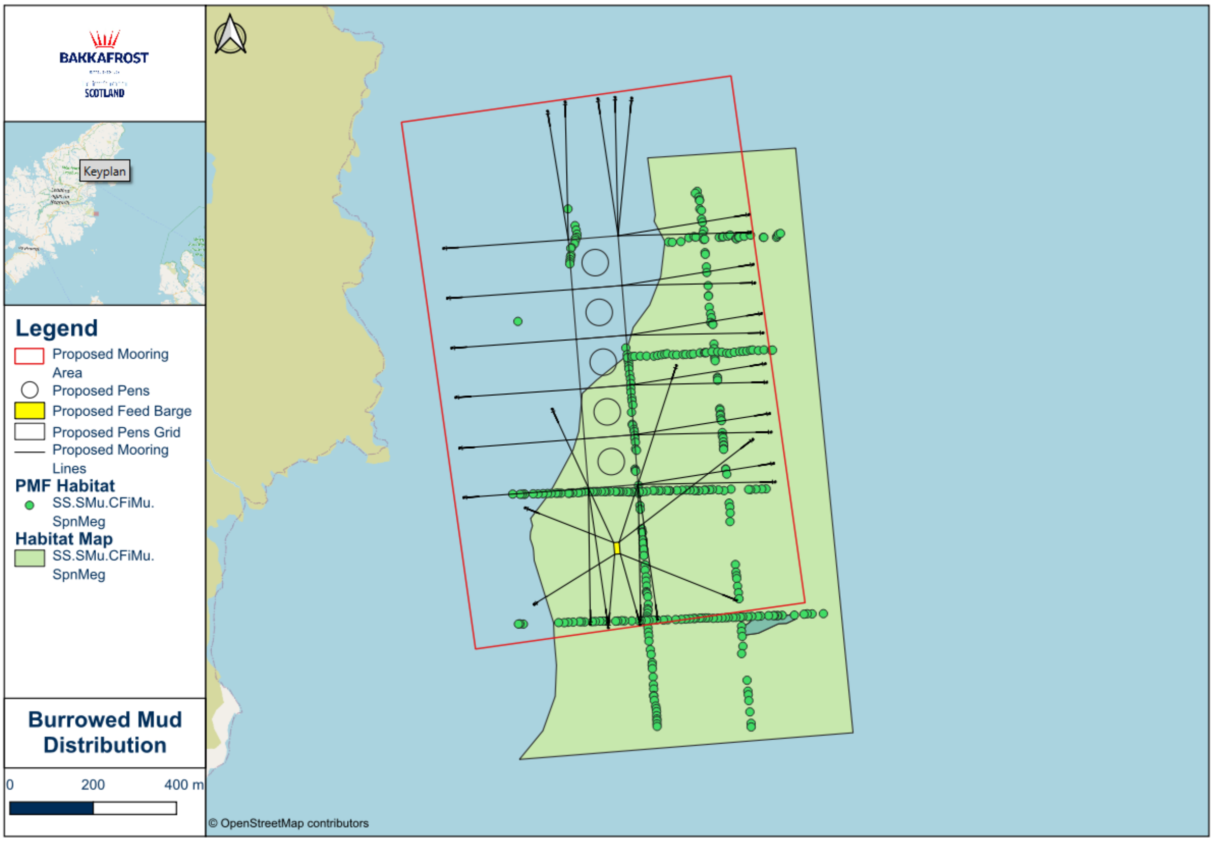


**Figure 11.1: Burrowed mud distribution in relation to mooring system.**

It is likely that this component biotope displays medium sensitivity (medium resistance and low resilience) to this impact pathway, whilst none of the characterising seapens were identified through the visual survey it is important to note that these species can avoid abrasion by withdrawing into the sediment, but frequent disturbance events may potentially reduce feeding times and hence the viability of these species[230]. Therefore, single abrasion events such as the placement of mooring system anchors are unlikely to significantly affect the seapens and the component biotope. If a single disturbance event does damage or dislodge the seapens from the sediment, recovery is likely to take place. During the installation process ROVs can be utilised to allow micro-siting of the anchor and chain to avoid areas where epifauna are present. However, as no characterising seapens were identified within SS.SMu.CFiMu.SpnMeg it is unlikely that this impact pathway will result in a reduction of the quality, or complete loss of this biotope.

Burrowed mud including the component SS.SMu.CFiMu.SpnMeg are considered to be important on a national scale and are distributed extensively throughout sheltered sea lochs, voes and other open coast muddy habitats on the west coast of Scotland, as well as the continental slope[229229]. Due to the absence of characterising seapens associated with this biotope and the limited spatial extent of the biotope in comparison to its national distribution. It is determined that the identified biotope does not significantly contribute to the national status of the burrowed mud PMF.

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[230] Marlin.ac.uk. (2022). Seapens and burrowing megafauna in circalittoral fine mud - MarLIN - The Marine Life Information Network. [online] Available at: https://www.marlin.ac.uk/habitats/detail/131/seapens_and_burrowing_megafauna_in_circalittoral_fine_mud

As a result of the limited spatial extent and the one-off nature of the impact, coupled with the reduced sensitivity to single event abrasion and the absence of seapens within that habitat, the overall magnitude is determined to be **negligible**.

###### 11.7.2.1.1.3.3 Significance of Effect without Mitigation

In light of the assessed **negligible magnitude** of the impact, the effect is assessed as **not significant** in relation to the EIA Regulations.

###### 11.7.2.1.1.3.4 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

###### 11.7.2.1.1.3.5 Significance of Residual Effect Post Mitigation

No mitigation is required as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

#### 11.7.2.1.2 Organic material deposition as result of the operation of the Proposed Development

##### 11.7.2.1.2.1 Nature of Impact

The primary source of organic material from operational fish farms comes from the release of uneaten feed and fish faeces. The majority of this material will sink to the seabed, while a smaller proportion will be suspended or dissolved and then transported within the water column. Carbon (organic material) is generally considered to be the most significant nutrient that is discharged from operational fish farms. Deposition of organic material at low levels may initially represent an increased food supply for infaunal and epifaunal communities.

However, organic material deposition at elevated and uncontrolled levels may result in the following alterations to benthic habitats:

- De-oxygenation;
- Organic enrichment;
- Changes in suspended solids (water clarity); and
- Smothering and siltation rate changes.

The extent of the impact on benthic features will depend on several variables, including the level of organic material input, the rate at which the organic material can be dispersed through hydrographic processes, the amount of organic material that can be assimilated within the sediment through bioturbation, and the specific sensitivity of the feature being impacted.

##### 11.7.2.1.2.2 Duration of Impact

The impact has been determined to be long-term but temporary. It is considered long-term, as throughout each production cycle, when fish are held onsite, there is the potential for organic material (faeces and uneaten feed) to be discharged into the water environment over a continuous temporal period. It is considered temporary, as between each production cycle the Farms undergo a fallow period. During this time there will be no discharge of organic material. Therefore, for temporary periods the potential impact is avoided.

##### 11.7.2.1.2.3 Burrowed Mud PMF

###### 11.7.2.1.2.3.1 Importance of IEF

SS.SMu.CFiMu.SpnMeg and SS.SMu.CFiMu.SpnMeg.Fun have been assigned a project-specific importance value of ‘**regional**’.

### 11.7.2.1.2.3.2 Magnitude of Unmitigated Impact

As detailed in **Sub-Section 11.5** only the component biotopes SS.SMu.CFiMu.SpnMeg and SS.SMu.CFiMu.SpnMeg.Fun of the burrowed mud PMF were identified to occur within the ZoI of this impact pathway. SS.SMu.CFiMu.SpnMeg occurs along all of the transects to the east of the pens, as well as T06 and T07 to the south. The majority of SS.SMu.CFiMu.SpnMeg.Fun occurs to the east of T07 with less frequent examples found on T06 and T03. As illustrated in **Figure 11.2** both biotopes are present within the organic deposition mixing zone for the Proposed Development which extends to the southeast of the pens.

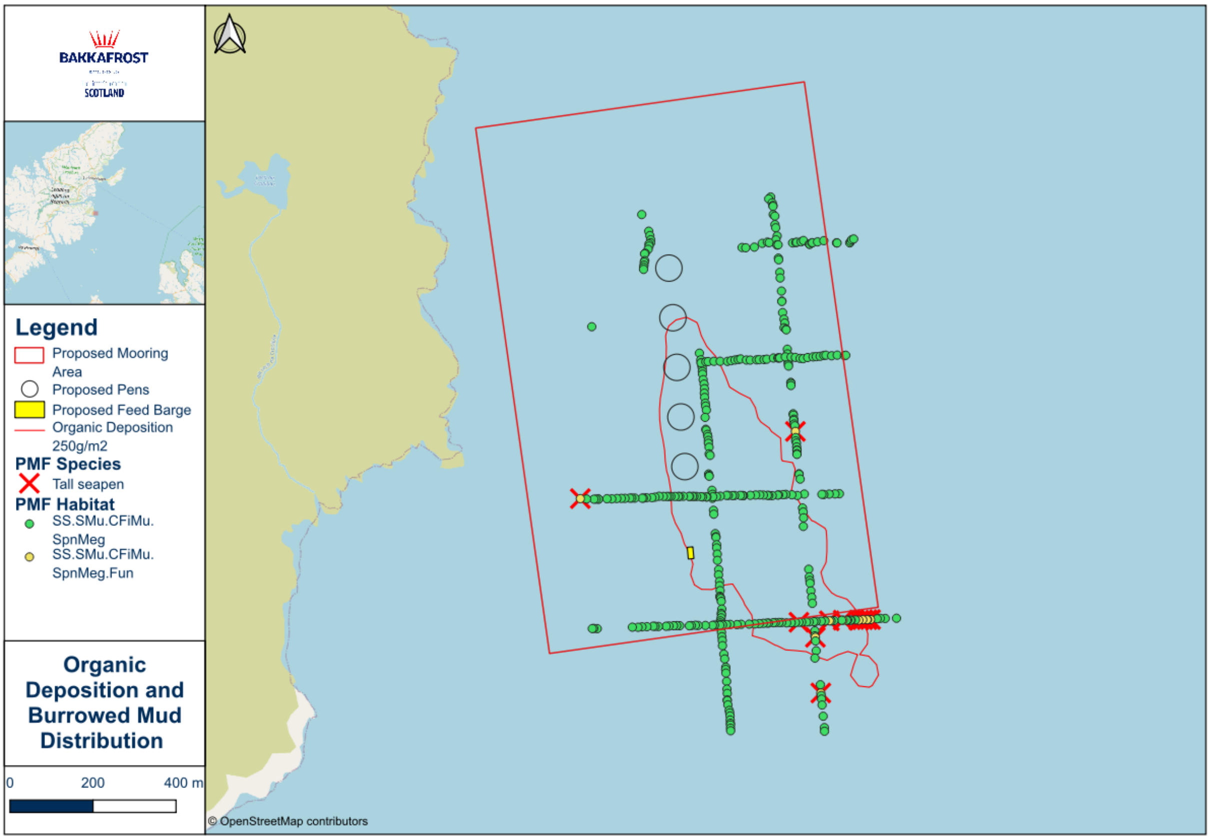


**Figure 11.2: Burrowed mud distribution in relation to organic deposition.**

**Table 11.11** summaries the identified biotopes' sensitivity to the pressures associated with organic material deposition from the Proposed Development. As can be seen, both biotopes are sensitive to de-oxygenation and organic enrichment. In relation to de-oxygenation, the characterising seapen species of these biotopes are thought to display some degree of tolerance to de-oxygenation, due to their recorded presence in sheltered sea lochs. However, most seapen species would likely be impacted by oxygen levels below 2 mg/l. Nephrops, a typical characterising species of these biotopes, also displays some degree of tolerance to de-oxygenation, as they are able to increase their production of haemocyanin. In relation to organic enrichment, the characterising seapen species are considered to display a degree of tolerance to increased organic enrichment. Similarly, the characteristic burrowing megafauna, such as Nephrops, are also considered to be resistant to all but gross organic enrichment[230].

**Table 11.11: Summary of feature sensitivity to pressures associated with organic material deposition.**

| Pressure | Resistance | Resilience | Sensitivity |
|---|---|---|---|
| SS.SMu.CFiMu.SpnMeg | | | |
| **De-oxygenation** | Medium | Low | Medium |

| Pressure | Resistance | Resilience | Sensitivity |
|---|---|---|---|
| **Organic Enrichment** | Medium | Low | Medium |
| **Changes in Suspended Solids** | High | High | Not sensitive |
| **Smothering and Siltation Rate Changes (Light and Heavy)** | High | High | Not sensitive |
| **SS.SMu.CFiMu.SpnMeg.Fun** | | | |
| **De-oxygenation** | Medium | Low | Medium |
| **Organic Enrichment** | Medium | Low | Medium |
| **Changes in Suspended Solids** | High | High | Not sensitive |
| **Smothering and Siltation Rate Changes (Light and Heavy)** | High | High | Not sensitive |

The examples of SS.SMu.CFiMu.SpnMeg identified within the visual survey area and also within the organic deposition ZoI are determined to be of low quality due to the absence of the characterising seapens. Whilst the examples of SS.SMu.CFiMu.SpnMeg.Fun included tall seapens, this characterising species was identified in relatively low abundance and density at a small number of discrete locations. Due to this general lack of seapens within both biotopes, not only are both biotopes determined to be of relatively poor quality, but they are also considered to be inherently less sensitive to this impact pathway as it is the seapens rather than the burrowing megafauna that is considered primarily sensitive to de-oxygenation and organic enrichment. Furthernmore, due to the poor quality of these two biotopes, it is determined that the identified biotopes do not significantly contribute to the national status of the burrowed mud PMF.

The Proposed Development is located in an area of very high dispersion potential[34]. This dispersive characteristic of the development location means that the organic material discharged from the Proposed Development is unlikely to be consolidated beneath the pens, but rather exported over a wide area to low levels.

The SEPA regulatory framework limits the maximum area of the Mixing Zone, this limit is equivalent to an area encompassed by 100 m from the pen edge in all directions. As detailed within the NewDEPOMOD Modelling Report (**Appendix K**) the Mixing Zone for the Proposed Development is 177,000 m$^2$. Within the Mixing Zone the average depositional intensity threshold for organic material is normally 2,000 g/m*2*/yr-*1* and the Mixing Zone extent must normally not exceed 100 % of the defined Mixing Zone area (177,000 m$^2$). However, as the development location has a mean WEI of 3.82 (minimum 3.80, and maximum 3.83), as derived from the SAMS WEI[58], the average depositional intensity threshold is increased to 4,000 g/m$^2$/yr$^{-1}$ and the permitted Mixing Zone extent is increased to 120 % of the Mixing Zone area.

The modelled average depositional intensity within the Mixing Zone for the Proposed Development was 360.16 g/m$^2$/yr$^{-1}$. These values are significantly lower than the average depositional intensity threshold of 4,000 g/m$^2$/yr$^{-1}$. The modelled Mixing Zone extent, where average depositional intensity was > 250 g/m*2*/yr-*1*, was 117.17 % of the permissible 120 %, which equates to an area of 207,390.90 m$^2$. SEPA considers 250 g/m$^2$ to be comparable to 0.64 IQI. This 0.64 IQI value represents the benthos quality threshold between ‘Moderate’ and ‘Good’ status under the WFD (2000/60/EC).

Due to the highly conservative nature of the NewDEPOMOD outputs, BFS commissioned DHI Water Environments (UK) Ltd. to undertake 3D hydrodynamic modelling for the Proposed Development (**Appendix L**) to estimate the degree of organic material deposition throughout the model domain, through the near, medium and far field environment. The hydrodynamic model was run for a full year (summer to summer) at a fixed biomass of 4,680 T (maximum biomass for the Proposed Development). Outputs from the last 90 days of the model run period have been averaged to provide values for the mean deposition within the model domain (mean deposition within each model domain cell). The averaging of the last 90 days of the model run period aligns with the NewDEPOMOD methodology for the calculation of the mean depositional intensity within the NewDEPOMOD Mixing Zone and therefore allows for a comparison of the predicted mean depositional intensity between the NewDEPOMOD outputs and the hydrodynamic model outputs. The hydrodynamic modelling set-up allowed for a worst case scenario for organic material deposition, as under normal production conditions, the maximum biomass would only be maintained for short periods of time.

As detailed above, NewDEPOMOD outputs indicate that the average depositional intensity within the Mixing Zone will be in excess of 250 $g/m^2/yr^{-1}$. In comparison the hydrodynamic model outputs indicate that mean deposition within the mixing zone and over the two component biotopes would be considerably below the 250 $g/m^2/yr\text{-}1$ SEPA threshold. The NewDEPOMOD model utilises uniform bathymetry and a uniform flow field, whereas the hydrodynamic model represents variability of water currents and bathymetry throughout the model domain. Therefore, the hydrodynamic model is considered to better represent variability within the domain, and as such, is considered to be more representative than the NewDEPOMOD outputs. As a result of the negligible levels of deposition predicted by the hydrodynamic model it is unlikely that the operation of the Proposed Development would result in the significant deterioration of the biotopes.

In addition, to the NewDEPOMOD model outputs, and the BFS marine modelling outputs, the Modelling Screening and Risk Identification Report[34] produced by SEPA estimated the average depositional intensity of organic material to be 4.06 $g/m^2$. Due to the low depositional intensity, SEPA concluded that the Proposed Development would have a low area of influence of (1.54 $km^2$)[34], in relation to sediment deposition.

Due to the low levels of deposition predicted through modelling over the identified biotopes, in addition to the low abundance of seapens across both biotopes within the ZoI, which inherently reduces the sensitivity to this impact pathway it is determined that it is determined that organic deposition will not lead to the significant deterioration or loss of the identified biotopes. As a result, the overall magnitude is determined to be **negligible**.

#### 11.7.2.1.2.3.3 Significance of Effect without Mitigation

In light of the assessed **negligible magnitude** of the impact, the effect is assessed as **not significant** in relation to the EIA Regulations.

#### 11.7.2.1.2.3.4 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

#### 11.7.2.1.2.3.5 Significance of Residual Effect Post Mitigation

No mitigation is required as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

#### 11.7.2.1.3 In-feed residue deposition as a result of the operation of the Proposed Development

##### 11.7.2.1.3.1 Nature of Impact

SLICE (EmBz) is an in-feed sea lice treatment, which is administered to the stock via medicated feed pellets in order to control farm derived sea lice onsite. Post-treatment, SLICE may be deposited on the seabed via excretion of both faeces from the treated stock or via settlement of uneaten medicated feed pellets. The active ingredient, EmBz, inhibits the nerve function in arthropods (including sea lice), which may lead to paralysis of the neuromuscular system. It also has low water solubility and therefore displays a high affinity with organic matter.

The extent of the impact on benthic features will depend on several variables, including the level of in-feed material input, the rate at which the in-feed residues can be dispersed through hydrographic processes, the amount of in-feed residue material that can be assimilated within the sediment through bioturbation, and the specific sensitivity of the feature being impacted.

##### 11.7.2.1.3.2 Duration of Impact

The impact has been determined to be **short-term** but **temporary**. It is considered **short-term**, as the SLICE will only be fed for short discrete temporal periods within the production cycle, meaning that for large portions of time, SLICE will not be actively discharged into the environment. It is considered **temporary**, as SLICE discharge will not be continuous and permanent, but limited to discrete events.

##### 11.7.2.1.3.3 Burrowed Mud PMF

###### 11.7.2.1.3.3.1 Importance of IEF

SS.SMu.CFiMu.SpnMeg and SS.SMu.CFiMu.SpnMeg.Fun have been assigned a project-specific importance value of ‘**regional**’.

###### 11.7.2.1.3.3.2 Magnitude of Unmitigated Impact

As detailed in **Sub-Section 11.5** only the component biotopes SS.SMu.CFiMu.SpnMeg and SS.SMu.CFiMu.SpnMeg.Fun of the burrowed mud PMF were identified to occur within the ZoI of this impact pathway. SS.SMu.CFiMu.SpnMeg occurs along all of the transects to the east of the pens, as well as T06 and T07 to the south. The majority of SS.SMu.CFiMu.SpnMeg.Fun occurs to the east of T07 with less frequent examples found on T06 and T03. As illustrated in **Figure 11.2** both biotopes are present within the organic deposition mixing zone for the Proposed Development which extends to the southeast of the pens.

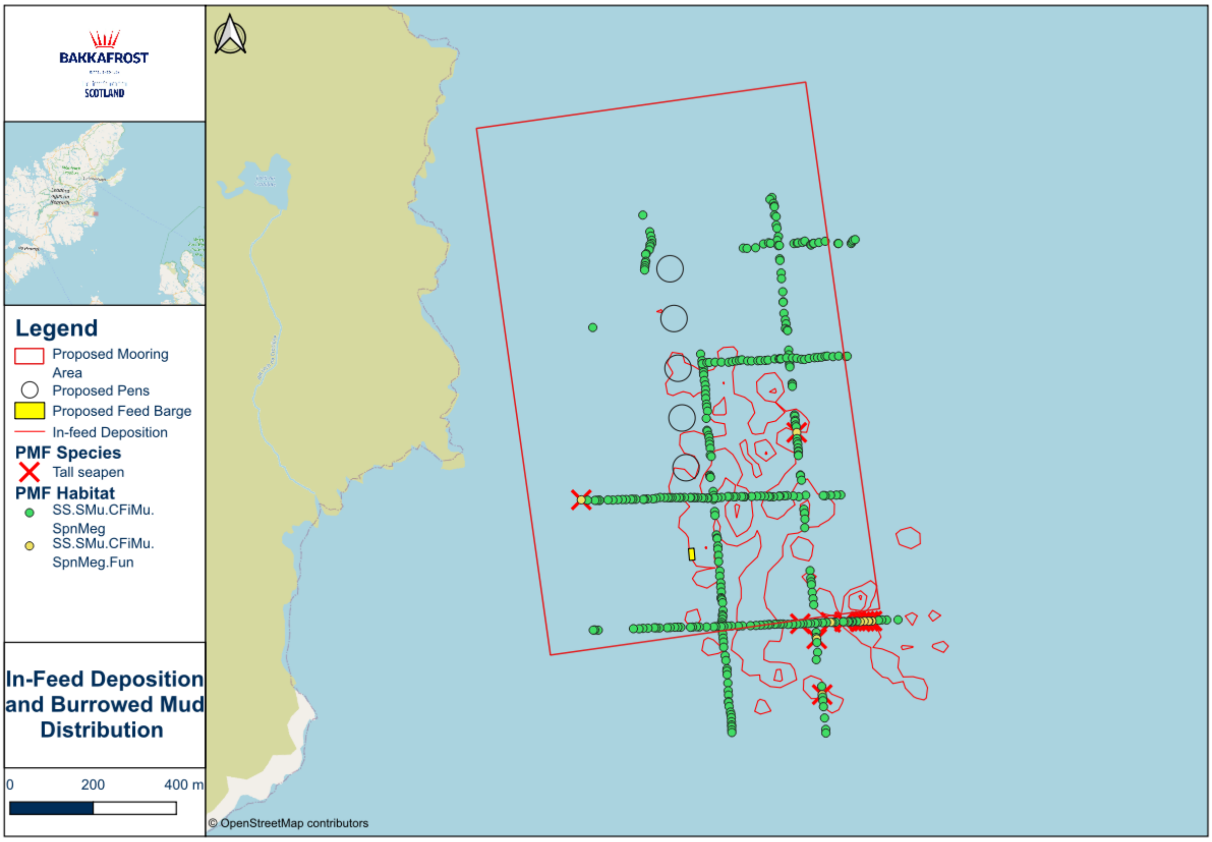


**Figure 11.3: Burrowed mud distribution in relation to in-feed treatments.**

Both biotopes are considered to display high sensitivity to synthetic compound contamination with low resilience and resistance noted. This high sensitivity primarily relates to the fact that arthropod species are very intolerant to pesticides and biocides such as SLICE (EmBz). Different species within these biotopes will be affected by different chemicals and to varying degrees, in areas of increased pollution there is a general declining trend in species diversity with habitats becoming dominated by pollution tolerant polychaete worms[230]. Whilst no direct evidence of the effect of synthetic compounds on seapens has been found, it is precautionary to assume that seapens will be affected adversely by some pesticides in the same way that some Anthozoa are known to be affected.

The Proposed Development is located in an area of very high dispersion potential[34]. This dispersive characteristic of the development location means that the in-feed residues discharged from the Proposed Development are unlikely to be consolidated beneath the pens, but rather exported over a wide area to low levels.

NewDEPOMOD modelling is used to determine the permissible quantity of SLICE, through the application of a Mixing Zone. The Mixing Zone is defined by the total area within which deposition of EmBz exceeds the interim EQS of 272 ng/kg (dry weight) (136 ng/kg (wet weight). The extent of the EmBz Mixing Zone shall not exceed an area of 100 m from the pen edge, in the case of the Proposed Development this is an area of 177,000 m$^2$. NewDEPOMOD modelling for the Proposed Development predicts a MMQ of 37 g EmBz. This MMQ has been approved by SEPA, with a Maximum Environmental Quantity value of 26.70 g (**Appendix T**). As a result of the NewDEPOMOD model outputs indicating compliance with the Mixing Zone criteria, the spatial extent of the impact is determined to be **negligible**. **Figure 11.3** illustrates the spatial extent of the in-feed deposition Mixing Zone in relation to the two burrowed mud component biotopes.

Due to the low permitted quantity of EmBz modelled, whilst complying with the SEPA Mixing Zone criteria, the SLICE consent for the Proposed Development will not allow for the treatment of the maximum biomass (4,680 T). However, the quantity does give the option to treat select sub-sets of the population of smolt shortly after stocking, if needed. The use of SLICE in this way will be determined on a case by case basis by the Biology Department. However, due to the low passing quantity of SLICE, other non-medicinal sea lice interventions, such as freshwater and FLS (see **Sub-Section 3.3.2.3**) will be favoured.

As outlined within **Sub-Section 11.3**, the ISLM Plan will be implemented at the Proposed Development. One of the main aims of the ISLM Plan is to actively reduce the use of medicinal (bath and in-feed) interventions, instead prioritising the use of biological, freshwater, and mechanical interventions. This will help reduce the overall volume of EmBz used throughout a production cycle and therefore help reduce the overall magnitude of the potential impact. Effective feed control and monitoring, as outlined within **Sub-Section 11.3**, is anticipated to limit the potential for uneaten medicated feed pellets to fall out of suspension and settle on the benthos, thereby helping to further reduce the magnitude of the potential impact. As a result, in practise it is unlikely that SLICE will make up a significant component of the fish health intervention strategy at the Proposed Development.

Due to the limited extent of in-feed residue deposition and the prioritisation of non-medical interventions to control sea lice at the Proposed Development it is determined that in-feed residue deposition will not lead to the significant deterioration or loss of the identified biotopes. As a result, the overall magnitude is determined to be **negligible**.

###### 11.7.2.1.3.3.3 Significance of Effect without Mitigation

In light of the assessed **negligible magnitude** of the impact, the effect is assessed as **not significant** in relation to the EIA Regulations.

###### 11.7.2.1.3.3.4 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

###### 11.7.2.1.3.3.5 Significance of Residual Effect Post Mitigation

No mitigation is required as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

## 11.8 Cumulative Impacts

### 11.8.1 Benthic Habitat IEFs

#### 11.8.1.1 Abrasion / Disturbance of the Surface of the Substratum or Seabed

Due to the significant distance between the Proposed Development and the existing Gravir farms it is determined that their ZoIs for this impact pathway do not overlap and as such is scoped out of further detailed assessment.

#### 11.8.1.2 Organic material deposition as result of the operation of the Proposed Development

Whilst the wider area is influenced by the organic material of the Gravir farms in addition to the Proposed Development detailed marine modelling indicated that due to the highly dispersive nature of the development location cumulative deposition is below the 250g/m$^2$ threshold set by SEPA, and as such this pathway has been scoped out of further detailed cumulative assessment.

#### 11.8.1.3 In-feed residue deposition as result of the operation of the Proposed Development

Whilst the existing Gravir farms are also licensed to discharge SLICE they are sufficiently distant from the Proposed Development that it is determined that the respective ZoIs do not overlap, therefore this impact pathway has been scoped out of further detailed cumulative assessment.

## 11.9 Statement of Significance

The findings of the impact assessment on species, habitats and sites of conservation importance are summarised below, with the full detailed assessment provided in **Section 11** of the EIAR.

The EIA assessed the potential for the Proposed Development to impact on species, habitats and designated sites of conservation importance due to the construction, operation, and eventual decommissioning of the Proposed Development. This section utilised the EcIA methodology, as described within **Sub-Section 2.4.2**.

The baseline condition was informed by a DBA, which focused on the review of biological records from a number of data sources. Initially, a number of ecological features were identified within the study area, including a number of designated sites. The next step was to determine whether each of the features represented an IEF within the baseline. This was done by considering the relative importance, based on legislation, the relative abundance and density of each ecological feature within the baseline, and the potential for connectivity, based primarily on the ecological traits of each ecological feature and the associated potential for interaction with the Proposed Development. The ecological feature identified within **Table 11.12** was determined to be an IEF and therefore assessed in detail.

**Table 11.12: IEFs identified within the Baseline.**

| IEFs Relevant to the Assessment of Species and Habitats of Conservation Importance |
|---|
| Burrowed mud PMF |

A number of embedded mitigation measures have been incorporated into both the design and operation of the Proposed Development to avoid, reduce or offset the potential for adverse significant effects, including:

- Development location (design);
- NewDEPOMOD modelling (design);
- Containment net strategy (design);
- Bird nets (design);
- Feed storage and feeding (design);
- Acoustic deterrent devices (ADDs) (will **NOT** be deployed) (operational);
- Anti-predator netting (will **NOT** be deployed) (operational);
- Pellet Detection Software (operational);
- Feed control and monitoring (operational);
- Fallowing (operational);
- Enforcement (operational);
- Best Practice husbandry (operational);
- Predator Control Plan (PCP) (operational);
- Mooring Installation Micro-Siting (operational); and
- Monitoring and reporting (operational).

In regard to benthic IEFs there is the potential that the Proposed Development may result in abrasion and disturbance, organic material deposition and in-feed residue deposition, resulting in damage to, or mortality of, characterising benthic communities that form discrete benthic habitats. Whilst the majority of finfish infrastructure floats upon the surface (pens and feed barge), the mooring lines and anchors of the grid and mooring system, do contact the benthos. As a result of the limited spatial extent of the impact and the one-off nature of the impact, coupled with the relative resilience of burrowed mud and the low presence of seapens within that habitat, the overall magnitude is determined to be **negligible**. Due to the low levels of deposition predicted through modelling over the identified biotopes, in addition to the low abundance of seapens across both biotopes within the ZoI, which inherently reduces the sensitivity to this impact pathway it is determined that it is determined that organic deposition will not lead to the significant deterioration or loss of the identified biotopes. As a result, the overall magnitude is determined to be **negligible**. In addition, due to the limited extent of in-feed residue deposition and the prioritisation of non-medical interventions to control sea lice at the Proposed Development it is determined that in-feed residue deposition will not lead to the significant deterioration or loss of the identified biotopes. As a result, the overall magnitude is determined to be **negligible**.

The assessment of habitat biotopes, of conservation importance, determined that the overall magnitude of identified potential impacts were significantly reduced to the extent that the effects were **not significant** in relation to the EIA Regulations. The embedded design mitigation measures such as the selection of a high energy, highly dispersive development location and detailed modelling, ensured that impacts were reduced to insignificant levels.

Cumulative impacts were also assessed to determine whether the Proposed Development in-combination with the existing BFS Gravir farms to the east of the Isle of Lewis would result in no significant effects on the identified IEF. It was determined that the embedded mitigation measures proposed for the Proposed Development, which are already implemented at the existing farms significantly reduces the overall magnitude of the identified potential impacts to levels that are anticipated to make the cumulative effects **not significant** in relation to the EIA Regulations.

## 11.10 Data Limitations and Uncertainties

There are a number of limitations and uncertainties associated with the overall evaluation of impact and effect on species and habitats of conservation importance. However, it has been determined through professional judgement that these limitations do not undermine the robustness of the assessment. These include aspects such as:

- **Pole-mounted top net interactions:** Pole-mounted top netting is increasingly commonly used within the Scottish salmon sector as a top net containment system. However, due to the limited historical commercial deployment of pole-mounted top netting, there is a lack of historic entanglement data available for top netting, particularly of various mesh sizes.

  In response to this novel top netting system and reports of entanglement of northern gannet, NS produced industry guidance on pole-mounted top netting mesh size to reduce the potential for connectivity. As a precaution BFS are proposing to deploy netting in line with the NS guidance. Moreover, BFS will maintain an entanglement logbook to help better understand the magnitude of potential interactions. These data will be fed back to NS and will help inform future management and mitigation, if required.

# 12 Navigation, Anchorage, Commercial Fisheries and Other Non-Recreational and Recreational Maritime Uses

## 12.1 Introduction

This technical assessment considers the potential impacts on navigation, anchorage, commercial fisheries and other non-recreational maritime uses. This Section follows the standard technical assessment methodology (**Sub-Section 2.4.1**) and assesses the impact of the Proposed Development on identified receptors within the baseline condition.

## 12.2 Scoping

The potential for significant effects on navigation, anchorage, commercial fisheries and other non-recreational maritime uses was raised by consultees in their specific Scoping advice, in response to the Screening and Scoping Request submitted to CnES. A brief summary of the requirements of the consultees is provided below in **Table 12.1** and a full review of the Scoping information requirements is provided in **Section 5**.

**Table 12.1: Summary of required information relevant to potential impacts on navigation, anchorage, commercial fisheries and other non-recreational maritime uses.**

| Consultee | Information Requirement | Cross Reference |
|---|---|---|
| CnES | • Request that BFS consult RYA, NLB and WIFA and the OHRIFG;<br>• Request that BFS design and locate the Proposed Development to reduce potential impacts on commercial fishing;<br>• Request information on appropriate adaptive measures in the event that pens break free from moorings;<br>• Request equipment specifications and attestations;<br>• Request charts, showing the Proposed Development layout; and<br>• Request information on navigational lighting. | Section 3;<br>Section 12;<br>Appendix A (Figures); and<br>Appendix B (Equipment). |
| NLB | • Stated that they have no objections to the Proposed Development; and<br>• Stated that they would provide navigational requirements once planning application has been submitted. | Section 3; and<br>Section 12. |

## 12.3 Embedded Mitigation

### 12.3.1 Design Mitigation

#### 12.3.1.1 Development Location

The location of the Proposed Development has been selected to minimise the disruption and disturbance to other non-recreational maritime users, including commercial fisheries and commercial ferry operations within the wider marine area. The hydrographic characteristics of the development location also help to mitigate potential benthic impacts of the Proposed Development.

#### 12.3.1.2 Development Lifespan

Whilst the Proposed Development is intended to be operational over the long-term with no decommissioning phase defined. The Proposed Development is completely reversible, with no permanent physical impacts on the seascape and navigational safety.

#### 12.3.1.3 Farm Layout and Design

The Proposed Development will have fewer, larger pens. The rationale for this design and layout decision includes mitigating impacts to other marine users (including commercial fisheries) by proposing an efficient and tidy development area.

#### 12.3.1.4 Minimisation of the Mooring Area

Through the design process of the mooring system, efforts have been made to minimise the length of individual mooring lines to ensure the mooring area has a minimal footprint. Following installation, the majority of the area taken up by mooring lines will still be accessible for static gear fishing with full exclusion only required during maintenance of mooring lines or boat operations. This is anticipated to reduce the overall magnitude of impacts on commercial fishing.

### 12.3.2 Operational Mitigation

#### 12.3.2.1 Navigational Lighting and Marking

Navigational lighting and marking to be installed at the Proposed Development will be in line with the requirements of the NLB to ensure that the Proposed Development is adequately lit and marked and therefore visible to mariners.

#### 12.3.2.1 Registration with United Kingdom Hydrographic Office (UKHO)

The UKHO will be notified of the Proposed Development, if consented, to allow for all nautical charts to be updated with the Proposed Development's mooring area, to ensure that all mariners are aware of the presence of the Proposed Development.

## 12.4 Baseline Condition

BFS commissioned Anatec Ltd. ('Anatec') to undertake a baseline assessment of maritime activity (shipping, fishing and recreation) in relation to the Proposed Development. The results of this assessment are provided in **Appendix Q** and a summary of the baseline condition is presented below.

Anatec identified a 5 km radius study area around the Proposed Development.

### 12.4.1 Commercial and Recreational Maritime Activities and Navigation

#### 12.4.1.1 Commercial Vessels

The baseline activity of commercial vessels was determined through assessment of Automatic Identification System (AIS). Under the umbrella of commercial vessels, the following sub-groups were reviewed:

- Passenger;
- Cargo; and
- Tanker.

**Figure 12.1** illustrates the spatial distribution and intensity of commercial vessel activity within the study area. Within the study area, cargo vessels accounted for 58 % of the total data. The majority of cargo vessels were generally seen in north / south transit to the east of the site; it is noted that three unique cargo vessels were broadcasting the Gravir fish farm as their destinations while entering / exiting Loch Odhairn. Tankers and passenger vessels were also mainly recorded in north / south transit, with tankers being further from the coast and passenger vessels being recorded a variety of distances from the coast.

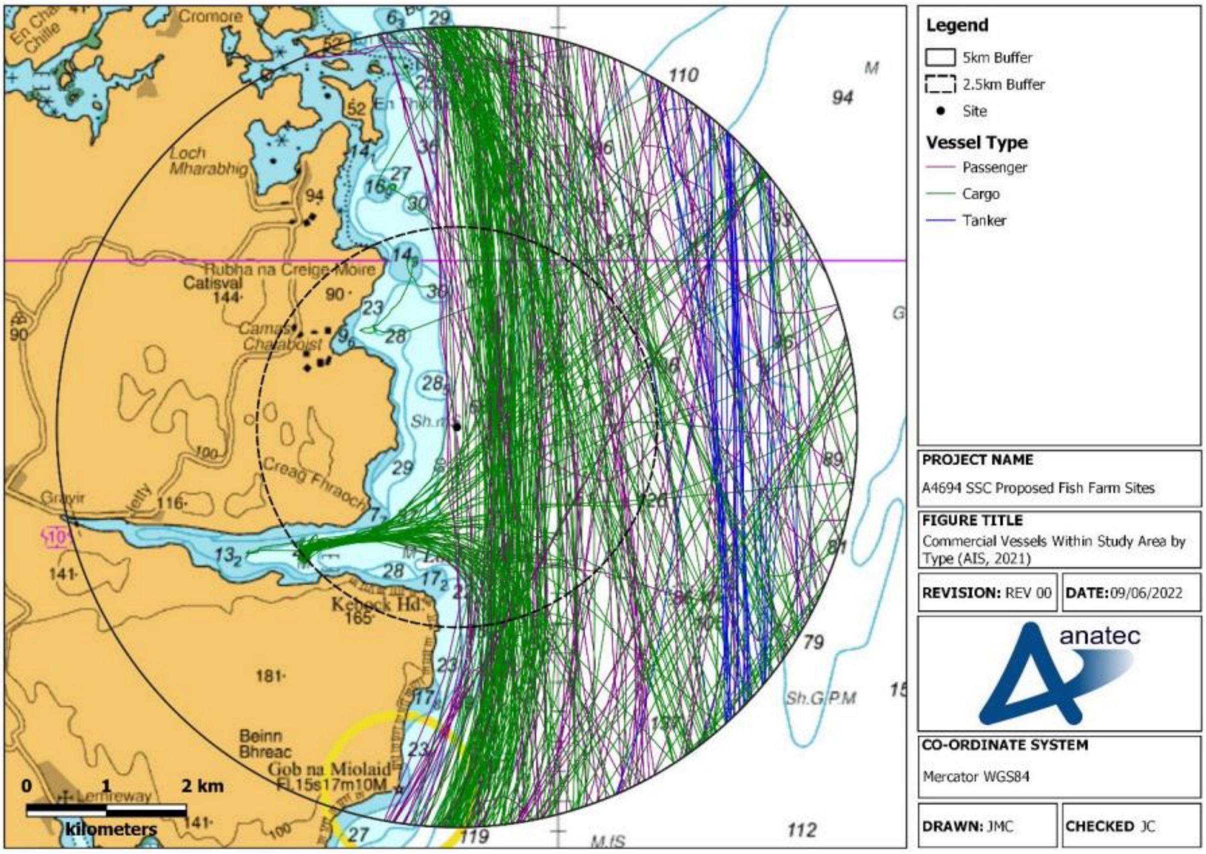


**Figure 12.1: Commercial vessel activity in relation to the Proposed Development.**

### 12.4.1.2 Tugs and Workboats

A review of tugboat and workboat activity was also undertaken to determine the baseline condition. Again, this assessment relied of the use of AIS.

**Figure 12.3** illustrates the spatial distribution and intensity of tugboat and workboat activity within the study area. As can be seen the highest density of tugboats and workboats were generally recorded in north/south transit along a similar route as the cargo vessels, with Stornoway and fish farms being common destinations. Many of the vessels entered Loch Odhairn for fish farm related work. In addition, an emergency towing vessel was recorded patrolling the sea throughout the year in the northeast region of the study area.

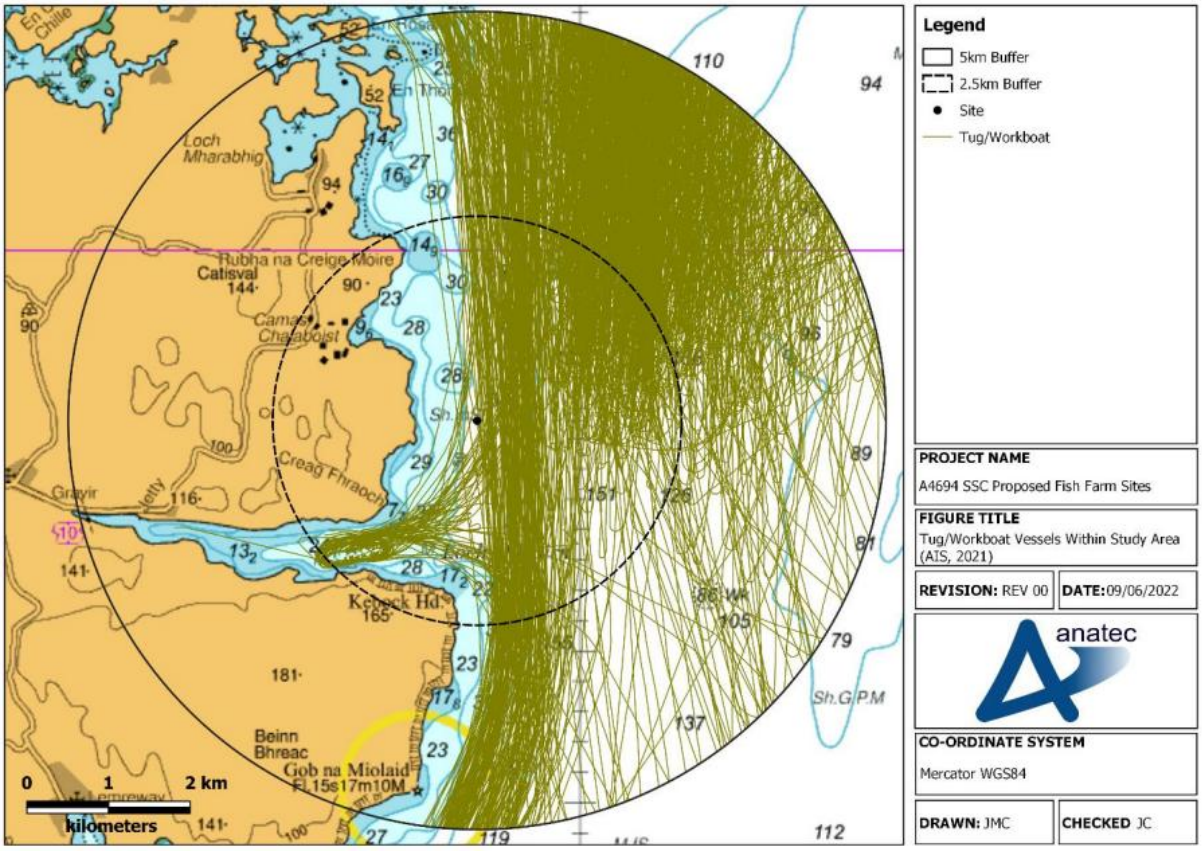


**Figure 12.2: Tugboat and workboat activity in relation to the Proposed Development.**

### 12.4.1.3 Recreational Vessels

A review of recreational marine vessel activity was also undertaken to determine the baseline condition. Again, this assessment relied of the use of AIS.

**Figure 12.3** illustrates the spatial distribution and intensity of recreational marine vessel activity within the study area. As can be seen the majority of the recreational marine vessel activity is located further offshore to the east of the Proposed Development, where these data indicate that vessels transit along the eastern seaboard of the Outer Hebrides.

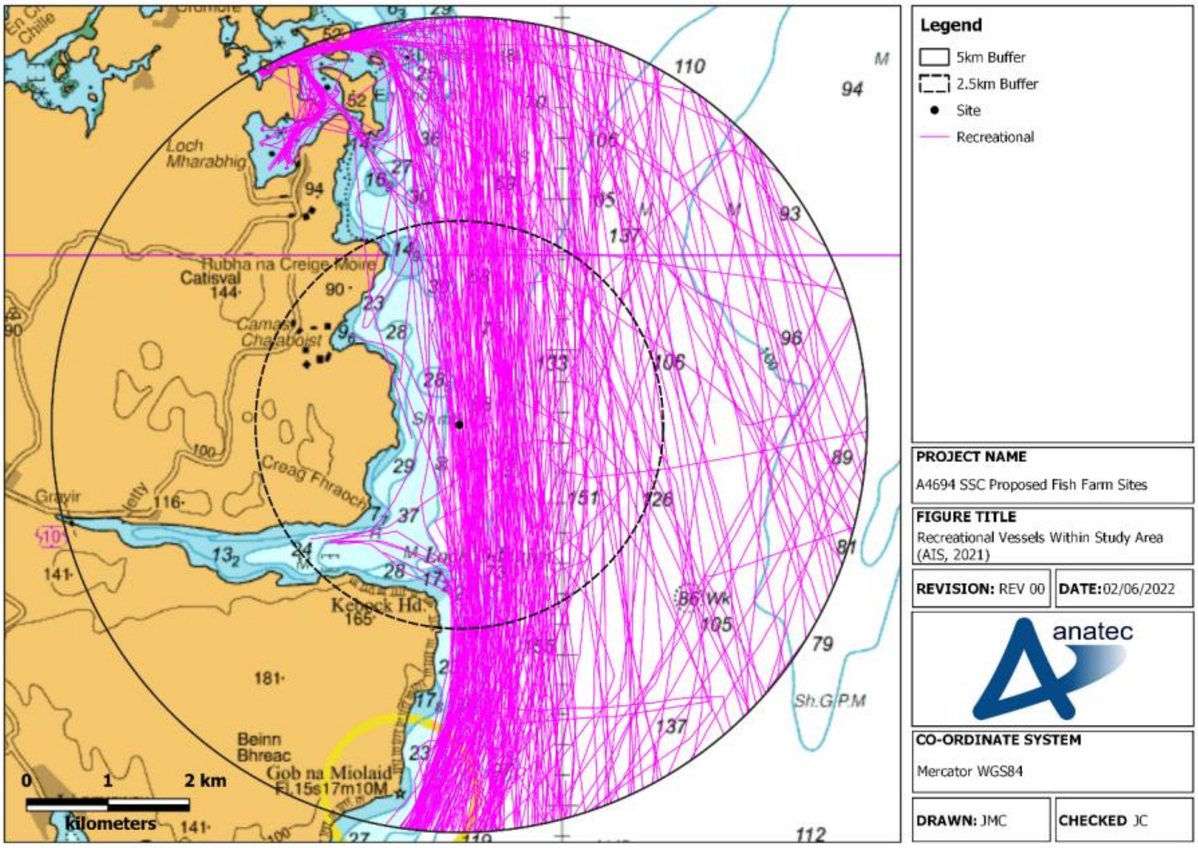


**Figure 12.3: Recreational vessel activity in relation to the Proposed Development.**

### 12.4.1.4 Other Vessels

The other vessels category was made up of the following sub-groups:

- Military;
- Dredging / underwater operations;
- High speed craft
- Other;
- Fish carriers; and
- Wind farm.

**Figure 12.4** illustrates the spatial distribution of vessel activity by the sub-groups of other vessels within the study area. The average length recorded for miscellaneous vessel types was 58 m. The longest vessel recorded was a 190 m long military vessel. On average, between one and two unique miscellaneous vessels were recorded passing within the study area each day. Stornoway was the main destination for fish carriers and the rest of the vessels in the “other” category. Most of the vessels were fish carriers, accounting for 76 % of all miscellaneous vessels. Eight military vessels, two dredgers, a high-speed craft and two wind farm vessels were also recorded within the study area. These vessels were also mainly in north / south transit to / from Stornoway, with the exception of a dredger that turned into Loch Odhairn and a military vessel that was travelling in a variety of directions to the east of the study area.

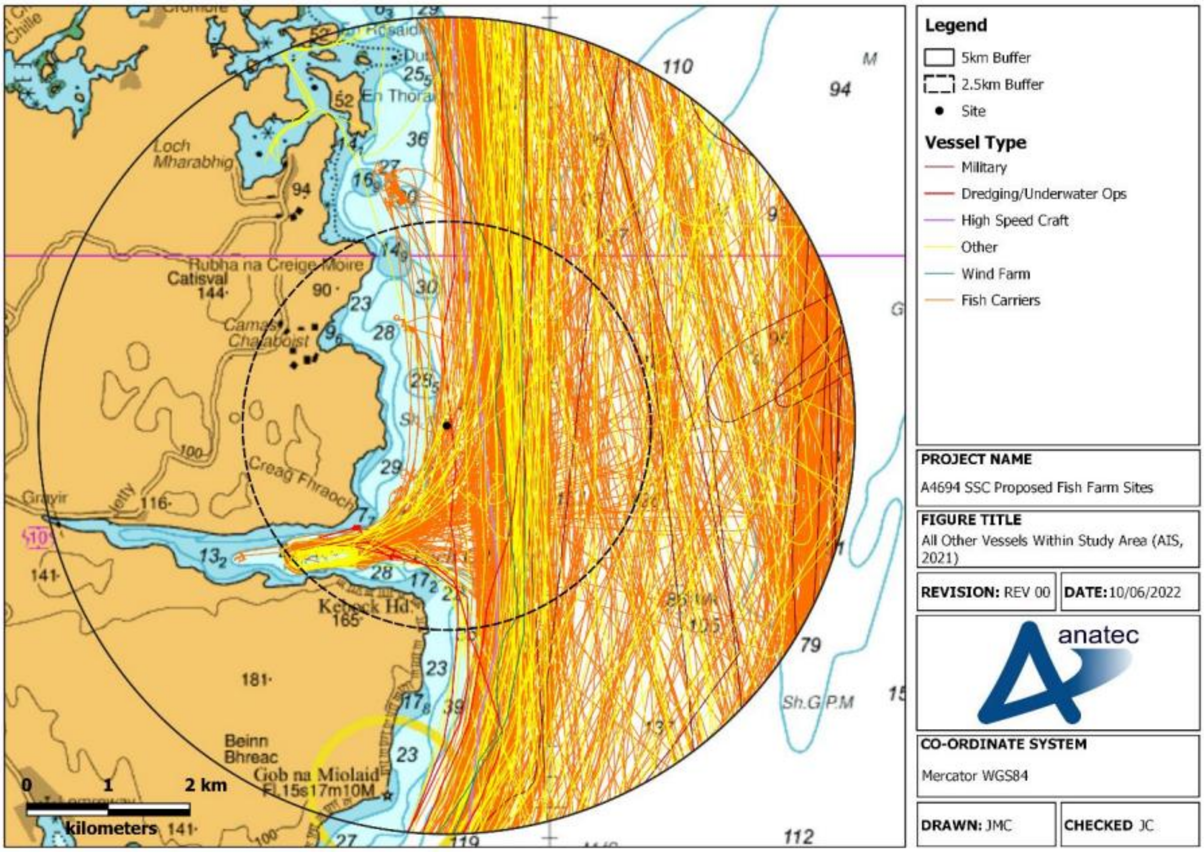


**Figure 12.4: Other vessel activity in relation to the Proposed Development.**

## 12.4.2 Anchorages

A review of designated anchorages and areas where harbour or port authorities may request a vessel to anchor[231] was undertaken to help inform the baseline condition. The review of the NMPi data layer identified four specific anchorage locations on the east coast of the Isle of Lewis, the closest of which lie to the north within Stornoway Harbour and to the north within the Minch. All of these areas lie sufficiently outwith the influence of the Proposed Development.

The Proposed Development will not be located within the immediate vicinity of any of the identified anchorage locations.

## 12.4.3 Sub-Sea Cables

There are no sub-sea cables in close proximity to the Proposed Development on the east side of the Isle of Lewis.

## 12.4.4 Ministry of Defence (MOD) Activities

Review of the Defence (Military) - Military exercise areas and danger areas (PEXAs) data layer on NMPi indicates that the Proposed Development is located within a Military practice area known as 'X5820: ERISORT'. The Proposed Development is located on the western extreme of this practice area, in shallower waters in comparison to the waters further offshore.

BFS sought to consult with the MOD to ensure that the MOD had no objection to the Proposed Development. The MOD did not object to the Proposed Development (see Section 5 for further detail).

[231] National Marine Plan interactive (NMPi): Anchor berths and anchorage areas. [Online] Available at: https://marine.gov.scot/maps/1006

### 12.4.5 Commercial Ferry Routes

A review of ferry routes was undertaken, with two routes identified servicing Stornoway from the mainland to the north and south of the proposed development. The Proposed Development will not be located within the immediate vicinity of any of the identified ferry routes as both routes are over 10 km away sufficiently outwith the influence of the Proposed Development.

### 12.4.6 Commercial Fisheries

To fully consider the potential impacts of the Proposed Development on the commercial fisheries sector, BFS has undertaken a full CFIA, which is provided as **Appendix U**, in support of this EIAR and planning application.

This Sub-Section therefore presents a summary of the findings of this CFIA, without repeating the full assessment.

#### 12.4.6.1 Commercially Important Fisheries

The CFIA has fully characterised the commercial fisheries within the study areas, defined within the CFIA. The following fisheries were identified and scoped in for detailed assessment:

- Mobile Gear Fisheries:
  - 12 m LOA and over Scallop Towed Dredge Fishery; and
  - 12 m LOA and over Nephrops Demersal Trawl Fishery.
- Static Gear Fisheries:
  - Under 12 m LOA Pots and Traps Fishery (Brown Crab, Velvet Crab, Lobster, and Nephrops).

Full details on fishing effort, landings and the spatial distribution of fishing activity are presented within the CFIA (**Appendix U**).

### 12.4.7 Evolution of the Baseline Condition

The EIA Regulations require that; ***"A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge"*** (EIA Regulations, Schedule 4, Paragraph 3), is included within the EIAR. Therefore, this Sub-Section of the EIAR, provides a qualitative description of the evolution of the baseline condition, on the assumption that the installation and subsequent long-term operation of the Proposed Development does not take place.

#### 12.4.7.1 Commercial Maritime Activities and Navigation

There is uncertainty associated with long-term predictions of commercial maritime activities and navigation.

It is also likely that the identified recreational and non-recreational routes that transit along the Isle of Lewis will remain in use over the long-term. However, it is difficult to predict whether or not there will be significant changes to the magnitude of usage. As such, it is determined that the frequency of use of these routes will be maintained at current levels.

#### 12.4.7.2 Commercial Fisheries

Commercial fisheries are known to show both spatial and temporal variation in terms of fishing intensity and effort. This variation is believed to be primarily influenced by the following factors:

- **Market demand:** Fishing effort for particular species is a product of market demand, therefore, fishers will exploit the species most in demand. Market demand itself is impacted by a range of factors, such as the COVID-19 pandemic, which resulted in the almost complete collapse of the market;
- **Market price:** Commercial fishing fleets will selectively exploit fisheries that are commanding the highest price in the marketplace. Therefore fishing effort may swing from one species to another, resulting in spatial variation in fishing effort;
- **Stock abundance:** Variation in the biomass of fisheries stocks in response to status of the stock, recruitment, natural disturbances, and changes in fishing effort;
- **Fisheries management:** Fisheries management measures, such as new management measures for specific species or fishing grounds, where overexploitation has been identified, may lead to the displacement of fishing effort, or an overall increase or decrease in fishing effort;
- **Environmental management:** Such as the restriction of certain fisheries within specific areas, in order to protect marine biodiversity;
- **Improved efficiency and gear technology:** Commercial fishing fleets are constantly evolving to reduce operational costs. Advances in gear technology, may increase the yield per unit effort within some fisheries, which may influence fishing effort both temporally and spatially; and
- **Sustainability:** Many seafood buyers request certification to show the sustainability of specific fisheries, the commercial fishing industry is adapting to improve fisheries management and wider environmental impacts. As such, there may be both temporal and spatial variation in fishing effort.

The variations and general trends in commercial fisheries activity are an important aspect of the baseline condition therefore the baseline assessment reviewed Scottish commercial fisheries data that spanned multiple years, where available. Given the temporal period of assessment, the future baseline scenario would typically be reflected within the current baseline condition. However, in this case, the existing baseline condition does not fully capture all the potential changes in commercial fisheries activity resulting from the withdrawal of the UK from the EU.

Following the withdrawal of the UK from the EU, the UK and EU have agreed to a Trade and Co-operation Agreement (TCA). The TCA sets out fisheries rights and confirms that from 01 January 2021, throughout the transition period until 26 June 2026, UK and EU vessels will continue to access respective Exclusive Economic Zones (EEZs 12 to 200 NM) to fish. In this period EU vessels will also be able to fish in specified parts of UK waters between 6 and 12 NM.

By the end of the TCA period, 25 % of the EU's fisheries quota for UK waters will be transferred to the UK, this is in addition to the 60 % that has already been transferred (2021). Therefore, based on this reallocation of quotas, it may be likely that between 2021 and 2026, UK vessels could catch relatively more quota species, with EU vessels catching relatively less. However, of the commercially important species identified within the baseline condition, the brown crab, European lobster, and scallop fisheries are not subject to the Total Allowable Catch (TAC) requirements nor national quotas. However, the Nephrops fishery is subject to national quota, with Scotland being allocated the majority of the UK's TAC.

As such, it has been determined that the future baseline condition will not significantly alter in regard to both the temporal and spatial pattern of fishing effort.

## 12.5 Identified Potential Impacts

Through the development of the baseline condition, via DBA and consultation with relevant non-statutory and statutory consultees, the following receptors have been advanced to the assessment stage:

- Commercial maritime activities and navigation; and
- Commercial fisheries.

Several receptors have been scoped out of further assessment within the EIA, either through the Scoping Opinion of the EIA or as a result of the determination of the baseline condition, where it became apparent that no significant effects were likely to occur. The following receptors have been scoped out:

- Anchorages;
- Sub-sea cables;
- MOD activities; and
- Commercial Ferries.

Potential impacts on commercial maritime activities and navigation have been determined to be:

- Direct impact on navigational access and safety.

The CFIA (**Appendix U**) identified several potential impact pathways between commercial fisheries and finfish aquaculture. These are outlined below:

- **Exclusion, access, displacement and associated economic loss:** Temporary or long-term exclusion from or reduction in access to existing fishing grounds, which may result in displacement of fishing vessels into adjacent fishing grounds. This potential impact may also have indirect economic impacts. Exclusion and reduction in access are related to the physical presence of aquaculture infrastructure within the marine environment;
- **Snagging gear, entanglement and navigational safety:** This may include snagging and entanglement of both static and mobile gear with aquaculture infrastructure such as mooring lines and anchors;
- **Change to the local environment:** Discharges of organic material and medicants may alter the composition of faunal communities beneath a fish farm;
- **Pressure on harbour facilities:** The shared usage on the local harbour facilities by commercial fishing vessels and aquaculture vessels could potentially result in congestion.

## 12.6 Impact Assessment

### 12.6.1 Construction Impacts

As stated within **Sub-Section 3.6**, the installation of the Proposed Development will take place over a 26 day window (worst-case scenario) with 14 to 21 days needed for the installation of the grid, 3 days needed for the installation of the pens and a further 2 days required to install the feed barge. As such, any impact arising from the construction and installation phase of the Proposed Development will only occur over the short-term.

The impact pathways arising from the construction phase are also anticipated during the operational phase. However, during the operational phase these impact pathways are expected to persist over the longer-term. Therefore, the assessment of the operational phase is anticipated to represent an assessment of the worst-case scenario.

### 12.6.2 Operational Impacts

#### 12.6.2.1 Commercial Maritime Activities and Navigation

##### 12.6.2.1.1 Direct Impact on Navigational Access and Safety

###### 12.6.2.1.1.1 Nature of Impact

The installation of the Proposed Development will result in the potential displacement and obstruction of navigational activity from the entire development footprint, including the mooring area, which covers a surface area of 1.02 km$^2$. The Proposed Development will also be primarily serviced by two types of marine vessels, a faster moving RIB type boat of 9 m in overall length and landing craft style vessels of up to 23 m in overall length. On a more infrequent basis, secondary vessels will service the Proposed Development, these include wellboats, treatment vessels, service vessels and feed delivery vessels. The operation of these vessels will increase non-recreational marine traffic activity within the area and therefore increase the risk to navigational safety.

## 12.6.2.1.1.2 Duration of Impact

The impact has been determined to be **long-term** but **temporary**. It is considered **long-term**, as the Proposed Development will be present within the marine environment for a continuous temporal period, resulting in the potential for impact across a significant temporal period. It is considered to be **temporary** as at the end of the Proposed Development's lifecycle, the infrastructure can be removed, and the impact avoided.

## 12.6.2.1.1.3 Sensitivity of Receptor

Commercial maritime activities and navigation has been determined to be of **medium sensitivity**, as the receptor has a moderate capacity to tolerate change without significantly altering its present character.

## 12.6.2.1.1.4 Magnitude of Unmitigated Impact

As detailed within **Sub-Section 12.4.1**, the identified AIS recreational and non-recreational vessel routes both show activity within the area of the Proposed Development, as a result it is likely that there will be spatial overlap and therefore an impact on these recreational and non-recreational vessel routes as a result of the Proposed Development.

A small area of increased cargo vessel activity was noted in association with the existing BFS fish farm to the southwest of the Proposed Development. These are service vessels operating at the existing fish farms that have been grouped within the cargo vessel AIS class, as a result it is unlikely that there will be a negative impact on these vessels. There were also low level of tanker activity associated with the Proposed Development, however, significantly more activity was identified further east off the Proposed Development. In addition, significant recreational boat activity was identified at the Proposed Development and further east off the Proposed Development, many of these vessels were assumed to be travelling to/from Stornoway and the Shiant Islands.

Despite the high level of marine vessel activity associated with the Proposed Development location, sufficient embedded mitigation measures have been put in place (**See Section 12.3)** to ensure no significant effect will occur. Specific measures include navigational lighting and marking to be installed at the Proposed Development in line with the requirements of the NLB to ensure that the Proposed Development is adequately lit and marked and therefore visible to mariners. In addition to this, UKHO will be notified of the Proposed Development, if consented, to allow for all nautical charts to be updated with the Proposed Development mooring area, to ensure that all mariners are aware of the presence of the Proposed Development.

As a result of the above assessment, the overall magnitude is determined to be **negligible**.

## 12.6.2.1.1.5 Significance of Effect without Mitigation

In light of the assessed **medium** sensitivity of the receptor and **negligible** magnitude of the impact, the effect of the impact on commercial maritime activities and navigation is determined to be of **negligible significance** and therefore **not significant** in relation to the EIA Regulations.

##### 12.6.2.1.1.6 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

##### 12.6.2.1.1.7 Significance of Residual Effect post Mitigation

No mitigation is required, as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

### 12.6.2.2 Commercial Fisheries

A full assessment of the potential impacts on identified commercial fisheries receptors has been undertaken within the CFIA (**Appendix U**). To avoid undue duplication, a summary of the impact assessment conducted within the CFIA is presented below.

#### 12.6.2.2.1 Exclusion, Access, Displacement and Associated Economic Loss

##### 12.6.2.2.1.1 Nature of Impact

The installation and subsequent operation of the Proposed Development could potentially result in the reduction of available fishing ground within the marine environment. The spatial extent of potential exclusion is influenced by the level of fishing effort and the method of fishing, with static gear vessels able to work within the Development Area of the Proposed Development, whilst mobile gear vessels are likely to be excluded from the entire Development Area. Therefore, the worst case scenario total area over which exclusion of fishing effort may occur is 1.02 $km^2$ (spatial extent of the Development Area). The potential reduction in area of fishing ground available to the commercial fishing industry could potentially also result in some degree of economic loss dependent on the relative value of the grounds encompassed by the Proposed Development.

##### 12.6.2.2.1.2 Summary of Impact

A summary of the impact magnitude and significance of effect is presented in **Table 12.2**. The assessment considered contextual data, which allowed the assessment to consider local and wider-scale areas of importance (high value / high fishing effort). This allowed the assessment to not just determine the absolute value of the fishing grounds within the footprint of the Proposed Development but also evaluate the relative importance of the fishing ground in relation to other areas that are persecuted by the local inshore fisheries.

The assessment concluded that the Proposed Development would result in impacts of **negligible overall magnitude** on the identified and scoped in fisheries. The mobile Nephrops demersal trawl fishery and the static gear pots and traps fishery (lobster, crab and Nephrops) were both determined to be of **low** and **medium sensitivity**; therefore the effect was determined to be of **negligible significance**, and thus **non-significant** in relation to the EIA Regulations.

**Table 12.2: Summary of the determination of impact magnitude and significance of effect in relation to exclusion, access, displacement and associated economic loss.**

| Receptor Name | Receptor Sensitivity | Magnitude of Unmitigated Impact | Significance of Effect without Mitigation | Mitigation | Significance of Effect Post Mitigation |
|---|---|---|---|---|---|
| Mobile Nephrops Demersal Trawling Fishery | Low | Negligible | Negligible | No additional mitigation proposed above the outlined | No significant residual effect |

| Receptor Name | Receptor Sensitivity | Magnitude of Unmitigated Impact | Significance of Effect without Mitigation | Mitigation | Significance of Effect Post Mitigation |
|---|---|---|---|---|---|
| Static Pots and traps Fishery | Medium | Negligible | Negligible | embedded mitigation | |

#### 12.6.2.2.2 Gear Snagging, Entanglement and Navigational Safety

##### 12.6.2.2.2.1 Nature of Impact

Due to the physical presence of the Proposed Development within waters utilised for commercial fishing there is the potential for physical interaction between the Proposed Development infrastructure and the fishing gear deployed by fishers. The potential for interaction is higher in relation to the sub-surface infrastructure of a fish farm, with mooring lines and anchors extending out from the surface infrastructure. There is the potential for both static and mobile gear to snag on aquaculture infrastructure. Static creels can be set in clusters along a leader, these groups of creels can comprise ten to 25 creels, and in excess of 100 for larger vessels, set at regular intervals along the leader. As a result, the leader, or individual creels, may be set over mooring lines or anchors, or during the soak period movement may result in snagging. Mobile gear is considered to be more susceptible to snagging and entanglement due to the nature of this fishing practice, with vessels requiring space to tow gear, therefore any alteration to the seabed of fishing grounds may result in snagging. In either scenario, snagging and entanglement of fishing gear may cause impacts to both economic viability and navigational safety.

There is also concern raised by the fishing industry over the potential interaction with aquaculture marine litter within the wider marine environment, as fishing vessels may catch discarded aquaculture infrastructure which may cause damage to fishing vessels or fishing gear. Depending on the nature of the snagged marine litter this may be dangerous, especially for fishing vessels operated by a single fisher[232].

In general, concerns are raised in relation to three aspects that can be controlled through best practice by aquaculture operators[233]:

- Inappropriate lighting;
- Farm infrastructure not being within the exact licensed co-ordinates; and
- Aquaculture marine litter.

This assessment will focus on these three key concerns raised by the fishing industry.

##### 12.6.2.2.2.2 Summary of Impact

A summary of the impact magnitude and significance of effect is presented in **Table 12.3**. Whilst the Proposed Development introduces infrastructure to the location, the range of embedded design and operational mitigation measures outlined for the Proposed Development are determined to reduce the overall magnitude of the potential impact to **negligible** levels. As a result of the determined **high sensitivity** for the mobile Nephrops demersal trawling fishery and the **low sensitivity** of the static pots

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[232] Poseidon. Co-existence of capture fisheries and marine aquaculture. Report, May 2022. [Online] Available at: https://www.crownestatescotland.com/resources/documents/co-existence-of-capture-fisheries-marine-aquaculture-review-of-measures-for-improved-co-existence-with-recommendations-for-adoption-in-scotland

[233] Co-existence of capture fisheries and marine aquaculture Review of measures for improved co-existence with recommendations for adoption in Scotland Report. (2022). Available at: https://www.crownestatescotland.com/sites/default/files/2023-07/co-existence-of-capture-fisheries-marine-aquaculture-review-of-measures-for-improved-co-existence-with-recommendations-for-adoption-in-scotland.pdf

and traps fishery and the **negligible overall magnitude** of the impact, the effect is determined to be of **negligible significance** and therefore, **non-significant** in relation to the EIA Regulations.

**Table 12.3: Summary of the determination of impact magnitude and significance of effect in relation to gear snagging, entanglement and navigational safety.**

| Receptor Name | Receptor Sensitivity | Magnitude of Unmitigated Impact | Significance of Effect without Mitigation | Mitigation | Significance of Effect Post Mitigation |
|---|---|---|---|---|---|
| Mobile Nephrops Demersal Trawling Fishery | Medium | Negligible | Negligible | No additional mitigation proposed above the outlined embedded mitigation | No significant residual effect |
| Static Pots and traps Fishery | Low | Negligible | Negligible | | |

## 12.6.2.2.3 Changes to the Local Environment

### 12.6.2.2.3.1 Nature of Impact

The operation of the Proposed Development is likely to lead to a degree of increased deposition of organic material, namely uneaten feed and faeces. This increased deposition, if intense enough, may lead to the modification of the benthic environment and therefore associated benthic communities beneath the pens and within the local area.

The Proposed Development, through the Scottish Environment Protection Agency (SEPA) Controlled Activities Regulations (CAR) licence will be permitted to discharge the following medicants into the water environment:

- SLICE (active ingredient: Emamectin Benzoate (EmBz));
- Salmosan (active ingredient: Azamethiphos); and
- Alphamax (active ingredient: Deltamethrin).

Whilst the Proposed Development will prioritise the use of non-medicinal interventions, such as combined gill health and sea lice freshwater interventions and mechanical interventions for sea lice removal. The licenced medicants are anticipated to make up part of the ISLM plan. These medicants have the potential to negatively impact arthropod crustacea within the immediate area, if concentrations are high enough, and therefore they may impact shellfish stocks.

### 12.6.2.2.3.2 Summary of Impact

A summary of the impact magnitude and significance of effect is presented in **Table 12.4**. Whilst the Proposed Development has the potential to discharge organic material, and the identified medicants into the marine environment, compliance with the SEPA discharge thresholds is predicted to ensure that the impact is reduced to a **negligible overall magnitude**. As a result of the determined **low sensitivity** of the mobile Nephrops demersal trawl fishery and the **medium sensitivity** of the static pots and traps fishery and the **negligible** magnitude of impact, the effect is determined to be of **negligible significance** and therefore, **non-significant** in relation to the EIA Regulations.

**Table 12.4: Summary of the determination of impact magnitude and significance of effect in relation to change to the local environment.**

| Receptor Name | Impact Pathway | Receptor Sensitivity | Magnitude of Unmitigated Impact | Significance of Effect without Mitigation | Mitigation | Significance of Effect Post Mitigation |
|---|---|---|---|---|---|---|
| Mobile Nephrops Demersal Trawling Fishery | Organic material deposition | Low | Negligible | Negligible | No additional mitigation proposed above the outlined embedded mitigation | No significant residual effect |
| | SLICE (EmBz) | | | | | |
| | Salmosan Vet (Azamethiphos) | | | | | |
| | AlphaMax (Deltamethrin) | | | | | |
| Static Pots and traps Fishery | Organic material deposition | Medium | Negligible | Negligible | | |
| | SLICE (EmBz) | | | | | |
| | Salmosan Vet (Azamethiphos) | | | | | |
| | AlphaMax (Deltamethrin) | | | | | |

# 12.7 Cumulative Impacts

## 12.7.1 Commercial Maritime Activities and Navigation

### 12.7.1.1 Direct Impact on Navigational Access and Safety

Within the waters surrounding the Proposed Development there is one existing BFS fish farm. The Proposed Development, if consented, will increase the number of fish farms in the area from one to two The Proposed Development will be isolated from the existing fish farms from a navigational perspective. All fish farms are located outwith the transit routes for passenger ferries and commercial cargo vessels, with the exception of cargo vessels associated with existing fish farms, that have been identified through AIS data analysis. The existing farms apply the same mitigation measures listed in **Section 12.3**, specifically navigational lighting and marking in line with the requirements of the NLB. As a result, the magnitude of the cumulative impact is determined to be **negligible**.

In light of the assessed **medium** sensitivity of the receptor and **negligible** magnitude of the cumulative impact, the effect of the cumulative impact is determined to be of **negligible significance** and therefore **not significant** in relation to the EIA Regulations.

## 12.7.2 Commercial Fisheries

The CFIA (**Appendix U**) has fully assessed the potential for cumulative impacts arising from the Proposed Development in-combination with the existing fish farm operations within the wider marine environment. Within the scope of the cumulative assessment, the existing and active BFS fish farm, Gravir, has been considered alongside the Proposed Development.

### 12.7.2.1 Summary of Cumulative Impacts

A full assessment of the potential for cumulative impacts on the local inshore commercial fishing industry has been undertaken within the CFIA (**Appendix U**). A summary of the conclusions of the cumulative impact assessment is presented below in **Table 12.5**. The cumulative impact relating to each of the identified impact pathways was determined to be of **negligible overall magnitude**. As a result, the significance of the cumulative effect of the identified impact pathways was determined to be **non-significant** in relation to the EIA Regulations.

**Table 12.5: Summary of cumulative impact magnitude and significance.**

| Receptor Name | Impact Pathway | Receptor Sensitivity | Magnitude of Unmitigated Impact | Significance of Effect without Mitigation | Mitigation | Significance of Effect Post Mitigation |
|---|---|---|---|---|---|---|
| Static Pots and traps Fishery | Exclusion, access, displacement and associated economic loss | Medium | Low | Minor | No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required. | No significant residual cumulative effect |
| | Gear snagging, entanglement and navigational safety | Low | Negligible | Negligible | | |
| | Changes to the local environment | Medium | Negligible | Negligible | | |

## 12.8 Statement of Significance

The findings of the impact assessment on navigation, anchorage, commercial fisheries (**Appendix U**) and other non-recreational maritime uses are summarised below.

**T**he EIA assessed the potential impacts and subsequent effects of the Proposed Development on non-recreational marine uses. This assessment was carried out in line with the IEMA assessment methodology detailed within **Sub-Section 2.4.1**.

The baseline marine activity was informed by the Baseline Marine Activity Assessment, undertaken by Anatec, and provided as **Appendix Q**. A DBA was also undertaken to compliment the Baseline Marine Activity Assessment and inform the baseline condition. The DBA identified a number of non-recreational receptors, including, anchorages, sub-sea cables, and Ministry of Defence (MOD). Through the identification of the baseline condition it was possible to scope out a number of receptors from the assessment. The scoped out receptors included, anchorages, sub-sea cables, and MOD. Therefore, the following receptors were scoped in and assessed in further detail:

- Commercial maritime activities and navigation; and
- Commercial fisheries (**Appendix U**).

A number of embedded mitigation measures have been incorporated into both the design and operation of the Proposed Development, including:

- Development location (design);
- Development lifespan (design);
- Farm layout and design (design);
- Minimisation of the mooring area (design);
- Navigational lighting and marking (operational); and
- Registration with the United Kingdom Hydrographic Office (UKHO) (operational).

The Proposed Development represents a long-term obstruction to commercial maritime activities and navigation. There is also the potential for marine vessel activity associated with the Proposed Development to interact with the existing baseline level of vessel activity. However, as a result of the limited spatial overlap of the development area, with areas of high maritime activity, along with the proposed embedded mitigation the assessment determined that the direct impact on commercial maritime activities and navigation would be of **negligible overall magnitude**. In light of the **medium sensitivity**, the effect is determined to be of **negligible significance** and therefore **non-significant** in relation to the EIA Regulations.

Exclusion, access, displacement and associated economic loss impacts on the identified and scoped in fisheries were determined to result in impacts of a **negligible overall magnitude**. The mobile Nephrops demersal trawling fishery was determined to be of **low sensitivity**, whilst the static pots and traps fishery was determined to be of **medium sensitivity**. As a result, the impact resulted in effects of **negligible significance** on both fisheries. Therefore, the effects were predicted to be **non-significant** in relation to the EIA Regulations.

Gear snagging, entanglement and navigational safety impacts on the identified and scoped in fisheries were determined to result in impacts of a **negligible overall magnitude**. The mobile Nephrops demersal trawling fishery was determined to be of **medium sensitivity**, whilst the static pots and traps fishery was determined to be of **low sensitivity**. As a result, the impact resulted in effects of **negligible significance** on both fisheries. Therefore, the effects were predicted to be **non-significant** in relation to the EIA Regulations.

Impacts resulting in changes to the local environment on the identified and scoped in fisheries were determined to be of a **negligible overall magnitude**. The mobile Nephrops demersal trawling fishery was determined to be of **low sensitivity**, whilst the static pots and traps fishery was determined to be of **medium sensitivity**. As a result, the impact resulted in effects of **negligible significance** on both fisheries. Therefore, the effects were predicted to be **non-significant** in relation to the EIA Regulations.

Significant cumulative effects on non-recreational marine uses, including commercial fishing (**Appendix U**) were determined to give rise to cumulative effects that were **non-significant** in relation to the EIA Regulations.

In summary, **no significant effects** on non-recreational marine users are predicted as a result of the Proposed Development.

## 12.9 Data Limitations and Uncertainties

A range of publicly available datasets informed both the baseline and impact assessment for recreational and non-recreational marine users, these various datasets each have specific limitations and inherent uncertainties that must be taken into consideration. However, it has been determined through professional judgement that these limitations do not undermine the robustness of the assessment:

- **Lack of location specific commercial fisheries data:** Through engagement with WIFA and Outer Hebrides Regional Inshore Fisheries Group (OHRIFG), BFS sought to obtain location specific fisheries data to ensure the impact assessment accounted for fine-scale fishing intensity. However, no quantitative data, that could be used to drive the assessment were shared. Therefore, the impact assessment was conducted via the utilisation of publicly available fisheries data;
- **AIS - Shipping Traffic Data:** AIS technology was created as a tool for collision avoidance and means of automatic data exchange both ship-to-ship and ship-to-shore. Complete deployment of AIS to Safety of Life At Sea (SOLAS) class vessels was required by 31 December 2004 under SOLAS Chapter V. SOLAS requires AIS to be fitted onboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged on international voyages and all passenger ships irrespective of size. UK and EU fishing vessels of 15 m length and above are also required to carry AIS. Military vessels, recreational craft and smaller fishing vessels (below 15 m) are not required to carry AIS, but a proportion do so voluntarily, however these vessels will be under-represented in the data;
- **MD ScotMap Data:** The data that underpins the ScotMap project were collected from face-to-face interviews with individual vessel owners and operators and relates to fishing activity for the period 2007 to 2011. Interviewees were asked to provide information relating to; the areas that they fish, their fishing vessels, species targeted, fishing gear used, and income from fishing. Responses were on a voluntary basis and for the Stornoway port district ScotMap data had a vessel coverage of 86 % (172/200). Therefore, ScotMap data may be an under-representation of actual fishing activity within the vicinity of the Proposed Development. Moreover, the data is over 10 years old and therefore may not accurately represent changes in fleet composition, stock abundance, and fishing practice. However, the ScotMap data still provides a good indication of historic fishing intensity within the inshore region; and
- **ICES C-Square Fishing Intensity Data:** Data on fishing locations for vessels under 12 m are not available, as VMS is not required on under 12 m vessels and are therefore not included within the dataset. This introduces bias that is expected to be strongest in inshore waters. However, dependent on the composition of specific fishery fleets, the magnitude of the bias will vary. Data on value and weight received from various countries are not quality checked by ICES and may therefore be inconsistent. Also due to the sensitive nature of certain data variables, such as value, weight and fishing hours, data is only available for lower and upper limits for 20 discrete categories which reduces the accuracy of the assessment. However, the upper value, on which the impact assessment is based represents the worst-case scenario and therefore is perhaps an over-representation of impact.

# 13 Seascape, Landscape, and Visual

## 13.1 Introduction

BFS commissioned ERM to undertake a full SLVIA to support the submission of the planning application for the Proposed Development under the Town and Country Planning (Scotland) Act 1997 (as amended). The full SLVIA is provided as **Appendix N**. **Section 13** of this EIAR provides an overview of the SLVIA findings and presents the outcomes in relation to the EIA Regulations.

## 13.2 Scoping

The potential for significant effects as a result of landscape and visual impacts was raised by consultees in their specific Scoping advice, in response to the formal Screening and Scoping Request submitted to CnES. A brief summary of the requirements of the consultees is provided below in **Table 13.1** and a full review of the Scoping information requirements is provided in **Section 5**.

**Table 13.1: Summary of the required information relevant to landscape and visual impacts.**

| Consultee | Information Requirement | Cross Reference |
| --- | --- | --- |
| NS | • Advised that the proposed development is likely to have an effect on the visual landscape;<br>• Request that BFS submit an LVIA for the Proposed Development; | Section 13; and Appendix N |
| CES | • Request that BFS submit an LVIA for the Proposed Development;<br>• State that the final LVIA should be undertaken in accordance with a methodology acceptable to NS, which will require the preparation of a ZTV, to inform the selection of representative viewpoints;<br>• State that BFS should take account of NS guidance of LVIAs; and<br>• State that the LVIA should consider the impact of the Proposed Development on the wild land area to the west and south; | Section 13; and Appendix N. |

## 13.3 Legislation, Policy, and Guidance

The following documentation has been determined to be relevant and has been utilised to inform the methodology of the SLVIA. For a detailed explanation of the SLVIA methodology please see **Appendix N**:

- Landscape Institute/ Institute of Environmental Management and Assessment (2013), 'Guidelines for Landscape and Visual Impact Assessment', 3rd Edition ('GLVIA3')[234];
- Landscape Institute (2013), GLVIA3 Statement of Clarification 1/13[235];
- Landscape Institute (2019), 'Visual Representation of Development Proposals', Technical Guidance Note[236];
- Landscape Institute (2019), Residential Visual Amenity Assessment TGN 2/19[237];

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[234] Landscape Institute and Institute of Environmental Management and Assessment, 2013, *Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition, Routledge, London.
[235] The Landscape Institute (2015) GLVIA3 – Statements of Clarification. Available online at: https://www.landscapeinstitute.org/technical-resource/glvia3-clarifications/
[236] The Landscape Institute, *Visual Representation of Development Proposals, Technical Guidance Note 06/19*, 17th September 2019.
[237] Landscape Institute, *Residential Visual Amenity Assessment (RVAA) Technical Guidance Note 02/19* 15th March 2019. Available online at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/03/tgn-02-2019-rvaa.pdf

- NatureScot (formerly Scottish Natural Heritage (SNH)) and The Countryside Agency (2002) Landscape Character Assessment Guidance for Scotland and England;
- NatureScot (2018) Visualisations for Aquaculture[238];
- NatureScot (2011) The siting and design of aquaculture in the landscape: visual and landscape considerations[239]; and
- NatureScot (2008) Guidance on Landscape/Seascape Capacity for Aquaculture[240].

## 13.4 SLVIA Methodology

The methodology utilised to conduct the SLVIA differs from that used within the other Sections of this EIAR, as detailed in **Sub-Section 2.4**. Therefore, a brief description of the SLVIA methodology is outlined below, for the full SLVIA methodology, please refer **Appendix N**.

### 13.4.1 Level of Effect and Criteria

Essentially, the level of seascape, landscape and visual effect (and whether this is significant) is determined through consideration of the 'sensitivity' and 'susceptibility' of:

- The seascape, landscape element, assemblage of elements, key characteristics or character type or area under consideration bearing in mind quality and value; or
- The visual receptor; and
- The 'magnitude of change' posed by the Proposed Development, in this case the construction of a fish farm.

The process involves design and re-assessment of any remaining, residual significant adverse effects that could not otherwise be mitigated or 'designed out'. Landscape or visual sensitivity is ranked from high, medium, low to negligible and the magnitude of change is similarly ranked from large, medium, small to negligible as indicated in **Table 13.2**. The type of effect is also considered and may be direct or indirect, temporary or permanent, cumulative, and positive, neutral or negative. The seascape, landscape and visual assessment involves a combination of both quantitative and subjective assessment and wherever possible has sought to gain a consensus of professional opinion through consultation, peer review and the adoption of a systematic, impartial, and professional approach.

In accordance with EIA Regulations, it is essential to determine whether the predicted effects are likely to be 'significant'. Significant seascape, landscape and visual effects, in the assessor's opinion, resulting from the Proposed Development would be all those effects that normally result in a 'major', a 'moderate / major', or 'moderate' effect with any exceptions being clearly explained (refer to **Table 13.2** below). The seascape, landscape and visual assessment unavoidably involves a combination of both quantitative and qualitative assessment and wherever possible a consensus of professional opinion has been sought through consultation, internal peer review, and the adoption of a systematic, impartial, and professional approach.

Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA Regulations and are shaded in light grey in **Table 13.2**.

[238] Nature Scot (February 2018) Visualisations for Aquaculture - Guidance Note. Available online at: https://www.nature.scot/sites/default/files/2018-02/Visualisations%20for%20Aquaculture%20-%20Guidance%20%20Note.pdf;

[239] NatureScot (November 2011) The siting and design of aquaculture in the landscape: visual and landscape considerations. Prepared by Alison Grant, Landscape Architect. Available online at: https://www.nature.scot/sites/default/files/2017-07/Publication%202011%20-%20The%20siting%20and%20design%20of%20aquaculture%20in%20the%20landscape%20-%20visual%20and%20landscape%20considerations.pdf

[240] NatureScot (2008) Guidance on Landscape / Seascape Capacity for Aquaculture. Available on line at: SNH1683 (nature.scot)

**Table 13.2: Evaluation of landscape and visual effects.**

| | | Sensitivity | | | |
|---|---|---|---|---|---|
| | | **High** | **Medium** | **Low** | **Negligible** |
| **Magnitude of Change** | **Large** | Major | Moderate - Major | Minor – Moderate | Negligible |
| | **Medium** | Moderate – Major | Moderate | Minor | Negligible |
| | **Small** | Minor - Moderate | Minor | Negligible - Minor | Negligible |
| | **Negligible** | Negligible | Negligible | Negligible | Negligible |

### 13.4.2 Duration and Reversibility

These are separate but linked considerations. The definitions for the duration of effects are set out in the EIAR SLVIA Methodology (**Appendix N**).

### 13.4.3 Duration

The duration of the Proposed Development is considered to be a permanent development.

### 13.4.4 Reversibility

Reversibility is a judgement about whether or not a development can be removed, and once removed can the landscape / seascape be fully restored. The following are examples of the type of land use and the respective assessment of reversibility defined in the Guidelines for Landscape & Visual Impact Assessment (GLVIA3)[241]:

- **Permanent:** Is irreversible change to the landscape / seascape, for example housing development, as it is not possible to remove the development and restore the land to the original state;
- **Partially Reversible:** Change to the landscape / seascape, where the landscape / seascape can be restored to something similar to the landscape / seascape that was removed. For example, mineral development, as it is possible to restore the land to something similar to the original state, but not the same state; and
- **Reversible:** Change to the landscape / seascape where the landscape / seascape can be fully restored.

To confirm, the SLVIA has assessed and determined the Proposed Development to be reversible, as the seascape character could be fully restored.

### 13.4.5 Study Area

The study area covers a 10 km radius from the Proposed Development and includes a large area surrounding the proposed development on the eastern coast of the Isle of Lewis. Beyond this distance, the Proposed Development is unlikely to be perceptible within the landscape due to its limited scale, low profile, and the reduction of visual effects over distance.

The 10 km radius wider study area has been defined based on the ZTV (Figure 1.9, **Appendix N**), site assessment and following guidance within the NS (2018) Visualisations for Aquaculture guidance, which states:

***"where a proposal is sited in an open or expansive coast, the ZTV radius will be greater, e.g. 7 km or up to 10 km; other factors such as complex seaways or straits, or the presence of ferry***

[241] Landscape Institute and Institute of Environmental Management and Assessment, 2013, *Guidelines for Landscape and Visual Impact Assessment*, 3rd Edition, Routledge, London, Paragraph 6.32 (GLVIA3)

***routes, or sensitive viewpoints may require a larger ZTV radius to ensure they are appropriately considered…"***[242]

The existing Gravir fish farm is situated within Loch Odhairn on the east coast of the Isle of Lewis within 1.6 km from the Proposed Development.

Following the site assessment, a detailed study area was adopted, based on a distance of a 5 km radius from the Proposed Development to focus on the areas where the greatest landscape and visual impacts may occur, and the lack of visibility for sensitive receptors beyond 5 km radius due to the topography of the Isle of Lewis. A 2 km radius was used for the assessment of residential properties due to the very lightly settled landscape of the Isle of Lewis, to include the nearest properties to the north of the Proposed Development near Calbost.

## 13.5 Embedded Mitigation

### 13.5.1 Design Mitigation

An outline of the key design measures related to mitigating the seascape, landscape and visual impact of the Proposed Development is presented below.

#### 13.5.1.1 Development Location

The development location is classified as open and expansive coast and therefore is capable of accommodating larger structures. As a result, the selection of this development location is anticipated to help reduce the overall magnitude of impacts on seascape and landscape receptors.

#### 13.5.1.2 Siting

The Proposed Development will be orientated parallel to the dominant coastline with open and expansive views out to sea, which are dominated by the horizontal. This is anticipated to reduce the overall magnitude of impacts on seascape and landscape receptors.

#### 13.5.1.3 Pens

A reduced number of larger pens helps to reduce the amount of infrastructure required to farm the proposed biomass. They are low profile and will be finished in a dark grey or matte black colour, this will help reduce the overall magnitude of impacts on seascape and landscape receptors.

#### 13.5.1.4 Feed Barge

The proposed feed-barge is designed to look similar to commercial marine vessels, which are common in the waters to the west of the Isle of Lewis.

#### 13.5.1.5 Low Profile Infrastructure

All surface infrastructure will have a low profile design, which is anticipated to allow the surface infrastructure to be accommodated within the wider context of the seascape and landscape.

#### 13.5.1.6 Bird Nets

Pole mounted top nets do not require the additional pen furniture of a 'hamster wheel' support within each pen. The netting will be battleship grey in colour. The utilisation of a pole mounted system with grey netting is anticipated to reduce the overall magnitude of visual impacts.

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[242] Nature Scot (February 2018) Visualisations for Aquaculture - Guidance Note, para 29, page 7. Available online at: https://www.nature.scot/sites/default/files/2018-02/Visualisations%20for%20Aquaculture%20-%20Guidance%20%20Note.pdf

# 13.6 Baseline Condition

The baseline condition is fully detailed within **Section 4** of the SLVIA (**Appendix N**). The below section of this EIAR, provides a summary of the baseline condition.

## 13.6.1 National and Regional Landscape Character

The national and regional Landscape Character within the study area has been defined within the SLVIA (**Appendix N**). **Table 13.3**, below, summarises the Landscape Character Type (LCT) identified and scoped in for further assessment.

**Table 13.3: Summary of the Landscape Character Type scoped In for further assessment within the SLVIA.**

| Landscape Character Type | Description |
|---|---|
| Cnoc and Lochan LCT 324 | • Steep-sided irregular outline of small cnocs, separated by depressions which frequently contains small lochans;<br>• Intimate landscape scale with only short internal views;<br>• Diversity of landform and contrasting textures, creating diverse microclimates; and<br>• Intensive use and reuse of small areas of cultivable land over thousands of years, with occasional patches of cultivated land creating focal features today[243]. |
| Dispersed Crofting LCT 319 | • Short, even slopes interspersed between rocky knock and boulder outcrops;<br>• Small and intimate landscape scale;<br>• Strong, simple relationship between crofting townships and the sea;<br>• Dispersed settlement pattern, with occasional groups focused around harbours and sheltered glens;<br>• Combination of landform variation and coastal location of townships create a landscape with a high level of natural diversity in a relatively small area; and<br>• Absence of woodland and trees[244]. |

## 13.6.2 Seascape Character

The Seascape Character within the study area has been defined within the SLVIA (**Appendix N**). **Table 13.4**, below, summarises the Seascape Character identified and scoped in for further assessment.

**Table 13.4: Summary of the Seascape Character scoped In for further assessment within the SLVIA.**

| Seascape Character | Description |
|---|---|
| North East Lewis, and specifically the Low Rocky Island Coasts Seascape Character Type 13 - SCA 12 | • Low rocky coastline, cliffs and fragmented coastline in places backed by the cnoc and lochan landscape;<br>• Sparsely settled. Small crofting settlements along coastline. Large |

[243] NatureScot (2023) Scottish Landscape Character Types, Maps and Descriptions. Available online at: Scottish Landscape Character Types Map and Descriptions | NatureScot

[244] NatureScot (2023) Scottish Landscape Character Types, Maps and Descriptions. Available online at: Scottish Landscape Character Types Map and Descriptions | NatureScot

| Seascape Character | Description |
| --- | --- |
| | settlement at Stornoway with some industrial development, airport and busy port;<br>• Views of the Little Minch to the south and beyond views of distant hills on mainland particularly distinctive Assynt to the east; and<br>• Parts of this landscape feel remote except for the Stornoway area[245]. |

## 13.6.3 Landscape and Seascape Character of the Development Location

The Landscape and Seascape Character of the development location has been defined within the SLVIA (**Appendix N**). **Table 13.5**, below, summarises the Landscape and Seascape Character of the development location, which has been scoped in for further assessment. The character of the development location and its immediate context has been informed by a review of published landscape character assessments and supplemented by site investigations.

**Table 13.5: Summary of the landscape and seascape character of the development location.**

| Character Type | Description |
| --- | --- |
| Low Rocky Island Coasts Seascape Character (SCT 13) (modified via site investigations) | • Scale & Openness - a medium to large scale seascape with sheltered bays and inlets along the coastline, within the Cnoc and Lochan landscape. On clear days views of Skye are available from the Western Isles forming the horizon to the east;<br>• Settlement – there is sparse residential settlement with traditional crofting and residential properties found in the sheltered bays and inlets. There are large stretches of uninhabited coasts found throughout this seascape area. The settlement of Gravir also contains a jetty and shore base for BFS, and the associated shipping container storage units and small buildings, associated with the industry, are also evident in the landscape / seascape;<br>• Pattern & foci - There are generally complex and intricate patterns of indented coastline fragmenting into islands and skerries or larger scale patterns of peninsulas, sounds and narrows. Foci tend to be residential properties where they appear and strong landscape features such as distinctive mountains on the horizon and headlands;<br>• Lighting – there is very limited lighting in the seascape / landscape from properties, boats, and fish farms, but this is a dark coastal area;<br>• Movement – there is limited movement from local roads / tracks and intermittent and there are areas which are very remote, and no |

[245] NatureScot Commissioned Report No. 103 – An assessment of the sensitivity and capacity of the Scottish Seascape in relation to windfarms (NatureScot, 2005), page 69. Available online at: https://www.nature.scot/sites/default/files/2017-07/Publication%202005%20-%20SNH%20Commissioned%20Report%20103%20-%20An%20assessment%20of%20the%20sensitivity%20and%20capacity%20of%20the%20Scottish%20seascape%20in%20relation%20to%20windfarms.pdf

| Character Type | Description |
|---|---|
| | movement is discernible except that of wind and waves;<br>• Modification/Remoteness/Sense of Naturalness - traditional small crofting settlements with natural elements and landscape and seascape experience dominating. Operational aquaculture developments are present along the coastline; and<br>• Degree of exposure – the landscape / seascape is exposed with indented lochs provide sheltered areas along the rocky coastline. The Proposed Development is located adjacent to the coastline within a more exposed / open seascape. |

### 13.6.4 Visual Receptors

The SLVIA (**Appendix N**) outlines the full considerations given to visual receptors within the study area. A summary of the scoped in visual receptors is provided below:

- Cnoc and Lochan LCT 324;
- Dispersed Crofting LCT 319;
- Low Rocky Coast SCT Seascape Unit 13; and
- Sea based recreational receptors.

### 13.6.5 Evolution of the Baseline Condition

The EIA Regulations require that; ***"A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge"*** (EIA Regulations, Schedule 4, Paragraph 3), is included within the EIAR. Therefore, this Sub-Section of the EIAR, provides a qualitative description of the evolution of the baseline condition, on the assumption that the installation and subsequent long-term operation of the Proposed Development does not take place.

It is not anticipated that the baseline condition described above would differ significantly in the future without the Proposed Development, or with the Proposed Development for the duration of its operations.

## 13.7 Identified Potential Impacts

In order to understand the likely effects of the Proposed Development, it is first necessary to understand the construction processes involved, and the components of the Proposed Development which would be present during the operational lifecycle (as outlined within **Section 3**). The likely effects that would arise as a result of the Proposed Development can be attributed to either the short-term construction works or the long-term presence of the Proposed Development throughout the operational phase of the lifecycle.

### 13.7.1 Effects of Construction

Potential effects as a result of the construction of the Proposed Development may include:

- Effects on landscape and seascape character, based on a current and future baseline, from construction activities within 5 km radius; and

- Effects on visual amenity of surrounding visual receptors, including sea based recreational receptors, based on a current and future baseline, from construction activities within 5 km radius.

### 13.7.2 Effects of Operation

Potential effects as a result of the operation of the Proposed Development may include:

- Effects on seascape and landscape character within the detailed study area 5 km radius; and
- Effects on visual amenity of surrounding visual receptors, including from recreational receptors, based on a current and future baseline, from the Proposed Development within a 5 km radius.

## 13.8 Impact Assessment

### 13.8.1 Assessment of Effects on Seascape and Landscape

**Section 7** of the SLVIA (**Appendix N**) details the assessment of effects on seascape and landscape, describing the expert judgements made regarding sensitivity, magnitude of change, and significance. This section summarises the results and conclusions but does not replicate the detail of the assessment made within the SLVIA. Therefore, please refer to **Appendix N** for the full assessment.

#### 13.8.1.1 Construction Effects on Landscape and Seascape

The construction phase would result in localised and direct effects on the existing seascape within the Low Rocky Island Coasts Seascape Character (SCT 13) **Table 13.6** provides a list of the construction activities to be undertaken together with an appraisal of the level and type of effect predicted. Please refer to **Appendix N** for the full assessment.

The seascape sensitivity of the Low Rocky Island Coasts Seascape Character Type 13 is considered to be medium. It is an undesignated seascape. However, the landscape / seascape may be valued for its perceptual qualities, notably wildness and/or tranquility, and may also be valued for recreational activity where experience of the landscape / seascape is important.

In addition, the Cnoc and Lochan LCT 324, as the closest LCT to the Development, also has a medium sensitivity which also reflects the perceptual qualities of the coastline.

**Table 13.6: Seascape and landscape effects during the construction phase.**

| Construction Activity and Assessment | Seascape and Landscape Assessment | | |
|---|---|---|---|
| | Sensitivity and Susceptibility | Magnitude of Change | Level of Effect |
| Fish Farm Pens, Feed Pipes & Feed Barge<br><br>As the construction works commence, the magnitude of change associated with the installation of the new pens, feed barge and feed pipes would increase from zero to small within the local landscape and seascape due to the restricted area of potential visibility.<br><br>The construction activity would directly affect the seascape within which the pens and feed barge | The landscape and seascape effects arising during the construction works within an area of medium sensitivity and medium susceptibility to change | Small | **Minor**<br><br>The nature of these effects would be minor, temporary (reversible), adverse, non-significant, direct seascape effects and indirect landscape effects within the Low Rocky Island Coasts SCT 13 and the Cnoc and Lochan LCT 324. |

| Construction Activity and Assessment | Seascape and Landscape Assessment | | |
|---|---|---|---|
| | Sensitivity and Susceptibility | Magnitude of Change | Level of Effect |
| would be installed. The pens and feed barge would be towed in by boat. | | | |

During the construction of the Proposed Development, the medium sensitivity and medium susceptibility of the seascape and landscape character and the predicted small magnitude of change within the Rocky Island Coasts SCT 13 and the Cnoc and Lochan LCT 324 would result in the overall effect during construction predicted to be **Minor**, **non-significant**, **adverse, direct & indirect, and short term (reversible).**

### 13.8.1.2 Assessment of Effects on Landscape and Seascape During Operation

Compared to the construction phase, the Proposed Development would gain a more 'settled' appearance during the operational period when construction activity ceases. This assessment has considered the operation of the Proposed Development within the landscape and seascape.

#### 13.8.1.2.1 Assessment of Effects on Landscape Character

An appraisal of the baseline landscape character has been undertaken in order to determine the sensitivity of the landscape and its capacity to accommodate the Proposed Development.
The landscape character is considered at two levels:

- National / regional setting, in relation to the NatureScot National Landscape Character Assessment and Seascape Character Assessment; and
- Local setting, based on field observations to confirm the key features and characteristics pertinent to the study area and the development location.

##### 13.8.1.2.1.1 Cnoc and Lochan LCT 324

Due to the reversible nature of aquaculture development, it is assessed there would be no permanent changes to the landscape character as a result of the Proposed Development.

The Cnoc and Lochan LCT 324 is the closest LCT to the Site, at a distance of 500 m west of the Proposed Development on the Pairc peninsula, and any potential landscape effects would be indirect.

The magnitude of change arising from the Proposed Development within the Cnoc and Lochan LCT would be negligible. There would be a negligible to small change to aesthetic and / or perceptual attributes of the landscape character and any indirect landscape changes would occur across a very limited geographical area within the LCT along the coastline. The landscape would be able to accommodate the Proposed Development without undue adverse effects, taking account of the existing character and quality of the landscape.

The medium scale landscape, predominantly uninhabited, results in a low susceptibility to the development because the landscape would be able to accommodate it without undue adverse effects, taking account of the existing character and quality of the landscape and the existing fish farm developments.
The landscape effects would be **negligible, indirect, adverse but reversible**, and there would be no discernible improvement or deterioration to the existing landscape character of the Cnoc and Lochan LCT.

#### 13.8.1.2.1.2 Dispersed Crofting LCT 319

Due to the reversible nature of aquaculture development, it is assessed there would be no permanent changes to the landscape character as a result of the Proposed Development.

The Dispersed Crofting LCT is located at a distance of 1.5 km northwest of the Proposed Development and any potential landscape effects would be indirect.

The magnitude of change arising from the Proposed Development within the Dispersed Crofting LCT would be negligible. There would be a negligible to small change to aesthetic and / or perceptual attributes of the landscape character and any indirect landscape changes would occur across a very limited geographical area, the rocky foreshore along the coastline at Camas Chalaboist, within the LCT. This results in a low susceptibility because the landscape would be able to accommodate the Proposed Development without undue adverse effects, taking account of the existing character and quality of the landscape.

The landscape effects would be **negligible, indirect, adverse but reversible**, and there would be no discernible improvement or deterioration to the existing landscape character of the Dispersed Crofting LCT.

#### 13.8.1.2.1.3 Local Landscape Character

Due to the reversible nature of aquaculture development, it is assessed there would be no permanent changes to the local landscape character as a result of the Proposed Development.

This is a lightly populated landscape, with little movement, excepting road vehicles along the local road network between Gravir and Calbost residential properties. Around the settlement of Gravir, boat movement in an out of the harbour is associated with servicing the existing fish farm and light recreational use. There are also areas which appear to be very remote within the local landscape, with the only movement being that of the wind and waves.

Travelling through the local landscape the experience is of a series of small to medium scale landscape and seascape views, with sheltered bays and inlets along the coastline, with the contrast of open views of the sea and east towards the coast of Skye are possible from elevated viewpoints along the local road. The coastline is a complex rocky coastline, with a larger scale patterns of peninsulas, sounds and narrows. Indented coastlines provide sheltered areas along the coastline.

The landscape of the LCT is of a medium landscape sensitivity overall.

The magnitude of change arising from the Proposed Development within the local landscape would be negligible to small (limited to coastline areas and elevated locations on rocky outcrops), comprising of a small scale alteration of the aesthetic and perceptual aspects of the landscape such as the removal of existing components of the seascape or by addition of new ones.

The local landscape would be able to accommodate the Proposed Development without undue adverse effects, taking account of the existing character and quality of the landscape.

The local landscape effects would be **negligible to minor, indirect adverse but reversible**, and there would be no discernible improvement or deterioration to the existing landscape character of the local landscape.

##### 13.8.1.2.2 Assessment of Effects on Seascape Character

Due to the reversible nature of aquaculture development, it is assessed there would be no permanent changes to the seascape character as a result of the Proposed Development.

###### 13.8.1.2.2.1 Low Rocky Island Coast Seascape SCT: Seascape Unity - Northeast Lewis 12

The Proposed Development would not detract from the overall existing medium seascape quality and low sensitivity to aquaculture development. This results in a low susceptibility to the Proposed Development because the seascape would be able to accommodate it without undue adverse effects, taking account of the existing character and quality of the seascape.

The magnitude of change arising from the Proposed Development within the Low Rocky Island Coast SCT 13 would be small overall. There would be a small-scale alteration of the aesthetic and perceptual aspects of the seascape such as the addition of new fish farm equipment. The change would affect a small part of the seascape character type, as the development would occupy a small geographical extent, for example, the level of the immediate setting of the site along the coastline near Stac an Fhir Mhaoil and Creag Fhraoch.

The seascape effects would be **minor, direct, adverse but reversible**, and there would be no discernible improvement or deterioration to the existing seascape character.

### 13.8.2 Assessment of Effects on the Isolated Coast

The Isolated Coast, as designated within the Outer Hebrides Local Plan, is situated ~1.8 km south of the Proposed Development, at A'Chabag. There is a short section of 200 m to 300 m of Isolated Coast within 2 km of the Proposed Development where there is potential visibility of the proposed pens and barge. Beyond 2 km there is no predicted visibility of the Proposed Development along the Isolated Coast for a distance of ~6 km.

The Proposed Development would not detract from the overall existing medium – high seascape quality, and medium sensitivity to aquaculture development. This results in a medium susceptibility to the development and the seascape would be able to accommodate it without undue adverse effects, taking account of the existing character and quality of the landscape, and overall lack of intervisibility of the Proposed Development from the Isolated Coast.

The magnitude of change arising from the Proposed Development within the Low Rocky Isolated Coast would be negligible overall. There would be a small scale alteration of the aesthetic and perceptual aspects of the seascape such as the addition of new fish farm equipment from a short section of the northern part of the Isolated Coast. The change would affect a small part of the seascape character, as the development would occupy a small geographical extent in the view ~ 1.8 km to the north.

The seascape effects on the Isolated Coast would be **minor, indirect, adverse but reversible**, and limited to the northern edge of the Isolated Coast only. There would be no discernible improvement or deterioration to the existing seascape character of the Isolated Coast.

### 13.8.3 Assessment of Effects on Visual Amenity

Visibility of aquaculture development, and structures within the water, varies considerably with change in weather and lighting conditions. NS guidance on the siting and design of aquaculture in the landscape describe how visibility of structures in the water varies due to:

- The contrast in texture between the pens, lines or buoys and the smooth, reflective surface of the water, particularly in calm weather;
- The contrast between the vertical sides of finfish pens and infrastructure and the flatwater surface;
- The constant changes in light conditions can one moment cast a structure into shadow, and the next reflect bright light upon it;
- The size, type or extent of the structures, including the feed storage barges or lighting associated with finfish farms, or numerous buoys associates with shellfish lines; and
- The changes in sea colour and tone, which can often camouflage the structures one moment, but then emphasise the structure in dramatic contrast the next.[246]

The change / sequence of views along the coastline, from the water, and the varying relief and scale of the surrounding landscape, are important factors in the appreciation of the local seascape, and in the visual assessment of the Proposed Development within the seascape.

#### 13.8.3.1 Viewpoint Assessment

The viewpoints (VPs) are used to assist in the appraisal of effects on landscape and visual resources. **Section 2** of the SLVIA (**Appendix N**) provides full detail and rationale for the selection of the chosen viewpoints. Viewpoint selection and micro-siting of each viewpoint location accord with technical guidance[247].

Wireline and photomontage visualisations have been prepared for all the assessed viewpoints, please see **Appendix N**.

**Table 13.7** provides a summary of the predicted visual effect of the Proposed Development from the selected nine VPs. Please refer to **Section 8** of the SLVIA (**Appendix N**) for the full assessment.

**Table 13.7: Summary of the visual effects from the nine selected viewpoints.**

| Viewpoint ID | Susceptibility | Value | Sensitivity | Cumulative Scheme | Magnitude of Change | Level of Visual Effect |
|---|---|---|---|---|---|---|
| VP 1 | High (recreational receptors), low (maritime workers) | High (recreational receptors), low (maritime workers) | High (recreational receptors), low (maritime workers) | No | Small | Moderate, significant, long-term (reversible), and adverse (recreational receptors), negligible - minor, non-significant, long-term (reversible) and adverse (maritime workers) |

[246] NatureScot (2011) The siting and design of aquaculture in the landscape: visual and landscape considerations, Section 2.10, page 10
[247] Landscape Institute (2019), 'Visual Representation of Development Proposals', Technical Guidance Note 02/19

| Viewpoint ID | Susceptibility | Value | Sensitivity | Cumulative Scheme | Magnitude of Change | Level of Visual Effect |
|---|---|---|---|---|---|---|
| VP 2 | High (recreational receptors), low (maritime workers) | High (recreational receptors), low (maritime workers) | High (recreational receptors), low (maritime workers) | No | Negligible | Negligible, non-significant, long-term (reversible) and adverse (maritime workers) |
| VP 3 | Low | Low | Low | No | Negligible | Negligible, non-significant, long-term (reversible) and adverse |
| VP 4 | Low | Low | Low | No | Negligible | Negligible, non-significant, long-term (reversible) and adverse |
| VP 5 | None | None | None | No | None | No visual effects |
| VP 6 | None | None | None | No | None | No visual effects |

#### 13.8.3.2 Visual Effects on Views from Water-Based Locations

Potential views from the sea will largely be from commercial and, to a lesser extent, recreational boats. The Development will be seen in the context of the surrounding dark backdrop of the rocky coastline and expansive open seascape.

Visual receptors would be of a high value (recreational receptors on the water), and the visual receptor susceptibility to change would also be high. For commercial fishing boats, the maritime workers would be of a low value and the visual receptor susceptibility to change would also be low given their focus on work.

There would be a low - medium magnitude of change arising from the Proposed Development along the coastline, depending on proximity of the vessels to the Proposed Development exiting / entering Loch Odhairn towards Gravir.

The nature of these visual effects would be **moderate, significant, long-term (reversible) and adverse** for recreational receptors, but only within proximity to the Proposed Development, up to 0.5 km distance. The visual effects would recede with distance after passing the pens and barge.

The nature of these visual effects would be **minor, not significant, long-term (reversible) and adverse** for commercial boats, who are occupied in the fishing industry or servicing nearby fish farms, but only within proximity to the Proposed Development, up to 0.5 km distance. The visual effects would recede with distance after passing the pens and barge.

## 13.9 Cumulative Impacts

**Table 13.8** provides a summary of the cumulative effects resulting from the Proposed Development in-combination with other active finfish farms, within the study area. Please review **Section 9** of the SLIVA (**Appendix N**) for the full assessment.

**Table 13.8: Summary of cumulative impacts.**

| Receptor Name | Magnitude of Change | Level of Effect |
|---|---|---|
| **Tabhaigh Fish Farm** | **Negligible** | **Negligible, non-significant, long-term (reversible) and adverse** |
| **Gravir Fish Farm** | **Small** | **Negligible -minor and minor, non-significant, long-term (reversible) and adverse** |

## 13.10 Statement of Significance

The findings of the Seascape, Landscape and Visual Impact Assessment (SLVIA) are summarised below, with the full detailed assessment provided in **Section 13** of the EIAR and **Appendix N**.

**Section 13** and **Appendix N** of the EIAR assessed the potential for seascape, landscape and visual impacts as a result of the Proposed Development, during both construction and operational phases. The SLVIA was undertaken by an independent consultant and followed the methodology outlined within **Appendix N**.

The baseline condition was informed by a DBA, which focused on the review of existing guidance and technical documentation. The DBA was also supplemented with site visits and photomontages taken from representative viewpoints within the study area.

Assessment of the baseline condition consisted of the determination of the existing environment through four distinct aspects;

- National / regional and local Landscape character;
- Seascape character types;
- Landscape designations; and
- Visual receptors.

Under national / regional landscape character, the baseline condition identified 'Cnoc and Lochan LCT 324 and Dispersed Crofting LCT 319' as the Landscape Character Type (LCT).

Under Seascape Character Area, the baseline condition identified the 'North East Lewis, and specifically the Low Rocky Island Coasts (SCT) 13'.

The baseline condition identified the seascape local to the Proposed Development as 'Low Rocky Coast (SCT) 9'.

Within the baseline condition no landscape designations were identified with connectivity to the Proposed Development, therefore no landscape designations were considered within the SLVIA.

The following visual receptors, which have connectivity with the Proposed Development, have been identified within the baseline condition:

- Cnoc and Lochan LCT 324;
- Dispersed Crofting LCT 319;
- Low Rocky Coast SCT Seascape Unit 13; and
- Sea based recreational receptors.

A number of embedded mitigation measures have been incorporated into both the design and operation of the Proposed Development to avoid, reduce or offset the potential for adverse significant effects, including:

- Development location (design);
- Siting (design);
- Pens (design);
- Feed barge (design);
- Low profile infrastructure (design); and
- Bird top netting (design).

Effects are considered to be significant for the purposes of the EIA Regulations where the effect is classified as being of 'major', 'moderate – major' or 'moderate' significance.

It is concluded that locally significant effects on landscape / seascape character and visual amenity are inevitable as a result of commercial aquaculture development. The screening of views by the local distinctive cnoc and lochan landscape for local receptors from the Proposed Development results in significant visual effects to be concentrated within a 0.5 km radius for sea based activities only. There are no predicted views from the local road network, residential properties, or from the settlement of Calbost. It is therefore considered that overall, the landscape and seascape has the capacity to accommodate the effects identified.

## 13.11 Data Limitations and Uncertainties

In accordance with the Landscape Institute Technical Guidance Note - Residential Visual Amenity Assessment TGN 2/19[248], the appraisal of residential properties, or groups of properties, is limited to those within 2 km of the Proposed Development. This is due to the lightly settled landscape, the nearest residential properties are situated near Calbost 0.94 km northwest of the Proposed Development.

Some of these properties are accessed from private farm / access tracks and, due to the limitations of access, they have been appraised from the track and footpath, and also with the aid of aerial photographs. In these cases, the appraisal should be regarded as an informed estimate of the likely visual effects.

There are no residential properties with an expected view of the Proposed Development due to the rising topography to the south and east of Calbost. Therefore, there is no residential visual amenity assessment within this SLVIA.

It has been determined through professional judgement that these limitations do not undermine the robustness of the assessment.

[248] The Landscape Institute, *Visual Representation of Development Proposals, Technical Guidance Note 06/19*, 17th September 2019.

# 14 Socio-Economic, Access, and Recreation

## 14.1 Introduction

This technical assessment considers the potential impacts on socio-economic, access and recreation as a result of the Proposed Development. This Section follows the standard technical assessment methodology and assesses the potential impacts of the Proposed Development on identified receptors within the baseline condition.

## 14.2 Scoping

The potential for significant effects on socio-economic, access and recreation was raised by consultees in their specific Scoping advice, in response to the Screening and Scoping Request submitted to CnES. A brief summary of the requirements of the consultees is provided below in **Table 14.1** and a full review of the Scoping information requirements is provided in **Section 5**.

**Table 14.1: Summary of required information relevant to the potential impacts on socio-economic, access and recreation.**

| Consultee | Information Requirement | Cross Reference |
|---|---|---|
| CnES | • Request that both the direct and indirect benefits associated with the Proposed Development be identified along with the associated generation of employment opportunities. | Section 14. |

## 14.3 Legislation, Policy, and Guidance

The following documentation has been determined to be relevant and has been considered throughout this assessment:

- National Planning Framework 4; and
- Outer Hebrides LDP.

### 14.3.1 National Planning Framework 4

NPF4 is a long term plan that looks forward to 2045, with the goal of achieving a sustainable, net zero Scotland. NPF4 guides spatial development, sets out national planning policies, designates national developments and highlights regional spatial priorities. NPF4 calls for the planning system to:

***"Support an aquaculture industry that is sustainable, diverse, competitive, economically viable and which contributes to food security, whilst operating with social licence, within environmental limits and which ensures there is a thriving marine ecosystem for future generations."***

### 14.3.2 Outer Hebrides Local Development Plan

The OH LDP is a planning document, that sets out a vision and spatial strategy for the development of land in the Outer Hebrides over the next ten to 20 years.

Within the Foreword of the OH LDP, the following is stated:

***"By capitalising on the recent major investment commitment for affordable housing and growth sectors such as marine resources, energy, tourism and aquaculture, our islands will be empowered to build a more prosperous and fairer future for our communities."***

Within the context of the Outer Hebrides, the OH LDP outlines that the real challenges facing the region are:

***"how to sustain population levels and a diverse local economy."***

Within the OH LDP, proposals for new marine fish farm developments or changes to existing marine fish farms will be assessed against the Supplementary Guidance for Marine Fish Farming. Within this document, the following is stated in relation to the economic importance of aquaculture to the Outer Hebrides:

***"The economic benefits to be accrued from new fish farming operations is potentially significant for an area such as the Outer Hebrides which suffers from an ageing and declining population and a low rate of GDP. Further growth of the fish farming sector offers economic and employment opportunities, not only at the individual site, but also for construction companies, processors and suppliers."***

The potential for interaction with the commercial fishing industry is assessed in **Section 12**.

## 14.4 Assessment Methodology

### 14.4.1 Study Areas

#### 14.4.1.1 Socio-Economic Study Areas

Three reference study areas have been selected for the assessment of socio-economic impacts. The three study areas are as follows:

- **Local:** The local study area is defined as the Sgire nan Loch electoral ward.
- **Regional:** The regional study area is defined as the Outer Hebrides council area; and
- **National:** The national study area is defined as Scotland.

## 14.5 Embedded Mitigation

There are a number of procedural measures that BFS undertake, as best practice, that are aimed at improving the socio-economic impact of operations within the communities that farming operations take place. The below best practice measures will also be applied to the Proposed Development and the local communities.

### 14.5.1 Local Sourcing

BFS actively encourages local suppliers (Scottish based) to tender for new developments as well as regular maintenance work. This can vary in value from the millions to hundreds of pounds, across all areas of operations. BFS spend with Scottish based suppliers in 2023 was over £131,682,265.25 spread across 565 local suppliers, and over £46,252,550.66 across 582 Scottish suppliers in 2024.

### 14.5.2 Local Staffing

The Proposed Development is anticipated to create a minimum of 5 new full-time positions. BFS will aim, if possible, to fill these positions locally, within The Isle of Lewis, or from further afield within the Outer Hebrides. This will help stimulate local economic activity, whilst also potentially attracting young families and individuals to the area.

### 14.5.3 Community Fund

BFS has a community fund programme in place, whereby external organisations and charities, either based within or delivering projects within a 20 mile radius of any BFS fish farm, can apply directly for funding. This programme allows the local communities within which BFS fish farms operate to gain additional benefit from fish farming operations.

# 14.6 Baseline Condition

## 14.6.1 Socio-Economic Baseline

### 14.6.1.1 Local

#### 14.6.1.1.1 Population

National Records of Scotland (NRS) data[249] indicate that on 14 October 2022, the electoral ward of Sgire nan Loch had a population of 1,793. This was fairly evenly split between male (910) and female (883). Within Scotland, the working age cohort is defined as the population aged between 16 and 64 (inclusive). Based on this definition the Sgire nan Loch electoral ward has a working age population of 1,019, 56.8 % of the total population for the electoral ward. The 65+ cohort accounted for 28.0 % (502) of the population and the below 16 cohort accounted for 15.2 % (272) of the population [250].

**Figure 14.1** illustrates that the population of the Sgire nan Loch electoral ward has varied temporally. The lowest population (1,754) was seen in 2009. Total population figures for 2021 indicate a slight increase on the 2020 value. The percentage of the total population made up by the working age cohort has steadily declined when compared to that of the total population, with the percentage peaking at 63.63% (2006), prior to declining to 56.83 % in 2021, indicating an aging population. As the percentage of the total population within the working age cohort has decreased through time, this may lead to labour shortages in key industries, particularly if the trend continues. Therefore, industry that can attract and retain people within the working age cohort has the potential to positively contribute to improving the population dynamics of the Sgeir nan Loch electoral ward.

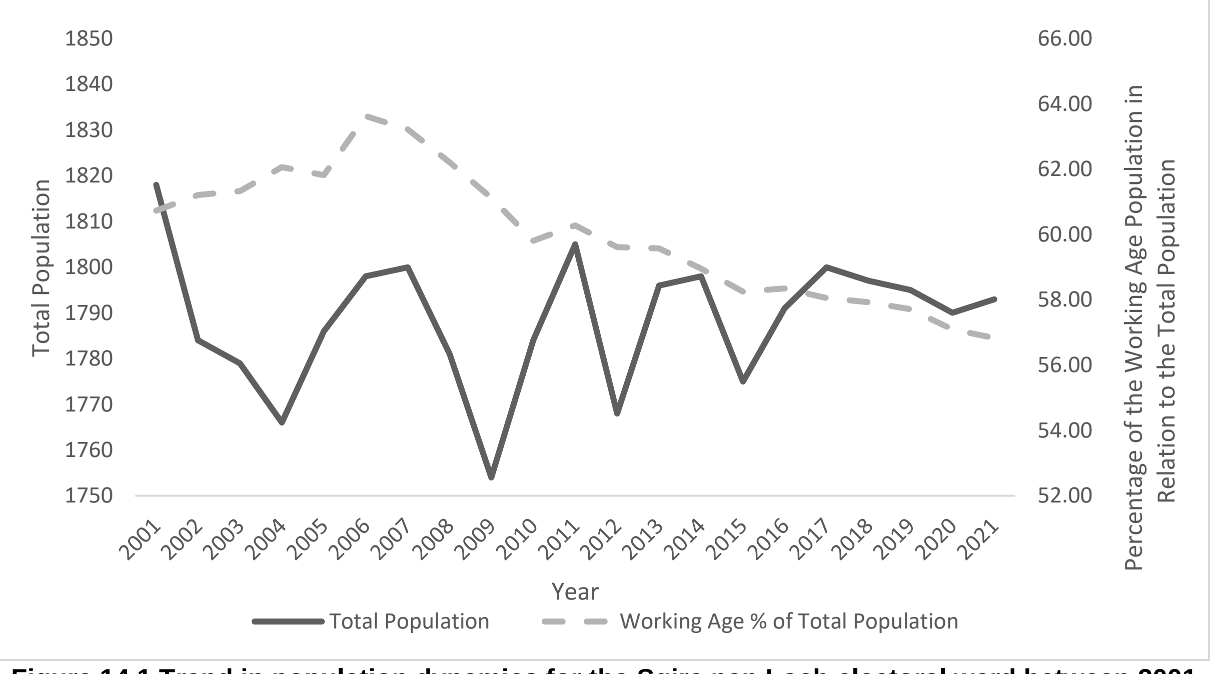


**Figure 14.1 Trend in population dynamics for the Sgire nan Loch electoral ward between 2001 and 2021 (inclusive).**

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[249] National Records for Scotland (NRS): Electoral Ward Population Estimates (2011 Data Zone Based). [Online] Available at: https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/2011-based-special-area-population-estimates/electoral-ward-population-estimates

[250] Team, N.R. of S.W. (2022). National Records of Scotland. [online] National Records of Scotland. Available at: https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates/mid-2022

#### 14.6.1.1.2 Employment

Out of the total Sgire nan Loch electoral ward 1,793, 1,580 people at the time of the 2022 census were aged over 16. Of these 1,580 people 57.34% (906) were economically active. Of the 906 economically active people, 58.17% (527) were in full-time employment, whilst 22.85% (207) of the economically active people were in part-time employment. Of the 1,580 people on the Isle of Lewis and Harris, during the 2022 census, aged over 16, 41.13 % (650) were economically inactive. 29.05 % (459) of these economically inactive people were retired.

Within Sgire na Loch, at the time of the 2022 census, the 'Wholesale and retail trade; repair of motor vehicles and motorcycles' industry employed the highest percentage of economically active people, at 10.48 %. This was followed by the 'Construction' industry at 10.15 %,

Out of the total Isle of Lewis and Harris population of 19,445, 16,725 people at the time of the 2022 census were aged over 16. Of these 16,725 people 59.14 % (9,891) were economically active. Of the 9,891 economically active people, 58.92 % (5,828) were in full-time employment, which was higher than the average for the Outer Hebrides (57.92 %). Whilst 23.10 % (2,285) of the economically active people were in part-time employment, which was slightly higher than the Outer Hebrides average (22.94 %). Of the 19,445 people on the Isle of Lewis and Harris, during the 2022 census, aged over 16, 33.60 % (6,534) were economically inactive. 24.00 % (4,666) of these economically inactive people were retired, which was lower than the average for the Outer Hebrides (27.97 %).

Within Lewis and Harris, at the time of the 2022 census, the 'Human Health and Social Work Activities' industry employed the highest percentage of economically active people, at 17.17 %. This was followed by the 'Wholesale and retail trade; repair of motor vehicles and motorcycles' industry at 10.03 %, and the 'Construction' industry at 9.32 %.

#### 14.6.1.1.3 BFS Local Spend and Interaction

Current BFS operations help generate long-term economic activity through the wider aquaculture supply chain, throughout the Outer Hebrides.

Across the Outer Hebrides, BFS total spend in 2023 was £3,712,004.25 across 119 suppliers. More locally, in 2023 BFS spent a total of £2,171,889.80 across 41 suppliers based on the Isle of Lewis. In 2024, BFS total spend across the Outer Hebrides was £3,712,004.25 across 119 suppliers. On the Isle of Lewis itself, during 2023, BFS spent £2,171,890 across 41 suppliers in OPEX and £172,624 across 5 suppliers in CAPEX.

These data indicate that BFS operations provide sustained economic stimulus to the economy of the Isle of Lewis.

Moreover, organisations can also benefit from BFS's involvement in the community through the Community Fund initiative, as detailed in **Sub-Section 14.5**

### 14.6.1.2 Regional

#### 14.6.1.2.1 Population

The 2022 census indicates that the population of the Outer Hebrides Council Area was 26,200. This was split between 13,000 males and 13,200 females. The working age cohort (16 to 64 (inclusive)) was 15,508, 58.21 % of the total population of the Outer Hebrides. The 65 years and over cohort accounted for 26.55 % (7,072) of the population and the below 16 years cohort accounted for 15.24 % (4,060) of the population.

**Figure 14.2** illustrates that the population of the Outer Hebrides has varied temporally. Between 1981 and 2002, there was a period of significant and sustained population decline, when the population fell from 31,548 to 26,350. However, over the same period the percentage of the population of working age increased from 55.87 % to 61.46 %. Between 2002 and 2011, there was a period of population growth, with the population reaching 27,690 in 2011. During this period, the percentage of working age cohort continued to increase, but at a much reduced rate. Since 2011, these data indicate that there has been another period of sustained population decline. However, the population estimate for 2021 represents a slight increase on the 2020 estimate.

**Figure 14.3** presents the percentage of the total population made up of the 65 years and over cohort over time. As can be seen, there has been a steady increasing trend in the percentage of the population aged 65 years and over. In 1981, the 65 years and over cohort made up 19.12 % of the total population. The latest statistics for 2021 indicate that this percentage has increased to 26.55 %. This trend indicates that the Outer Hebrides have an ageing population. This may lead to labour shortages in key industries, particularly if the trend continues. Therefore, industry that can attract and retain people within the working age cohort has the potential to positively contribute to improving the population dynamics of the Outer Hebrides.

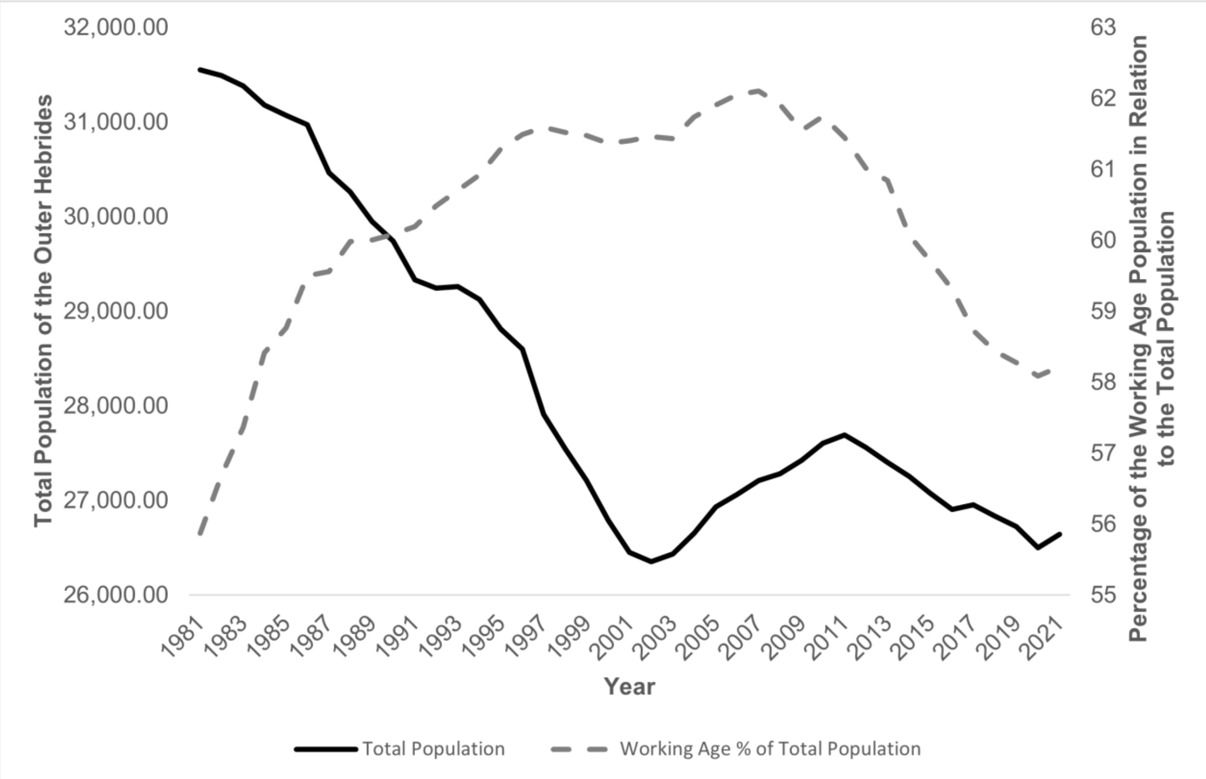


**Figure 14.2: Trend in population dynamics for the Outer Hebrides Council Area between 1981 and 2021 (inclusive).**

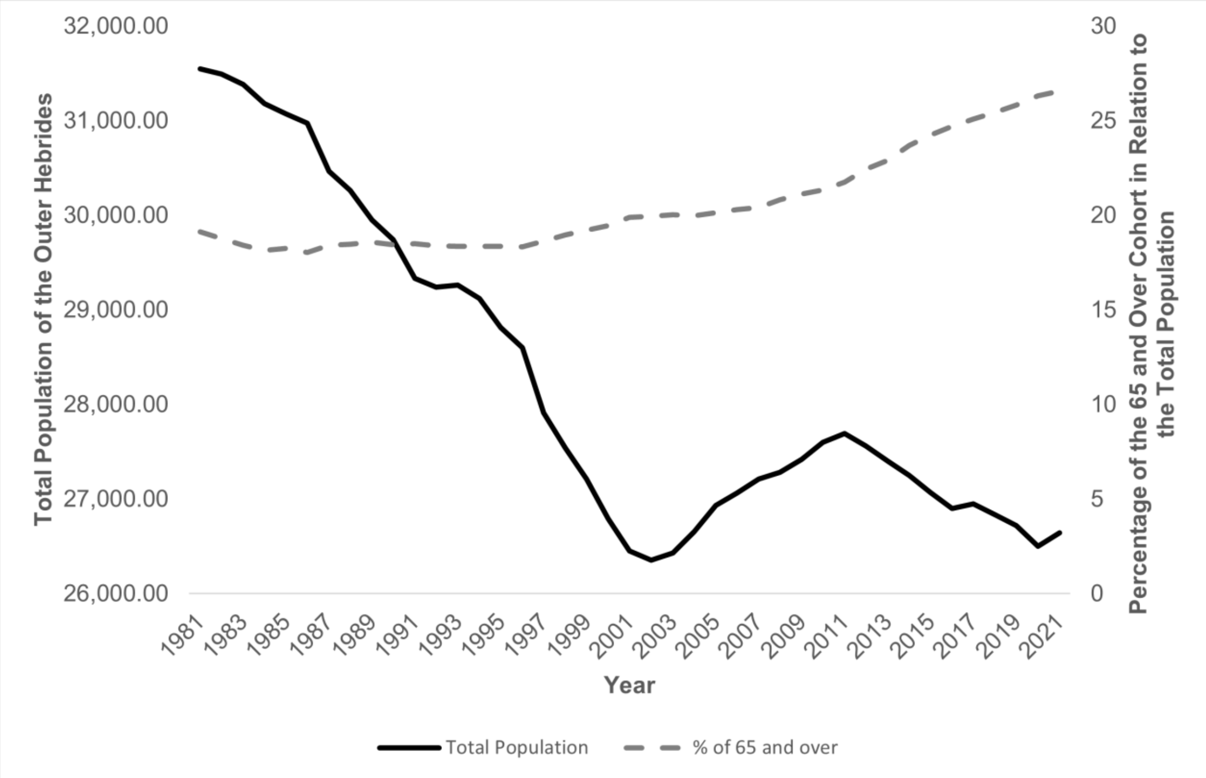


**Figure 14.3: Trend in the percentage of the total population made up of the 65 years and over cohort between 1981 and 2021 (inclusive)).**

### 14.6.1.2.2 Employment

Publicly available employment data for the Outer Hebrides, from the Office of National Statistics[251], has been interrogated to provide a baseline for the Regional study area.

Between January 2022 and December 2022, there were a total of 13,900 economically active people in the Outer Hebrides, of which 10,700 were employees. A total of 2,400 were economically inactive during the same period. Whilst the sample size provided by the Office of National Statistics is too small to provide a breakdown on relative contribution of the different categories for economic inactivity, the 2011 census results for the Outer Hebrides help provide context. In 2011, 18.10 % of all economically inactive people were categorised as retired, this was higher than the Scottish average, at 14.90 %.

Within the Outer Hebrides, as of 2021, the 'Human Health And Social Work Activities' industry employed the highest percentage of people, at 20.50 %. The 'Public Administration And Defence; Compulsory Social Security' industry employed the second largest proportion of people, at 15.90 %. The 'Wholesale And Retail Trade; Repair Of Motor Vehicles And Motorcycles' industry employing the third largest proportion, at 13.60 %.

Office of National Statistics data on the earnings by place of work, for 2022, indicate that the average gross weekly pay for full-time employees in the Outer Hebrides is £562.60. This average gross weekly pay represents 87.84 % of the average gross weekly pay (£640.50) for Scotland.

### 14.6.1.2.3 BFS Regional Spend and Interaction

Current BFS operations help generate long-term economic activity through the wider aquaculture supply chain, across the Outer Hebrides.

[251] Office of National Statistics. Labour Market Profile – Na H-Eileanan Siar. [Online] Available at: https://www.nomisweb.co.uk/reports/lmp/la/1946157417/report.aspx#tabempocc

Throughout The Outer Hebrides, in 2022, BFS spent a total of £4,238,547 in OPEX across 111 suppliers and £594,327.32 in CAPEX across 5 suppliers. These data indicate that BFS operations provide sustained economic stimulus to the economy of the Outer Hebrides.

### 14.6.1.3 National

#### 14.6.1.3.1 Population

NRS data estimated the population of Scotland to be 5,479,900 as of 30 June 2021, with males accounting for 2,672,562 and females accounting for 2,807,338. This represents an increase of 0.25 % in the year to mid-2021. **Figure 14.4** displays the temporal variation in the Scottish population over time. As can be seen, from 1981 to 2000, the Scottish population experienced a decline. However, since 2000, the Scottish population has experienced a significant increase. also displays the percentage of the working age population in relation to the total population. An increasing trend in the percentage of the working age population can be seen between 1981 and 2011, which reaches a peak in 2011 at 65.80 %. However, since 2011, the percentage of the total population made up of the working age population had decreased to 63.77 % in 2021.

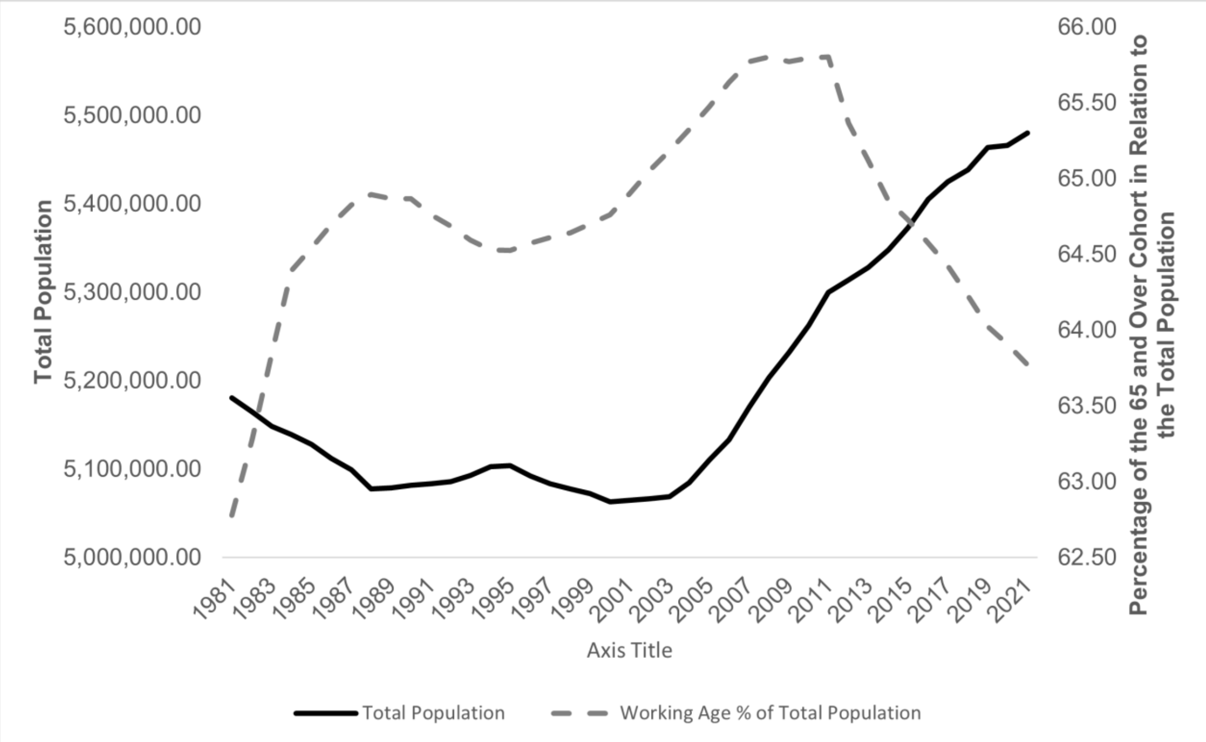


**Figure 14.4: Trend in the Scottish population between 1981 and 2021 (inclusive).**

#### 14.6.1.3.2 Employment

Publicly available employment data for Scotland, from the Office of National Statistics[252], has been interrogated to provide a baseline for the National study area.

Between January 2022 and December 2022, there were a total of 2,769,000 economically active people in Scotland, of which 2,683,000 were in employment. A total of 788,500 were economically inactive during the same period.

[252] Office of National Statistics. Labour Market Profile – Scotland. [Online] Available at: https://www.nomisweb.co.uk/reports/lmp/gor/2013265931/report.aspx

Within Scotland, as of 2021, the 'Human Health And Social Work Activities' industry employed the highest percentage of people, at 14.80 %. The 'Wholesale And Retail Trade; Repair Of Motor Vehicles And Motorcycles' industry employed the second largest proportion, at 13.60 %. The 'Education' industry employed the third largest proportion, at 8.7 %.

Office of National Statistics data on the earnings by place of work, for 2022, indicate that the average gross weekly pay for full-time employees in Scotland is £640.50.

#### 14.6.1.3.3 BFS National Spend and Interaction

Current BFS operations help generate long-term economic activity through the wider aquaculture supply chain, across Scotland.

Across the whole of Scotland in 2023 BFS had a total capital expenditure (CAPEX) of £6,387,268 across 56 Scotland based suppliers, and a total operational expenditure (OPEX) of £131,682,265.25 across 565 Scotland based suppliers. In 2024, the total CAPEX was £15,210,456 across 92 Scotland based suppliers, which represents an increase in CAPEX of 138.14 %. However, during 2024, the total OPEX was £46,252,551.66 across 582 Scotland based suppliers, this represents a decrease of 64.88 % in comparison to the 2023 OPEX.

This demonstrates the significant contribution of BFS's current operations to the sustained economic activity of Scotland, particularly in the rural and remote regions where BFS's farms are located. Across Scotland, BFS has provided support through the Community Fund initiative to over 155 organisations and charities since 2017.

### 14.6.2 Evolution of the Baseline Condition

The EIA Regulations require that; ***"A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge"*** (EIA Regulations, Schedule 4, Paragraph 3), is included within the EIAR. Therefore, this Sub-Section of the EIAR provides a qualitative description of the evolution of the baseline condition, on the assumption that the installation and subsequent long-term operation of the Proposed Development does not take place.

It is determined that based on the information reviewed to determine the existing baseline condition, the future baseline condition would not significantly differ.

## 14.7 Identified Potential Impacts

The Proposed Development has the potential to generate positive social and economic impacts and effects. These impacts can be divided into three major categories:

- **Direct economic impact:** This includes the increased post-tax profit, direct wages, and direct employment opportunities associated with the Proposed Development;
- **Indirect economic (supply chain) impact:** The Proposed Development will support economic activity through spending on goods and services. This expenditure, either capital expenditure (CAPEX) or operational expenditure (OPEX), will then support the turnover and employment of those businesses within the wider supply chain; and
- **Induced economic impacts:** Employees directly employed at the Proposed Development or employed indirectly, within the wider aquaculture supply chain, will generate induced economic activity through the spending of their wages and salaries within the Scottish economy. This

expenditure will then support Scottish businesses and in turn allow them to expand their operations.

# 14.8 Impact Assessment

## 14.8.1 Construction Impacts

The initial construction and installation of the Proposed Development will result in significant CAPEX. However, this CAPEX is also associated with OPEX as a result of operation of the Proposed Development as well as ongoing CAPEX throughout the lifecycle of the Proposed Development. Moreover, the construction and installation phase of the Proposed Development is anticipated to persist over the short-term (26 days (worst-case scenario)). As a result, the decision has been taken to combine the potential socio-economic impacts of the construction and operational together, due to the intrinsic connection between both phases, and assess the potential socio-economic impact of the Proposed Development on a holistic basis, under the operational phase.

## 14.8.2 Operational Impacts

### 14.8.2.1 Socio-economic Impact

#### 14.8.2.1.1 Nature of Impact

In 2020 the MD commissioned BiGGAR Economics to undertake a review and produce a report, titled 'Estimation of the Wider Economic Impacts of the Aquaculture Sector in Scotland'[253]. This report found that in 2018 the Scottish aquaculture sector had a turnover of £1,483,000,000, supported a total of 11,700 jobs and generated a total Gross Value Added (GVA) of £885,000,000.

The salmonid production sub-sector, in 2018, contributed £585,000,000 of the total GVA, which is equivalent to 66.10 %, whilst supporting 1,800 direct jobs[253]. However, a more recent report on the economic contribution of the Scottish salmonid sub-sector[254] has determined that total GVA generated in 2021 had increased to a value of £766,000,000, whilst the number of people directly employed within the salmonid production sub-sector also increased to 2,500. The same report also determined that the salmonid production sub-sector contributed £151,000,000 to the regional economy of the Western Isles in 2021.

##### 14.8.2.1.1.1 Direct Economic Impact

The Scottish aquaculture industry (salmonid production, other finfish production, shellfish production, aquaculture processing) supported a total of 6,260 people via direct employment in 2018, with the salmonid production sub-sector providing 1,800 of these jobs (28.75 %). However, Salmon Scotland, in their latest economic quarterly report state that, as of the fourth quarter of 2021, salmonid production provided employment to 2,500 people[255]. This shows a clear increase in the total number of jobs supported by the salmonid production sub-sector.

Furthermore, the majority (93 %) of staff employed within the salmonid production sub-sector are employed on a permanent basis, which helps to ensure year round financial stability for employees.

The Scottish aquaculture industry contributed a total direct GVA of £468,000,000 in 2018, with the salmon production sub-sector contributing £251,000,000 (54 %) of the total. More recent data, for 2021,

[253] BiGGAR Economics: Estimation of the Wider Economic Impacts of the Aquaculture Sector in Scotland. [Online] Available at: https://www.gov.scot/news/wider-economic-impacts-of-aquaculture/
[254] Salmon Scotland: Scottish salmon hands economy £760 million boost. [Online] Available at: https://www.salmonscotland.co.uk/news/press-release/scottish-salmon-hands-economy-ps760million-boost
[255] Salmon Scotland: Economic Quarterly: 2021 Quarter 4. [Online] Available at: https://www.salmonscotland.co.uk/sites/default/files/inline-images/salmon%20scotland%20-%20economic%20quarterly%20-%202021%20q4.pdf

indicates that the direct GVA generated by the salmonid production sub-sector has increased to £303,000,000[255].

Therefore, based on the direct GVA value for 2021 and the employment figure for 2021 it was possible to calculate an estimate for the direct GVA contribution per workforce employee within the salmonid production sub-sector, as presented below:

| | |
|---|---|
| Direct GVA per workforce job =<br>Direct GVA / total workforce number | £303,000,000/2,500 = £121,200.00 |

The above calculation indicates that each employee, within the salmonid production sub-sector, contributes £121,200.00 per annum to the Scottish economy through direct GVA.

#### 14.8.2.1.1.2 Supply Chain Impact

In 2018, the total external spend of the Scottish aquaculture sector within the supply chain was estimated to be £834,600,000. Of this, £634,700,000 (76.05 %) was spent within Scotland, with the majority (£374,700,00) being spent within the manufacturing sector of the supply chain.

The supply chain total GVA generated by the Scottish aquaculture sector in 2018 was £359,400,000;

- £196,200,000 of this was generated through direct GVA within the supply chain, for example through the direct employment of staff within supply chain companies and therefore through direct staff costs;
- £102,500,000 was generated through indirect GVA within the supply chain, which refers to the economic activity that is supported by suppliers of the aquaculture sector purchasing goods and services; and
- £60,600,000 was generated through induced GVA within the supply chain, this refers to the economic activity that is generated by employees of supply chain companies spending their salaries and wages within the Scottish economy.

Of the total supply chain GVA of £359,400,000, the salmonid production sub-sector generated £310,000,000, which equates to 86.25 %. The 2021 figure for supply chain (indirect) GVA generated by the salmonid production sub-sector was £397,000,000.

Furthermore, a total of 4,250 supply chain jobs were supported by Scottish aquaculture in 2018. This can be further sub-divided as follows:

- **Direct:** 2,700;
- **Indirect:** 970; and
- **Induced:** 580.

Of the total jobs supported within the supply chain, 3,430 or 80.71 % of them were generated through the supply chain spending of the salmonid production sub-sector.

#### 14.8.2.1.1.3 Induced Economic Impact

Total staff costs across the Scottish aquaculture sector (2018) were estimated to be £185,200,000, with the salmonid production sub-sector contributing £77,300,000 of the total. The salmonid production sub-sector provided the highest average salary of all the sub-sectors, with an average salary of £43,000.

Induced economic impacts, in terms of the economic activity stimulated via employees of the Scottish aquaculture industry spending their wages and salaries, generated an estimated induced GVA of £57,000,000 in 2018, with £24,000,000 of that attributable to the salmonid production sub-sector. More recent data for 2021 indicates that the induced GVA contribution of the salmonid production sub-sector has markedly increased from these 2018 estimates, with an induced GVA of £66,000,000.

###### 14.8.2.1.2 Duration of Impact

The impact is determined to be **long-term** and **permanent**. It is considered to be **long-term** as the economic activity generated from the Proposed Development will persist throughout the operational phase of the lifecycle. It is considered to be **permanent** as, throughout the lifecycle of the Proposed Development, economic impact will be generated over a continuous temporal period.

###### 14.8.2.1.3 Sensitivity of Receptor

A **medium sensitivity** has been assigned to socio-economic receptors. This was determined through assessment of the baseline condition.

###### 14.8.2.1.4 Magnitude of Unmitigated Impact

###### 14.8.2.1.4.1 Direct Economic Impact

In order to adequately service and operate the Proposed Development, BFS would need to hire a minimum of 5 full-time staff members.

Based on the calculations conducted in **Sub-Section 14.8.2.1.1**, the employment of 5 full time permanent staff is estimated to generate a direct GVA contribution of £606,000.00 per annum (£121,200.00 x 5) within the Scottish economy. Through the determination of the baseline socio-economic condition, it was identified that the regional (Outer Hebrides) average weekly wage is £562.60. In comparison the average weekly wage earned by BFS marine staff is £607.43. This clearly shows that BFS are able to provide employment and career opportunities in rural and coastal communities that offer a competitive level of pay.

Approximately 93 % of staff employed within the salmonid production sub-sector are employed on a permanent basis. All staff employed at the Proposed Development will be employed on a full time and permanent basis. Therefore, the Proposed Development will contribute to stable employment rates across the Local and Regional, and National study areas.

Moreover, within the salmonid production sub-sector, in general, there has been an increase in the total number of jobs supported and also an increase in workforce skill which has, in turn, increased salaries and therefore staff costs paid by the salmonid production sub-sector. Many of these highly skilled jobs are markedly higher paid than other employment opportunities, particularly within the rural and coastal communities where salmon farming is common. As a result, the salmonid production sub-sector plays an important role in attracting people and their associated expenditure to fragile economies throughout Scotland. Regionally, as identified within **Sub-Section 14.6.1.2**, the Outer Hebrides are faced with a declining and ageing population. The Proposed Development, along with all other BFS operations within the Outer Hebrides, will help to attract people within the working age cohort and therefore contribute to improving the population dynamics of the area.

Furthermore, as highlighted within **Sub-Section 14.5**, BFS operates a community fund initiative, where local organisations and charities, based within or operating within a 20 mile radius of a BFS fish farm, can apply directly to receive funding to support their projects. This programme can further help local communities gain additional benefit from fish farm operations.

In conclusion, the Proposed Development, if consented, would have a permanent, long-term, and positive direct economic impact of a **medium magnitude**.

### 14.8.2.1.4.2 Supply Chain Impact

The installation of the Proposed Development would require significant initial CAPEX in order to purchase the necessary infrastructure from manufacturing companies within the supply chain. It is anticipated that BFS's initial CAPEX on the Proposed Development's infrastructure will be approximately £7,650,000.00. In addition to this, temporary, short-term economic activity would also be stimulated through the contracting of supply chain companies to carry out the installation process (the installation process typically requires the contracting of various companies each with specific expertise). Furthermore, once the Proposed Development has been installed and is operational, there would be the requirement for ongoing planned preventative, maintenance and fish husbandry operations, resulting in OPEX. This operational work would be contracted out to supply chain companies within Scotland, as is done across all BFS fish farms, thereby generating permanent, long-term economic activity.

In addition to short-term and temporary CAPEX spending associated with new farm development, ongoing CAPEX spending also takes place throughout the lifecycle of a fish farm, through replacement equipment purchasing, and infrastructure improvements, if needed. The ongoing CAPEX for all of BFS operations in the Outer Hebrides has generated a spend of £220,019.01 and £220,146.54 in 2023 and 2024, respectively.

Across the Outer Hebrides, BFS operations have generated an OPEX of £3,502,985.24, across 112 Outer Hebrides based suppliers, and £2,417,952, across 106 Outer Hebrides based suppliers, in 2023 and 2024, respectively.

Based on the direct GVA value for the Proposed Development (£606,000.00) it is possible to calculate an estimate of the indirect GVA for the Proposed Development, by using the Scottish type I multiplier for aquaculture[256] (1.5 in 2019). The equation and calculation are presented below:

| | |
|---|---|
| Indirect GVA (Proposed Development) = Direct GVA (Proposed Development) * (Type 1 Multiplier – 1) | £424,200 = £606,000 * (1.7 - 1) |

Therefore, the estimated indirect economic impact of the Proposed Development, would contribute £424,200 per annum, through the aquaculture supply chain, to the Scottish economy.

There is also the potential that supply chain companies will increase their direct workforce, as a result of either the temporary construction, or permanent operational requirements of the Proposed Development. The total number of full time jobs within the supply chain generated as a result of the Proposed Development can be estimated based on the Scottish type 1 employment multiplier for aquaculture (2.1 in 2019)[263]. The equation and calculation are presented below:

| | |
|---|---|
| Indirect Employment = Direct Employment * (Type 1 Employment Multiplier – 1) | 5 = 5 * (2.0 – 1) |

Therefore, it is estimated that the Proposed Development would generate 5 full time jobs within the aquaculture supply chain.

It is also highly likely that the local study area will see an increase in the number of supply chain company staff visiting the island to service the Proposed Development, along with the existing fish farm, this will

[256] Scottish Government: Supply, Use and Input – Output Tables. [Online] Available at: https://www.gov.scot/publications/input-output-latest/

potentially result in the increased utilisation of accommodation and food service providers on the island and wider local area, which will help to generate local economic activity.

In conclusion, the Proposed Development, if consented, would generate both temporary, through construction activity, and permanent, through ongoing operational activity, positive supply chain impacts of a **medium magnitude**.

#### 14.8.2.1.4.3 Induced Economic Impact

As identified within **Sub-Section 14.8.2.1.1.3**, the salmonid production sub-sector is estimated to have contributed £66,000,000 to the Scottish economy through induced GVA in 2021. Based on the direct GVA value for the Proposed Development it is possible to calculate an estimated induced GVA for the Proposed Development, by using the Scottish type II multiplier for aquaculture (1.7 in 2019)[256]. The equation and calculation are presented below:

| | |
|---|---|
| Induced GVA (Proposed Development) = Direct GVA (Proposed Development) * (Type II multiplier – Type I multiplier) | £181,800 = £606,000.00 *(2.0 – 1.7) |

Based on the above calculation, the Proposed Development will contribute an estimated £181,800 per annum to the Scottish economy through induced economic activity. These induced impacts will be delivered through the spending of wages and salaries within the wider economy through increased demand as a result of economic activity.

In addition to the induced economic activity stimulated through the staff at the Proposed Development spending their salaries within the Scottish economy, there is also likely to be an induced employment effect, as the increased spending within the wider economy will allow Scottish businesses to expand their activities and employment. It is possible to estimate the total number of induced full time jobs generated as a result of the Proposed Development by using the Scottish type II employment multiplier for aquaculture (2.4 in 2019)[256]. The equation and calculation are presented below:

| | |
|---|---|
| Induced Employment = Direct Employment * (Type II Employment Multiplier – Type I Employment Multiplier) | 2 = 5 * (2.4 – 2.0) |

Therefore, it is estimated that the Proposed Development would generate 2 full time jobs through induced effects.

In conclusion, the Proposed Development, if consented, would generate permanent, positive induced economic impacts of a **low magnitude**.

### 14.8.2.1.5 Significance of Effect without Mitigation

#### 14.8.2.1.5.1 Direct Economic Impact

In light of the assessed **medium sensitivity** of the receptor and **medium magnitude** of the direct economic impacts, the effect is determined to be of **moderate positive significance** and therefore **positivity significant** in relation to the EIA Regulations.

#### 14.8.2.1.5.2 Supply Chain Impact

In light of the assessed **medium sensitivity** of the receptor and **medium magnitude** of the supply chain impacts, the effect is determined to be of **moderate positive significance** and therefore **positivity significant** in relation to the EIA Regulations.

#### 14.8.2.1.5.3 Induced Economic Impact

In light of the assessed **medium sensitivity** of the receptor and **low magnitude** of the induced economic impacts, the effect is determined to be of **minor positive significance** and therefore **not significant** in relation to the EIA Regulations.

#### 14.8.2.1.6 Mitigation

No negative significant effects are anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

#### 14.8.2.1.7 Significance of Residual Effect post Mitigation

No mitigation is required, as **no negative significant effects** were predicted. As such, **no significant negative residual effects** are predicted. However, in light of the identified **significant positive effects**, **positive residual effects** are predicted.

## 14.9 Cumulative Impacts

At present there is one existing BFS fish farm located off the east coast of the Isle of Lewis. This existing fish farm support a farm team of 5 full time staff members. The farm has one Site Manager, one Senior Marine Operative, and three Marine Operatives. Therefore, at present, there are 5 members of full time staff supported by BFS's existing operations in Loch Odhairn on the Isle of Lewis. In addition, there is one Area Manager who covers the Isle of Lewis. BFS also operates sites in Loch Roag, on the west coast of Lewis, and employs 20 full-time members of staff on these sites. Therefore, the cumulative workforce of the east coast of Lewis (Proposed Development and existing fish farm) would be 10 and the cumulative workforce for all marine sites on Lewis (including the Proposed Development) would be 30. Based on this cumulative workforce it was possible to calculate estimates for the cumulative direct, indirect (supply chain), and induced GVA and employment for the whole of the Isle of Lewis BFS fish farms.

### 14.9.1 Direct Economic Impact

The cumulative direct GVA of the fish farms on the Isle of Lewis is estimated to be £3,636,000 per annum (£121,200.00 x 30).

Through cumulative direct employment, the Proposed Development would result in the full time employment of 5 additional staff members.

This represents a **major positive significant effect.**

### 14.9.2 Supply Chain Impact

Based on the estimated cumulative direct GVA value (£3,636,000.00) it is possible to calculate an estimate for the cumulative indirect GVA, by using the Scottish type I multiplier for aquaculture (1.5 in 2020)[256]. The equation and calculation are presented below:

| | |
|---|---|
| Cumulative indirect GVA = cumulative direct GVA * (Type I multiplier – 1) | £2,545,200 = £3,636,000 * (1.7 - 1) |

Therefore, the estimated cumulative indirect economic impact of the Proposed Development, would contribute £2,545,200 per annum, through the aquaculture supply chain, to the Scottish economy.

It is also possible to estimate the cumulative indirect employment within the wider aquaculture supply chain, based on the Scottish type I employment multiplier (2 in 2020) [256]. The equation and calculation are presented below:

| | |
|---|---|
| Cumulative Indirect Employment = Cumulative Direct Employment * (Type I Employment Multiplier – 1) | 30 = 30 * (2 -1) |

Therefore, the estimated cumulative indirect employment impact of the Proposed Development, would generate 30 full time jobs within the wider supply chain.

This represents a **moderate positive significant effect.**

### 14.9.3 Induced Economic Impact

Based on the estimated cumulative direct GVA value (£3,636,000.00) it is possible to calculate an estimate for the cumulative induced GVA, by using the Scottish type II multiplier for aquaculture (2.0 in 2020) [256]. The equation and calculation are presented below:

| | |
|---|---|
| Cumulative induced GVA = cumulative direct GVA * (Type II multiplier – Type I multiplier) | £1,090,800 = £3,636,000.00 * (2.0 – 1.7) |

Therefore, the estimated cumulative induced economic impact of the Proposed Development, would contribute £1,090,800 to the wider Scottish economy.

It is also possible to estimate the cumulative induced employment within the wider Scottish economy, based on the Scottish type II employment multiplier for aquaculture (2.4 in 2020) [256]. The equation and calculation are presented below:

| | |
|---|---|
| Cumulative Induced Employment = Cumulative Direct Employment * (Type II Employment Multiplier – Type I Employment Multiplier) | 12 = 30 * (2.4 – 2.0) |

This represents a **minor positive non-significant effect.**

## 14.10 Statement of Significance

The findings of the impact assessment on socio-economic, access and recreation are summarised below, with the full detailed assessment provided in **Section 14** of the EIAR.

**T**he EIA assessed the potential impacts of the Proposed Development on socio-economic, access and recreation, in isolation and in-combination with the existing BFS fish farm on the east coast of the Isle of Lewis. This assessment was undertaken in line with the assessment methodology detailed within **Sub-Section 2.4.1**.

As a result of the CnES Scoping Opinion, it was possible to scope out access and recreation from the assessment. Therefore, **Section 14** of the EIAR assessed only the potential socio-economic impacts of the Proposed Development (in isolation and in-combination).

A DBA was undertaken to inform the baseline condition in terms of socio-economic situation. The DBA defined three study areas that focused the determination of the baseline and the subsequent assessment. The study areas included local, regional and national spatial scales.

The local study area was defined as the Sgire nan Loch electoral ward, with data specific to the Isle of Lewis provided where available. Within the local study area, it was identified that 57.34 % of the population were within the working age cohort (aged 16 to 64 (inclusive)), whilst 29.05 % of the population were in the 65+ cohort, indicating that the population of the Sgire nan Loch electoral ward is ageing.

At a national level, there has been a general pattern of population increase throughout the temporal period assessed (1981 to 2021). However, since 2011, the proportion of the Scottish population comprised of the working age cohort has declined, mirroring the ageing trend identified within both the local and regional study area. In 2021, the Scottish population was estimated to be 5,479,900, with the working age cohort making up 64 % of the total population.

Particularly in relation to the local and regional study areas, the combination of a declining and ageing population may lead to labour shortages in key industries, particularly if the trend continues. Therefore, industry, such as aquaculture, that can attract and retain people within the working age cohort has the potential to positively contribute to improving population dynamics

A number of embedded mitigation measures have been incorporated into both the design and operation of the Proposed Development to avoid, reduce or offset the potential for adverse significant effects. The Proposed Development will create opportunities for local communities, including;

- Local sourcing (design);
- Local staffing (design); and
- Community fund (design).

The assessment of potential socio-economic impacts was centred around the determination of the Gross Value Added (GVA) of the Proposed Development. GVA is defined as an economic productivity metric that measures the contribution of a company to an economy, producer, sector or region. GVA was then split into three categories, direct (specific to the Proposed Development), indirect (the aquaculture supply chain), and induced (the wider Scottish economy).

In regard to direct GVA, it was estimated that the Proposed Development would contribute £606,000.00 per year to the wider Scottish economy, with the direct employment of a minimum of 5 full-time staff members. The overall magnitude of the impact was determined to be **medium**. As a result, the effect was determined to be of **moderate positive significance** and therefore **significant** in relation to the EIA Regulations.

Assessment of the indirect GVA estimated that the Proposed Development would contribute £424,200 per year, through the aquaculture supply chain, to the Scottish economy. Initial capital expenditure (CAPEX) for the Proposed Development was estimated to be £7,650,000.00. It was also estimated that the Proposed Development would generate 5 full-time jobs within the aquaculture supply chain. The overall magnitude of the impact was determined to be **medium**. As a result, the effect was determined to be of **moderate positive significance** and therefore **significant** in relation to the EIA Regulations.

The Proposed Development was estimated to contribute £1,090,800 per year to the Scottish economy through induced economic activity. These induced impacts will be delivered through the spending of wages and salaries and through induced employment within the wider economy through increased demand as a result of economic activity. The Proposed Development is estimated to generate 12 full-time jobs through induced effects within the wider Scottish economy. The overall magnitude of the impact was determined to be **low**. As a result, the effect was determined to be of **minor positive significance** and therefore **not significant** in relation to the EIA Regulations.

Cumulative impacts of the Proposed Development were also considered and assessed. The cumulative assessment found that the Proposed Development in combination with the existing fish farm to the northeast of the Isle of Lewis resulted in greater GVA contribution across direct, indirect and induced means. Cumulative effects were determined to be **positively significant** for direct and indirect GVA, but **not significant** for induced GVA, in relation to the EIA Regulations.

## 14.11 Data Limitations and Uncertainties

The determination of the baseline condition, across the three defined study areas, relied on the availability of up to date publicly available data. Dependent on the study area in question, the temporal period covered by these data varied. This resulted in data being utilised that was a number of years out of date, in some circumstances. However, it has been determined that the data used to determine the baseline condition provides an accurate representation of the general socio-economic landscape within each study area.

A range of economic data related to the Scottish aquaculture industry has been utilised to complete this assessment of the potential socio-economic impacts of the Proposed Development. The Impact Assessment (**Sub-Section 14.8**) relied on publicly available data on the GVA contributions of the aquaculture industry to the Scottish economy. As a result, the assessment and calculations of the Proposed Development's GVA contribution provide an average for the Scottish salmonid aquaculture industry in general. However, these average GVA contribution data are robust, therefore, it has been determined that the impact assessment provides a robust and thorough assessment of the potential socio-economic contribution of the Proposed Development to the defined study areas.

# 15 Noise

## 15.1 Introduction

This Section of the EIAR assesses the impact and subsequent effect of the Proposed Development on nearby noise sensitive receptors (NSRs) during the operational phase of the Proposed Development's lifecycle.

## 15.2 Scoping

The potential for significant effects as a result of noise generation and propagation was not raised by consultees in their specific Scoping advice, in response to the Screening and Scoping Request submitted to CnES. Therefore, the potential impacts of noise have been scoped out of assessment under EIA. However, as detailed within **Table 15.1**, CnES require that detail on noise emissions be provided, to allow for an assessment of the Proposed Development in line with the OH LDP.

Therefore, to allow CnES to reach a planning determination, BFS have provided an assessment of potential noise impacts.

**Table 15.15.1: Summary of required information relevant to the potential impacts of noise.**

| Policy Reference | Information Requirement | Cross Reference |
|---|---|---|
| Outer Hebrides LDP – Development Policy 4: Noise and Lighting | Developers will be required to provide details on noise and light emissions relating to the proposed development, along with details of any mitigating measure that will minimise the impacts. This should include details of surface and underwater lighting and if sited within 2 km of a residential property, details of noise generating equipment and hours of operation.<br><br>The Comhairle may require the applicant to provide further technical information or undertake survey work if the information submitted is not considered adequate.<br><br>Proposals will be assessed to ensure that impacts arising from noise and lighting at fish farms are minimised. | Section 3; and<br><br>Section 15. |

## 15.3 Legislation, Policy, and Guidance

The following documentation has been determined to be relevant and has been considered throughout this assessment:

- Planning Circular 1/2007: Planning Controls for Marine Fish Farming;
- Planning Advice Note (PAN): 1/2011 Planning and Noise; and
  Outer Hebrides LDP (inclusive of Supplementary Guidance: Marine Fish Farming)

### 15.3.1 Planning Circular 1/2007: Planning Controls for Marine Fish Farming

This planning circular provides guidance to planning officers, developers, communities, and regulators on the provisions of a number of Acts, Regulations and Orders, which relate specifically to aquaculture development. The circular, whilst providing general planning advice, does not provide noise specific guidance.

### 15.3.2 Planning Advice Note (PAN): 1/2011 Planning and Noise

This document, produced by the Scottish Government, provides advice and guidance on the role of the planning system in limiting and preventing the adverse effects of noise. Guidance on assessment methodology is provided in the associated Technical Advice Note: Assessment of Noise. Whilst both documents provide guidance on a range of new noise generating development types, no specific guidance is given for aquaculture developments such as fish farms.

### 15.3.3 Outer Hebrides Local Development Plan (LDP) (inclusive of Supplementary Guidance: Marine Fish Farming)

As previously stated within **Sub-Section 15.2**, the OH LDP, through Development Policy 4, requires that consideration in the determination of a fish farm planning application should be given to the potential impacts arising from noise generation and propagation. The policy requires that all potential noise generating sources are identified, along with details on the proposed mitigation measures to ensure that any impacts are avoided and reduced.

Therefore, Development Policy 4, and its information requirements, are the primary driver of this assessment.

## 15.4 Embedded Mitigation

### 15.4.1 Design Mitigation

An outline of the key design measures related to mitigating the generation and propagation of noise is presented below.

#### 15.4.1.1 Development Location

The Proposed Development will be located along a section of coastline that is relatively devoid of human habitation, with only a few properties to the northwest identified. This lack of NSRs will reduce the impact of sound propagation from the Proposed Development.

#### 15.4.1.2 Generator Positioning

All generators deployed to produce electrical power to the feed barge will be located below water level, within the hull of the feed barge. The positioning of the generators below water level ensures that above water sound propagation is reduced. Any sound that propagates into the water column is unlikely to transmit into the air, through the water-air interface, as the water-air interface is usually an almost perfect reflector of acoustic waves due to a strong mass density contrast between the two mediums[257].

#### 15.4.1.3 Sound Insulation

The feed barge will be purpose built with a high level of sound proofing, with the specific level of sound proofing specified during the design phase of feed barge construction. Each generator will be housed with a sound attenuating enclosure to ensure a high level of sound absorption. These insulating measures, undertaken as best practice, will reduce the propagation of sound from the feed barge.

#### 15.4.1.4 Operational Mitigation

An outline of the key operational measures related to mitigating the generation and propagation and therefore impact of noise as a result of the Proposed Development is presented below.

#### 15.4.1.5 Standard Working Hours

In general BFS's normal working hours are from 0700 hrs to 2000 hrs, over a seven day working week. However, due to the nature of rearing livestock, additional operations will likely be required outwith the

[257] Godin, O.A., 2006. Anomalous transparency of water-air interface for low-frequency sound. Physical review letters, 97(16), p.164301. [Online] Available at: https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.97.164301

standard working hours to ensure high levels of fish health and welfare. Any operations outwith normal working hours shall be minimised, wherever possible.

In addition, during certain periods of the year, equipment integral to the production cycle and ensuring high standards of fish health and welfare, will be required to run overnight. This primarily includes underwater lighting and aeration systems.

Dependent on stocking times, the worst case scenario for the use of underwater lighting would be from input during quarter (Q) 4 through to June the following year. The stocking time of the Proposed Development may vary year on year therefore the use of underwater lighting may be for a much reduced temporal period in comparison to the worst case scenario. Aeration systems will typically be used from April to October. However, this is subject to review and modification by the BFS Production and Biology Departments.

#### 15.4.1.6 Automatic Timer System

The feed barge will be fitted with a timer system which will automatically switch off all the generators onboard at a pre-set time. This ensures that once daily operations are complete and power is no longer needed on the feed barge, generators will turn off and therefore generation of unnecessary noise is avoided.

## 15.5 Baseline Condition

The Proposed Development will be located off the east coast of the Isle of Lewis. The east coast of the Isle of Lewis and, in particular the section of coastline immediately adjacent to the Proposed Development, is relatively devoid of human habitation, with seven residential properties within a 2 km radius. No core paths or beaches were identified in close proximity to the Proposed Development. **Table 15.2** below summarises the identified residential buildings within the ZoI of the Proposed Development.

**Table 15.2: Summary of identified residential dwellings.**

| Receptor Name | Eastings | Northings | Distance (Straight-line) (KM) | Direct Line of Sight (Yes/No) |
|---|---|---|---|---|
| Dwelling 1 | 141681 | 916920 | 0.94 | No |
| Dwelling 2 | 141592 | 916918 | 1.02 | No |
| Dwelling 3 | 141426 | 916870 | 1.17 | No |
| Dwelling 4 | 141429 | 917037 | 1.22 | No |
| Dwelling 5 | 141563 | 917325 | 1.24 | No |
| Dwelling 6 | 141286 | 917186 | 1.41 | No |
| Dwelling 7 | 141344 | 917241 | 1.45 | No |

The sound environment of the seven identified residential dwellings is anticipated to be typical of a rural coastal location, with sound associated with waves dominating the soundscape, particularly at Dwelling 1, which is nearest to the coast. It is also anticipated that sound relating to bird song, bird activity and wind rustling vegetation will contribute to the baseline sound environment to varying degrees. However, due to the relative proximity of the cliffs, and an exposed, high energy section of water, sounds relating to both water movement (waves and the crashing of waves on the cliffs) and wind gusts are more likely to dominate at this location. It is also likely that there will be a degree of sound associated with both commercial and recreational maritime activity off the east coast of the island. However, due to the transient nature of such activities, sound associated with this is likely to be infrequent.

### 15.5.1 Evolution of the Baseline Condition

The EIA Regulations require that; ***"A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge"*** (EIA Regulations, Schedule 4, Paragraph 3), is included within the EIAR. Therefore, this Sub-Section of the EIAR, provides a qualitative description of the evolution of the baseline condition, on the assumption that the installation and subsequent long-term operation of the Proposed Development does not take place.

The Isle of Lewis is a relatively remote region of the Outer Hebrides. As such, the baseline noise condition is one associated with a coastal rural environment. Whilst there may be short-term periods of increased noise within the baseline it is considered unlikely that there will be any significant long-term and permanent change in the baseline noise environment.

## 15.6 Identified Potential Impacts

There is the potential for the Proposed Development, through operational activities, to impact on the amenity of NSRs within the vicinity, resulting in a significant negative effect on the baseline sound environment.

## 15.7 Impact Assessment

### 15.7.1 Construction Impacts

The construction and installation phase of the Proposed Development is predicted to persist over the short-term only (a worst-case scenario of 26 days). Moreover, following the completion of the construction phase, all associated impacts will cease and are therefore considered to be temporary in nature. The DBA also identified that there are limited NSRs within the immediate vicinity of the Proposed Development. As such, potential impacts arising from the construction and installation of the Proposed Development have been scoped out of further assessment.

### 15.7.2 Operational Impacts

#### 15.7.2.1 Noise Disturbance on NSRs as a Result of Sound Generated from the Proposed Development, including Associated Marine Vessel Activity

##### 15.7.2.1.1 Nature of Impact

The feed barge will store and distribute feed to individual pens during feeding operations. When active, the feed barge will be powered by generators and therefore sound will be generated. The primary sound generated during feeding operations will come from the feed blowers and selectors.

There is also the potential for sound to be generated via marine vessel activity associated with the Proposed Development. The Proposed Development will primarily be serviced by a 9 m RIB and a landing craft style workboat of up to 23 m in length. Daily activity will be limited to a single return journey between the shorebase and the Proposed Development by both vessel types along the 4.44 km VTR.

On a more infrequent basis secondary vessel will service the Proposed Development. These secondary vessels include wellboats, feed delivery boats and treatment vessels. Wellboats will be used to stock the Proposed Development over a 1 to 2 month period. Harvesting operations will also be carried out, via wellboat, over a 6 month period at the end of the production cycle, with no more than 12 trips made per month.

#### 15.7.2.1.2 Duration of the Impact

The impact is determined to be **long-term** and **temporary**. It is considered to be **long-term**, as the Proposed Development has the potential to generate and propagate noise throughout operational hours, resulting in the potential for continuous noise, over a number of hours. It is considered to be **temporary** as, outwith the operational hours, all noise generating equipment will be shut off, resulting in the avoidance of noise generation and propagation for temporary periods.

#### 15.7.2.1.3 Sensitivity of Receptor

##### 15.7.2.1.3.1 Residential Dwellings

The identified residential dwellings have been determined to be of **high sensitivity**, as the receptor has a low ability to absorb change without fundamentally altering its present character.

#### 15.7.2.1.4 Magnitude of Unmitigated Impact

Sound emitted from the generators onboard the feed barge will be sufficiently reduced by the embedded design and operational mitigation, outlined in **Sub-Section 15.4**. Feeding operations will generally take place throughout normal operating hours, although feeding operations may be extended when required, and therefore sound emitted as a result of these operations is determined to be of a **high** frequency and of a **medium** duration.

Sound generated from the primary service vessels will be transient in nature as the area of audibility will move with the vessels as they transit the VTR between the shorebase and the Proposed Development. As previously stated, these primary vessels will only make a single return journey per day, under normal operating conditions and, as such, the frequency of the potential impact will be **negligible** and of short duration. There will also be a degree of marine vessel sound associated with the baseline condition, with commercial and recreational vessels known to use the waters around the Isle of Lewis.

Secondary vessels will be present more infrequently at the Proposed Development and, whilst onsite, they will spend the majority of the time moored alongside farm infrastructure. Therefore, sound emitted from the engines of these vessels will be greatly reduced.

Out of the seven identified residential dwellings only one is within 1 km of the Proposed Development, the nearest being 0.94 km, and none of the dwellings have a clear line of sight of the Proposed Development, due to the rising topography of the eastern coastline of the Isle of Lewis. It is generally accepted that when the line of sight between the source and receiver is fully obscured there will be a reduction in the transmission of sound by around 10 dB[258]. Therefore, the location of the Proposed Development relative to the identified residential dwellings will further mitigate the potential for negative impacts on these NSRs.

As a result, the impact is determined to be of **negligible magnitude**.

#### 15.7.2.1.5 Significance of Effect Without Mitigation

##### 15.7.2.1.5.1 Residential Dwellings

In light of the assessed **high sensitivity** of the receptor and **negligible magnitude** of the impact, the effect is determined to be of **minor significance**.

#### 15.7.2.1.6 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

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[258] Murphy, E. and King, E.A., 2014. Noise Mitigation Approaches. Environmental Noise Pollution, pp.203-245. [Online] Available at: https://www.sciencedirect.com/science/article/abs/pii/B9780124115958000070?via%3Dihub

#### 15.7.2.1.7 Significance of Residual Effect Post Mitigation

No mitigation is required, as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

## 15.8 Cumulative Impacts

Cumulative noise impacts have not been considered within this assessment, as noise impacts were not scoped into the EIA. Therefore, the scope of this assessment is limited to the information requirements of the OH LDP, Development Policy 4 (Noise and Lighting), which requires detail on the noise and light emissions, and proposed mitigation measures relating directly to the proposal.

## 15.9 Statement of Significance

The findings of the impact assessment on noise are summarised below and the full detailed assessment provided in **Section 15** of the EIAR.

The technical assessment assessed the impact and subsequent effect of the Proposed Development on close by NSRs during the operational phase of the Proposed Development. This assessment does not form part of the formal EIA but has been undertaken to allow CnES to determine compliance to Development Policy 4 of the OH LDP. This assessment was carried out in line with the assessment methodology detailed within **Sub-Section 2.4.1**.

A DBA was undertaken to inform the baseline condition associated with the Proposed Development. The DBA identified seven residential properties at Calbost, to the northwest of the Proposed Development, the closest being 0.94 km from the Proposed Development.

The sound environment at the NSRs is anticipated to be typical of a coastal rural setting, with sound associated with waves dominating the soundscape. It is also anticipated that sound relating to bird song, bird activity and wind rustling vegetation will contribute to the baseline sound environment to varying degrees.

As a result, the receptor (residential properties) sensitivity is determined to be high, as the receptor is tolerant of change without detriment to its character.

A number of embedded mitigation measures have been incorporated into both the design and operation of the Proposed Development to avoid, reduce or offset the potential for adverse significant effects, including:

- Development location (design);
- Generator positioning (design);
- Sound insulation (design);
- Standard working hours (operational); and
- Automatic timer system (operational).

Several primary noise generating aspects of the Proposed Development have been identified, including; the feed barge generators, the feed selectors and blowers, and marine vessels associated with the Proposed Development.

Sound emitted from the generators and feed equipment (selectors and blowers) onboard the feed barge will be sufficiently reduced by the embedded design and operational mitigation, which will help reduce the propagation of sound from the feed barge. Feeding operations will take place throughout normal operating hours. Sound emitted as a result of these operations is determined to be of a high frequency and of a medium duration.

Sound generated from the primary service vessels will be transient in nature, as the area of audibility will move with the vessels as they transit from the shorebase to the Proposed Development. These primary vessels will only make a single return journey per day under normal operating conditions and, as such, the frequency of the potential impact will be negligible and of short duration. There is already a degree of marine vessel sound associated with the baseline condition, with commercial and recreational vessels known to use the waters around the Isle of Lewis.

The assessment carried out in **Section 15** of the EIAR has determined that the overall magnitude of the identified impact has been sufficiently reduced to **negligible** levels, therefore the subsequent effects would be of **minor** significance.

## 15.10 Data Limitations and Uncertainties

There are a number of limitations and uncertainties associated with the overall evaluation of the impact and effect of noise on NSRs. However, it has been determined through professional judgement that these limitations do not undermine the robustness of the assessment. These include aspects such as:

- **Desk-Based Assessment**: Due to a full Noise Impact Assessment not being requested through CnES's Scoping Opinion, the determination of the baseline condition has been undertaken based on a desk-based review of relevant NSRs with potential connectivity with the Proposed Development. The baseline noise environment of the study area has also been determined based on review of the natural environment and settlement patterns within the study area. Therefore, the baseline condition provides a qualitative review rather than a quantitative description of the existing noise levels; and
- **Assessment Approach**: Due to the Scoping Opinion not requiring a Noise Impact Assessment, BFS have undertaken a qualitive assessment of the potential for noise generation and propagation from the Proposed Development to allow CnES to determine compliance with Development Policy 4 of the OH LDP. This assessment focused on the identification of NSRs, a description of the onsite noise sources and physical and management practices to limit the generation and propagation of noise from the Proposed Development.

# 16 Lighting

## 16.1 Introduction

This technical assessment considers the potential impacts and subsequent effects of light generation and propagation as a result of the operation of the Proposed Development. This Section follows the standard technical assessment methodology (**Sub-Section 2.4.1**) and assesses the potential impacts and effects of the Proposed Development on identified receptors within the baseline condition.

## 16.2 Scoping

The potential for significant effects as a result of light generation and propagation was not raised by consultees in their specific Scoping advice, in response to the Screening and Scoping Request submitted to CnES. Therefore, the potential impacts of obtrusive lighting have been scoped out of assessment under EIA.

However, as detailed within **Table 16.1**, CnES require that detail on light emissions be provided, to allow for an assessment of the Proposed Development in line with the OH LDP.

**Table 16.1: Summary of required information relevant to the potential impacts of lighting.**

| Policy Reference | Information Requirement | Cross Reference |
|---|---|---|
| Outer Hebrides LDP – Development Policy 4: Noise and Lighting | Developers will be required to provide details on noise and light emissions relating to the proposed development, along with details of any mitigating measure that will minimise the impacts. This should include details of surface and underwater lighting and if sited within 2 km of a residential property, details of noise generating equipment and hours of operation.<br><br>The Comhairle may require the applicant to provide further technical information or undertake survey work if the information submitted is not considered adequate. | Section 3; and<br><br>Section16. |

## 16.3 Legislation, Policy, and Guidance

The following documentation has been determined to be relevant and has been considered throughout this assessment:

- The Institute of Lighting Professionals (ILP): Guidance Note 01/21: The Reduction of Obtrusive Light;
- Public Health etc. (Scotland) Act 2008;
- BS EN 12464-2:2014 Lighting of workplaces; Outdoor workplaces; and
- CIE 150: 2017 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations.

### 16.3.1 The Institute of Lighting Professionals (ILP): Guidance Note 01/21: The Reduction of Obtrusive Light

Sets out lighting guidance and criteria for lighting impact assessments with a recommendation that they are incorporated at local plan level. The guidance defines various forms of light pollution and describes a series of environmental zones against which limits for obtrusive light are defined.

### 16.3.2 Public Health etc. (Scotland) Act 2008

The Public Health etc. (Scotland) Act 2008 extends the nuisance provisions of the Environmental Protection Act 1990 to cover artificial light nuisance.

### 16.3.3 BS EN 12464-2:2014 Lighting of Workplaces; Outdoor Workplaces

Focuses on the recommendations for outdoor workplaces that are used at night and advice on limiting the effects of light obtrusion within the environment.

### 16.3.4 CIE 150: 2017 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations

This guide sets out guidelines for assessing the environmental impacts of outdoor lighting and gives recommended limits for relevant lighting parameters to contain the obtrusive effects of outdoor lighting within tolerable levels.

## 16.4 Embedded Mitigation

### 16.4.1 Design Mitigation

An outline of the embedded mitigation built into the physical design of the Proposed Development is presented below.

#### 16.4.1.1 Northern Lighthouse Board Requirements

The Proposed Development will display navigational lighting in line with the requirements made by NLB. Through their Scoping advice, NLB have stated that they will provide their specific requirements for the Proposed Development once the full planning application has been submitted to CnES. By ensuring compliance to the NLB recommendations, BFS will ensure that external lighting will be kept to a minimum.

#### 16.4.1.2 Lighting Installations

The Proposed Development, including the feed barge and associated marine vessels, will have external lighting equipment installed. During periods of work in the mornings and late afternoon, especially during the winter months, it may be necessary for site staff to use these lighting systems to ensure a safe working environment. In addition, during periods of work outside of normal working hours, in periods of darkness, external light sources of the feed barge and marine vessels will likely be required. To reduce the potential for obtrusive light to propagate from the Proposed Development all external lighting will be designed to not spread light above the horizontal plane, thereby helping to ensure that sky glow and light spill is kept to a minimum. Furthermore, to reduce both the potential for glare and light spillage from the Proposed Development, all external light sources will be installed from the highest mounting point possible, and the main beam angle will be set between 0 and 70°. These measures are considered best practice for reducing the light pollution from external light sources.

#### 16.4.1.3 Underwater Lighting

As detailed within **Sub-Section 3.2.5**, the Proposed Development will likely make use of underwater lighting, the worst case scenario for the use of underwater lighting would be from input during quarter (Q) 4 through to June the following year. It is anticipated that a maximum of five low energy, long-life LED lights will be used in each of the five pens. The lighting will be held at a depth of 6 m and faced downwards, ensuring that the beam is directed downwards within the water column and not towards the surface. The potential effect from the lights will be a slight underwater illumination, seen as a green glow, which has minimal visibility from the surface.

### 16.4.2 Operational Mitigation

An outline of the embedded mitigation built into the operational design of the Proposed Development is presented below.

#### 16.4.2.1 Standard Working Hours

In general, BFS's normal working hours are from 0700 hrs to 2000 hrs, over a seven day working week. However, due to the nature of rearing livestock, additional operations will likely be required outwith the standard working hours to ensure high levels of fish health and welfare. Any operations outwith normal working hours shall be minimised, wherever possible.

In addition, during certain periods of the year, equipment integral to the production cycle and ensuring high standards of fish health and welfare, will be required to run overnight. This primarily includes underwater lighting and aeration systems.

Dependent on stocking times, the worst case scenario for the use of underwater lighting would be from input during quarter (Q) 4 through to June the following year. The stocking time of the Proposed Development may vary year on year therefore the use of underwater lighting may be for a much reduced temporal period in comparison to the worst case scenario. Aeration systems will typically be used from April to October. However, this is subject to review and modification by the BFS Production and Biology Departments.

#### 16.4.2.2 Best Practice Operational Procedures

The Proposed Development will implement best practice lighting procedures to ensure the potential for generation and propagation of obtrusive lighting is avoided and reduced. As detailed in **Sub-Section 16.4.1.2**, all external lighting equipment will be installed to best practice standards. In addition, operational procedures will ensure that only the minimum level of external lighting will be activated to ensure a safe working environment, for example, external lighting will only be activated to light sections of the Proposed Development where work is occurring, this will ensure that redundant lighting of unused areas of the Proposed Development does not take place. Moreover, once staff have finished working onsite, all internal and external lighting that is not needed for navigational purposes will be extinguished to avoid and reduce the generation of anthropogenic light.

## 16.5 Baseline Condition

The Proposed Development will be located off the east coast of the Isle of Lewis. This part of the eastern coast of the Isle of Lewis is relatively remote, with limited anthropogenic light sources noted. To the northwest of the Proposed Development there is the small settlement of Calbost, with the nearest residential property being 0.94 km from the Proposed Development. Through Geographic Information System based topographic analysis it was possible to determine that the identified residential properties at Calbost will not have direct line of sight of the Proposed Development. Other settlements in the vicinity include Marvag, approximately 3 km northwest, and Gravir, in Loch Odhairn, approximately 3.5 km southeast of the Development.

There is a small section of crofting landscape (defined as "Crofting Three" township) to the north of the site surrounding the settlement of Calbost. This area is characterised as short even slopes with settlements interspersed with rocky knock and boulder outcrops and indented coastline. The scale of these landscapes are described as being small and intimate with views to distant horizons infrequent. This is the case in Calbost and as such the Proposed Development will not be visible from this township due to knockans blocking the view to much of the coastline.

Due to the Proposed Development being located within the marine environment, maritime lighting also forms part of the current baseline condition. Through consultation with the RYA (**Section 5**) no recreational anchorages have been identified in close proximity to the proposed development.

Further east from the Proposed Development, within the wider Minch, marine vessels will transit past the Isle of Lewis, introducing navigational lighting into the baseline condition. Channel markers will also appear as light sources. These contribute to the baseline level of lighting.

Lighting is measured in lux and is a product of the luminous intensity (brightness) of the lamp used and the distance from the lamp to the surface being lit. Lighting is rarely a problem during daylight hours, with potential issues typically only related to after dark, where lighting may become obtrusive. There are several types of obtrusive lighting that are considered pollution, these include:

- **Sky glow:** The brightening of the night sky due to anthropogenic light sources;
- **Glare:** The uncomfortable brightness of a light source when viewed against the contrast of a dark background;
- **Light spill:** The spilling of light beyond the boundary of the area that is intended to be lit by the light source; and
- **Light intrusion:** Light intrusion is light spill that falls onto a property and perhaps into a property through windows or other openings.

**Table 16.2**, below, provides a summary of the obtrusive light sources within the baseline condition.

**Table 16.2: Summary of the obtrusive light baseline condition for the development location and the Isle of Lewis more generally.**

| Baseline Condition | Summary of Findings |
|---|---|
| Existing Lighting Installations On-Site | Due to the natural and remote setting immediately adjacent to the development location there are currently no anthropogenic light sources associated with the development location. As identified above, navigational lighting associated with marine vessels is likely to form part of the baseline immediately adjacent to the development location. |
| Impact of Sky Glow | Due to the natural setting of the development location, it is considered not to contribute to sky glow within the baseline condition.<br><br>Due to the rural and maritime nature of the wider environment, it is considered that sky glow as a result of light sources from the Isle of Lewis is negligible. |
| Glare | At present, due to the natural setting of the development location, it is considered not to contribute to sources of glare within the baseline.<br><br>Within the wider environment, particularly within the settlement of Calbost and in association with the islands road network, glare from anthropogenic light sources, internal, and |

| Baseline Condition | Summary of Findings |
|---|---|
| | external lighting and vehicle headlights are likely to contribute to glare within the baseline. |
| Light Spill | At present, due to the natural setting of the development location, it is not contributing to light spillage, nor is light spillage from other light sources encroaching into the development location. |
| Light Intrusion | Due to the natural setting of the development location and the lack of residential properties within the immediate area and with a direct light of sight, it is considered that the development location does not contribute to light intrusion. |

### 16.5.1 Environmental Zones

A key aspect of a lighting assessment is to accurately determine the nature of the local lighting environment, through the specification of an appropriate Environmental Zone. The relevant Environmental Zones for the relevant locations of the Isle of Lewis have been assigned based on the guidance table (**Table 16.3**) within the Institute of Lighting Professionals (ILP): Guidance Note 01/21: The Reduction of Obtrusive Light document.

**Table 16.3: Environmental zones.**

| Zone | Surrounding | Lighting Environment | Examples |
|---|---|---|---|
| E0 | Protected | Dark (Sky Quality Meter (SQM) 20.5+) | Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places. |
| E1 | Natural | Dark (SQM 20 to 20.5) | Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc. |
| E2 | Rural | Low district brightness (SQM ~15 to 20) | Sparsely inhabited rural areas, village or relatively dark outer suburban locations. |
| E3 | Suburban | Medium distinct brightness | Well inhabited rural and urban settlements, small town centres of suburban locations. |
| E4 | Urban | High district brightness | Town / city centres with high levels of night-time activity. |

Based on the guidance provided within **Table 16.3**, and the information on the baseline condition for the development location and the wider Isle of Lewis it was possible to assign specific Environmental Zone to the locations relevant to this assessment:

- **Development location:** E1 – Natural; and
- **Calbost:** E2 – Rural.

### 16.5.2 Sensitive Receptors

Through the determination of the baseline lighting condition at the development location and other specific locations across the Isle of Lewis, it has been possible to identify the presence of sensitive receptors to potential increases in anthropogenic light associated with the Proposed Development. The sensitive receptors are considered to be:

- Existing residential properties in Calbost.

### 16.5.3 Evolution of the Baseline Condition

The EIA Regulations require that; ***"A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge"*** (EIA Regulations, Schedule 4, Paragraph 3), is included within the EIAR. Therefore, this Sub-Section of the EIAR, provides a qualitative description of the evolution of the baseline condition, on the assumption that the installation and subsequent long-term operation of the Proposed Development does not take place.

It is determined that based on the information reviewed to determine the existing baseline condition, the future baseline condition would not significantly differ.

## 16.6 Identified Potential Impacts

Through assessment of the baseline lighting condition at the development location and more generally across specific areas of the Isle of Lewis and in combination with a review of the potential elements of the Proposed Development that may give raise to light generation and propagation, it was possible to identify a number of potential impacts. These include:

- Light spill from the Proposed Development
- Glare from the Proposed Development
- Sky glow from the Proposed Development

However, to ensure a concise and effective assessment of potential lighting impacts, the above component impacts will be grouped and assessed as:

- Obtrusive light impacts as a result of the operation of the Proposed Development.

## 16.7 Impact Assessment

### 16.7.1 Construction Impacts

Due to the short-term and temporary nature of the construction of the Proposed Development as well as the fact that construction activities will primarily take place during daylight hours, the light impacts associated with the construction (and decommissioning) phase of the Proposed Development have been scoped out of further assessment.

### 16.7.2 Operational Impacts

#### 16.7.2.1 Obtrusive Light Impacts as a Result of the Operation of the Proposed Development

##### 16.7.2.1.1 Nature of Impact

The Proposed Development will introduce anthropogenic lighting to the development location, which is believed to align with Environmental Zone E1 (**Table 16.3**). As a result, during periods of operation outwith daylight hours, the Proposed Development may give rise to obtrusive lighting that may impact on residential receptors. The Proposed Development may impact residential properties through light spill, glare, and sky glow with the potential to result in a statutory nuisance under the Public Health etc. (Scotland) Act 2008, if the magnitude of the impact is determined to be great enough.

#### 16.7.2.1.2 Duration of Impact

The impact has been determined to be **short-term** and **temporary**. It is considered **short-term**, as lighting will only be utilised for short periods, where natural light is not sufficient to carry out work safely, meaning that lighting impacts will not be continuous over the long-term. It is considered to be **temporary** as, outwith operational hours at the Proposed Development, all lighting aside from the navigational lighting will be extinguished. This therefore avoids the impact for specific periods.

#### 16.7.2.1.3 Sensitivity of Receptor

Residential properties scoped into the assessment are located at Calbost. Due to the distance and lack of direct line of sight, a sensitivity grading of **medium** has been determined.

#### 16.7.2.1.4 Magnitude of Unmitigated Impact

As detailed within the baseline (**Sub-Section 16.5**), the closest residential properties to the Proposed Development are those located at the small settlement of Calbost, 0.94 km to the northwest of the Proposed Development. However, these properties are shielded from the Proposed Development by the natural topography of the east coast of the Isle of Lewis. This area is characterised as short even slopes with settlements interspersed with rocky knock and boulder outcrops and indented coastline. The scale of these landscapes are described as being small and intimate with infrequent views to distant horizons. This is the case in Calbost and, as such, the development will not be visible from this township due to knockans blocking the view to much of the coastline.

As detailed in **Sub-Section 16.4**, best practice luminaire installation will be applied at the Proposed Development. It is acknowledged that if luminaires are installed at a lower mounting point, a wider beam will be required to light the task area in comparison to luminaires mounted from higher locations (**Figure 16.1**). This lower mounting of luminaires may result in a higher level of light spill, glare and sky glow. Therefore, the Proposed Development will have external luminaires installed from the highest practical mounting point possible. The angle of the luminaire and therefore the associated beam will also be set between 0 and 70°. The ability to angle the luminaire beam more acutely towards the task area will also help reduce the amount of direct upward light emitted from the luminaires. All luminaires installed at the Proposed Development will also have cowling installed to further reduce the potential for light spill to areas other than the task area, an example of the type of cowling to be installed is provided in **Figure 16.2**. The combination of higher mounting points and the cowling will help avoid and reduce the amount of light propagated above the horizontal plane, thereby reducing potential sky glow impacts. This embedded mitigation is also anticipated to minimise visual intrusion within the wider landscape of the Proposed Development. As a result, this best practice installation process is anticipated to reduce the potential for obtrusive light generation and propagation from the Proposed Development.

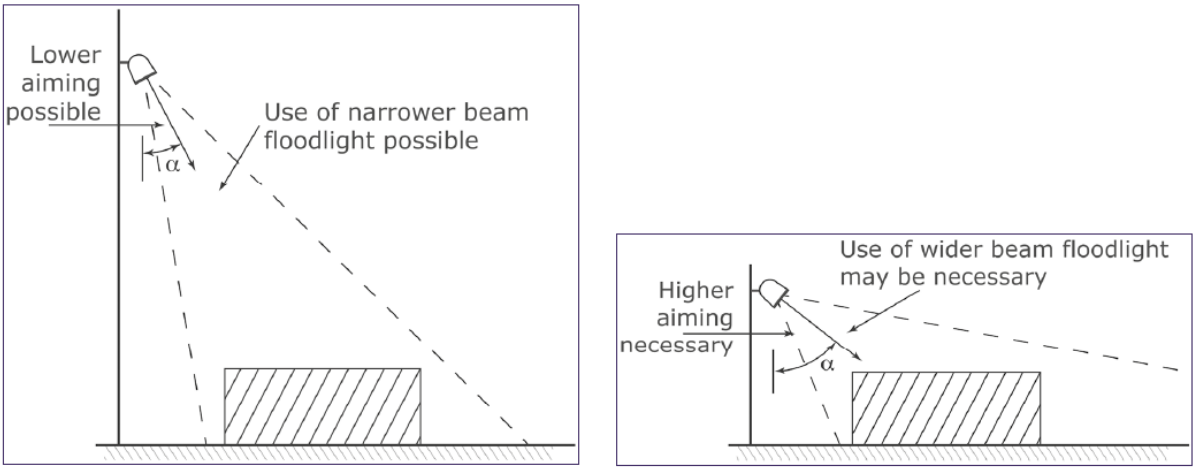


**Figure 16.1: Illustration of the difference in light character when luminaires are installed from a high vs low mounting point.**

**Figure 16.2: Example of cowling typically installed on all external luminaires.**

In addition to best practice installation, the Proposed Development will implement best practice operational procedures to limit the potential for obtrusive light generation and propagation. As detailed within **Sub-Section 16.4.2.2**, during occasions when work is carried out in the hours of darkness, only the minimum luminaires to light the relevant task area and ensure a safe working environment will be active, this will ensure that there are no redundant light sources lighting unused areas of the Proposed Development. This will also apply to any marine vessel being used onsite. Furthermore, once all daily operations are complete at the Proposed Development all external and internal lighting, except navigational lighting, will be extinguished to avoid the generation and subsequent propagation of unnecessary light. This will avoid the generation and propagation of obtrusive light during the most sensitive night-time periods.

The majority of operations at the Proposed Development will take place between 0700 hrs and 2000 hrs over a seven day working week. However, as stated within **Sub-Section 16.4**, due to the nature of rearing livestock, there is the potential for work to take place outwith the normal working hours. As the majority of operations are likely to fall between 0700 and 2000 hrs, potential impacts as a result of anthropogenic lighting are mitigated as the majority of operations will take place during daylight hours, when lighting impacts are less of an issue. However, during the winter months, it is likely that at the start and end of the standard working period (early morning and late afternoon / early evening) operations will take place in darkness or reduced light conditions. These times are likely to avoid the sensitive overnight period, therefore the sensitivity of receptors are not anticipated to be increased. On occasion, operations at the Proposed Development will be undertaken outwith the standard working hours, these operations may include health interventions, stocking and harvest lifts. However, these events are considered to have a **negligible** frequency. The above best practice operational lighting procedures will be applied to all marine vessels onsite. As a result, the timing and probability of the impact is determined to be **negligible**, as the majority of operational activity will occur during daylight or normal working hours.

As detailed within **Sub-Section 16.4**, dependent on stocking times, the worst case scenario for the use of underwater lighting would be from input during quarter (Q) 4 through to June the following year, inclusive of night-time periods. During the evening and night-time, the underwater lighting will give a very slight green glow from each of the five pens. However, as the underwater lighting is installed at a depth of 6 m and faced downwards, with the main beam of light directed downwards within the water column, this significantly reduces the amount of light visible from the surface. Although the lighting will be noticeable as a green glow on the surface of the water, the strength of the light reaching the surface is not strong enough to result in obtrusive lighting in the form of sky glow or light spill within the surrounding sky and landscape.

Over the hours of darkness the Proposed Development will display navigational lighting in accordance with the NLB requirements, which are a statutory requirement specified on the Marine Licence and must be complied with. However, these luminaires have a flashing characteristic and are not constantly active. They also propagate light over the horizontal with a focused light beam, which helps to reduce the magnitude of light spill and sky glow. As a result, navigational lighting is not expected to constitute obtrusive lighting.

As a result of the embedded design and operational mitigation, the probability and frequency of the impact are both determined to be **negligible**.

As a result of the lack of connectivity (large distances and no direct line of sight with residential properties (Calbost)), the limited operational activity anticipated to take place during the hours of darkness, and the embedded mitigation, the overall magnitude of the impact is determined to be **negligible**.

###### 16.7.2.1.5 Significance of Effect without Mitigation

In light of the assessed **medium sensitivity** of the receptor and **negligible magnitude** of the impact, the effect is determined to be of **negligible significance**. Based on this determination, it is concluded that the Proposed Development would not constitute a statutory nuisance under the Public Health etc. (Scotland) Act 2008.

###### 16.7.2.1.6 Mitigation

No significant effect is anticipated, therefore, no additional mitigation measures above the embedded mitigation measures are required.

###### 16.7.2.1.7 Significance of Residual Effect post Mitigation

No mitigation is required, as **no significant effect** was predicted. As such, **no significant residual effect** is predicted.

## 16.8 Cumulative Impacts

Cumulative light impacts have not been considered within this assessment, as light impacts were not scoped into the EIA. Therefore, the scope of this assessment is limited to the information requirements of the OH LDP, Development Policy 4 (Noise and Lighting), which requires detail on the noise and light emissions, and proposed mitigation measures relating directly to the proposal.

## 16.9 Statement of Significance

The findings of the impact assessment on lighting are summarised below, with the full detailed assessment provided in **Section 16** of the EIAR.

The technical assessment assessed the potential impacts of obtrusive lighting generated and propagated from the Proposed Development. This assessment does not form part of the formal EIA but has been undertaken to allow CnES to determine compliance to Development Policy 4 of the Outer Hebrides Local Development Plan (OH LDP). This assessment was carried out in line with the assessment methodology detailed within **Sub-Section 2.4.1**.

The baseline condition at the development location and the wider environment is characterised by negligible to low levels of anthropogenic light. The development location itself is a remote and natural location. Due to the maritime nature of the location, marine vessels and associated navigational lighting also contribute to the baseline light condition. Through assessment of the baseline condition and the lighting characteristics of the Proposed Development it was possible to identify sensitive receptors that may be impacted by obtrusive light generation and propagation as a result of the operation of the Proposed Development. Residential properties were identified in association with Calbost. However, due to the distance (0.94 km) between these properties and the Proposed Development, sensitivity was determined to be **medium**.

A number of embedded mitigation measures have been incorporated into both the design and operation of the Proposed Development to avoid, reduce or offset the potential for adverse significant effects, including:

- Northern Lighthouse Board (NLB) requirements (design);
- Lighting installations (design);
- Underwater lighting (design);
- Standard working hours (operational); and
- Best practice operational procedures (operational).

Impacts relating to the construction of the Proposed Development were scoped out due to the short-term and temporary nature of construction activities, coupled with the fact that the majority of construction work will be carried out during daylight hours.

Potential impacts were determined to be obtrusive light impacts as a result of the operation of the Proposed Development. Obtrusive lighting includes; light spill, glare, and sky glow. However, due to the embedded mitigation proposed the overall magnitude of potential obtrusive light generation and propagation was determined to be **negligible**. Design mitigation (such as best practice lighting installation) and operational mitigation (such as best practice lighting procedures including extinguishing all external lighting outwith work hours, ensuring only active task areas are illuminated, and ensuring that standard working hours predominately fall within daylight and normal working hours) will ensure impacts are sufficiently avoided and reduced.

As a result, it is determined that in light of the **medium sensitivity** of the identified receptors and the **negligible** overall magnitude of the impact, the effect of obtrusive lighting from the operation of the Proposed Development is of **negligible significance**.

## 16.10 Data Limitations and Uncertainties

There are a number of limitations and uncertainties associated with the overall evaluation of the impact and effect of obtrusive lighting on sensitive receptors. However, it has been determined through professional judgement that these limitations do not undermine the robustness of the assessment. These include aspects such as:

- **Desk-Based Assessment**: A desk-based approach has been used to determine the baseline lighting condition of the study area, following relevant guidance. As such the determination of the baseline lighting condition utilised existing information on the natural environment, settlement and human activity patterns. Therefore, specific light readings have not been undertaken using an SQM, but rather a qualitative approach has been used to define the study area based on the expected light conditions. As this qualitative assessment has ensured a precautionary approach whilst following best practice guidance, this methodology is considered appropriate for the level of assessment required; and
- **Qualitative Assessment**: The assessment of potential obtrusive lighting impacts has utilised a qualitative approach to identify and assess the potential magnitude of the impact. The assessment has also outlined all design and operational measures to avoid and reduce the potential impact. As such, whilst specific lighting levels are not provided, the qualitative approach is considered appropriate for the scale of potential impact.

# 17 Summary of Mitigation

This Section provides a summary of mitigation measures that have been proposed within the EIAR to prevent, reduce or offset the impacts and effects associated with the Proposed Development, in line with Planning Advice Note (PAN) 1/2013[8].

Embedded mitigation measures have been integral to the design evolution of the Proposed Development as outlined within **Section 3**. The overall aim of the design strategy was to create a fish farm with a cohesive design that relates appropriately to the surrounding seascape and landscape, whilst also taking account of the environmental characteristics of the development location.

**Table 17.1** outlines a schedule of mitigation measures for the Proposed Development listed according to the relevant environmental topic, which would be applied during the construction (and decommissioning) and operational phases of the Proposed Development.

**Table 17.1: Schedule of the embedded and additional mitigation put forward for the Proposed Development.**

| Environmental Subject Area | Mitigation Proposed | Timing |
|---|---|---|
| **Section 7: Benthic** | Embedded mitigation measures are anticipated to sufficiently mitigate potential impacts to ensure no significant effects occur. These embedded mitigation measures include:<br>• **Development Location:** The highly dispersive environment is anticipated to result in organic, in-feed and bath treatment discharges being dispersed to low levels over a large area, with little consolidation expected beneath the Proposed Development;<br>• **Farm Design and Layout:** The Proposed Development will make use of a small number of larger pens. This will help limit the spatial extent of the Proposed Development in relation to the benthic environment;<br>• **NewDEPOMOD Modelling:** Model outputs have indicated the maximum biomass that results in satisfactory outputs in terms of Mixing Zone requirements. This is anticipated to reduce the overall magnitude of benthic impacts;<br>• **Feed Control and Monitoring:** The utilisation of feed monitoring technologies, specifically high-definition cameras will allow close monitoring of the feed response. This will allow real-time adjustments and cessation of feeding, if required;<br>• **Pellet Detection Software:** BFS is implementing 'Observe' pellet detection software across all marine farms, including the Proposed Development. This software is intended to improve the efficiency of feeding operations, with the aim of reducing the amount of feed pellets used allowing BFS to be more sustainable both economically and environmentally;<br>• **SEPA CAR Licensing:** The Proposed Development will be regulated by SEPA through compliance with the conditions of the CAR Licence;<br>• **Environmental Monitoring Plan:** A site specific monitoring plan will be implemented to monitor seabed impacts from the Proposed Development in order to assess compliance with the seabed standards outlined by SEPA;<br>• **Environmental Quality Standards:** Discharge limits for the Proposed Development represent discharge quantities that have been modelled and show full compliance to the relevant EQSs;<br>• **Fallowing:** As is current best practice within the Scottish finfish aquaculture industry, a fallow period of at least 28 consecutive days will be applied between each production cycle. This will result in a temporary removal of benthic impact inducing activities, and therefore allow the recovery of benthic faunal communities; | Design and Operation. |

| Environmental Subject Area | Mitigation Proposed | Timing |
|---|---|---|
| | • **Enforcement:** In a worst-case scenario, SEPA has extensive enforcement powers to decrease the maximum biomass, if the Proposed Development is deemed to continuously not comply with benthic EQSs; and<br>• **Integrated Sea Lice Management (ISLM) Plan:** The ISLM focuses on the utilisation of biological, and mechanical intervention options. This will in turn help to reduce the use of chemical and in-feed interventions. | |
| **Section 8: Water Column Impacts** | The ECE calculations indicate that nutrient enhancement will result of impacts of a negligible overall magnitude. Despite this, considerable effort will be made to reduce nutrient waste discharges. The following embedded operational mitigation measures are proposed to achieve this:<br>• **Development Location:** The highly dispersive environment is anticipated to result in nutrient discharges from the Proposed Development being dispersed to low levels over a large area, meaning that nutrient discharges from the Proposed Development are unlikely to have a strong influence on the surrounding environment;<br>• **Optimised Feed Composition:** Optimised feed will ensure efficient nutrient conversion, meaning that the amount of soluble nutrients released into the water column will be minimised;<br>• **Staff Training Programme:** Site staff will receive specific in-house training as part of the 'feed, feeding, fish growth and development' section of the Marine Competency Framework;<br>• **Feeding Strategy:** Feeding will be in accordance with established guidelines and staff will be able to adapt the feeding regime, as necessary; and<br>• **Feed Monitoring and Control:** All feeding operations will be monitored by high-definition cameras, which allows for close monitoring of feed response. Feed input can be adjusted in real-time based on the observed feed response, helping to minimise the amount of feed wastage. This is anticipated to reduce the overall magnitude of water column impacts. | Design and Operation. |
| **Section 9: Interactions with Predatory Species** | Embedded mitigation measures, both through design and best practice operation, are anticipated to sufficiently mitigate potential impacts to ensure no significant effects occur. These embedded mitigation measures include:<br>• **Containment Net Strategy:** The utilisation of higher rigidity primary netting, with correct tensioning will ensure that the netting presents as a 'solid wall'. This will help reduce the overall magnitude of impacts associated with sub-surface entanglement and entrapment, whilst ensuring effective predator control;<br>• **Bird Nets:** Pole mounted top nets will be installed, with a ceiling mesh size of 100 mm and a sidewall mesh size of 75 mm. Daily checks and re-tensioning will be carried out with records maintained onsite. | Design and Operation. |

| Environmental Subject Area | Mitigation Proposed | Timing |
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| | This is anticipated to help reduce the overall magnitude of impacts associated with surface entanglement and entrapment, whilst ensuring effective predator control;<br>• **Feed Storage and Feeding:** Feed will be stored in purpose built, fully sealed silos. Feed will be delivered to each pen via a high-pressure air system, with all feed spreaders facing down and set to distribute feed evenly. High-definition cameras will monitor feeding to ensure all equipment is working correctly. This is anticipated to reduce the overall magnitude of impacts;<br>• **Best Practice Husbandry Procedures:** Best practice husbandry procedures will be employed at the Proposed Development to ensure fish health and welfare are maintained at a high standard throughout the production cycle. The presence of mortalities building up at the base of pens is a known attractant to seal species. Therefore, an effective daily mortality removal procedure will be implemented;<br>• **Pellet Detection Software:** BFS is implementing 'Observe' pellet detection software across all marine farms, including the Proposed Development. This software is intended to improve the efficiency of feeding operations, with the aim of reducing the amount of feed pellets used allowing BFS to be more sustainable both economically and environmentally;<br>• **Acoustic Deterrent Devices (ADDs):** BFS has committed to not using ADDs as standard practice at the Proposed Development. In circumstances of exceptional welfare concern for stocked fish, BFS will consult with NS, the LPA, and the MD-LOT to discuss how best to proceed and to obtain approval for any ADD use. It is likely that a European Protected Species (EPS) licence will be required, which can be applied for via the MD-LOT who will consult with NS on any applications;<br>• **Anti-Predator Nets:** The Proposed Development will not utilise anti-predator netting at standard practice. This decision is anticipated to reduce the overall magnitude of impacts associated with sub-surface entanglement and entrapment;<br>• **Predator Control Plan (PCP):** The PCP details the control measures that will be in place to avoid and reduce the potential interactions with predatory species. The control measures focus on passive proactive measures aimed at reducing the overall magnitude of potential impacts;<br>• **Monitoring and Reporting:** The monitoring and reporting programme is designed to provide data to better understand interactions with locally occurring predatory species, and where appropriate adapt mitigation and management procedures to reduce the overall magnitude of impacts and interactions; and<br>• **Wildlife Logbook Monitoring:** The Proposed Development will keep a logbook of all wildlife noted in the vicinity. This will include a comment on the interaction type, e.g., distant sighting, or direct | |

| Environmental Subject Area | Mitigation Proposed | Timing |
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| | interaction with fish farm infrastructure. This wildlife logbook will help understand patterns in species utilisation of the area over time. | |
| **Section 10: Interactions with Wild Salmonids** | Embedded mitigation measures, both through design and best practice operation are anticipated to sufficiently mitigate potential impacts to ensure no significant effects occur. These embedded mitigation measures include:<br>• **Development Location:** The development is open and unconstrained in nature, as a result, it is highly unlikely to represent a bottleneck to migratory fishes. The Proposed Development is not located within the vicinity of an SAC, designated for Atlantic salmon;<br>• **Containment Net Strategy:** The utilisation of Sapphire Seal Pro netting (or similar), which provides a greater level of rigidity, bite and cut resistance in comparison to regular PE braided netting, is anticipated to reduce the potential for containment breaches, which will reduce the overall magnitude of impacts associated with farmed salmonid escape events;<br>• **Mooring and Grid System:** The mooring system has been designed specifically for the Proposed Development based on modelled and observed environmental data. The utilisation of a 120 m x 120 m grid will allow for a better distribution of overall loading during inclement weather. As a result, the probably of escape events occurring due to infrastructure failure is reduced;<br>• **Best Practice Husbandry:** Best practice husbandry procedures are anticipated to promote high levels of fish health and welfare, limiting the incidence of disease at the Proposed Development, whilst also helping to avoid and reduce interactions with predatory species, namely seals, which subsequently reduces the potential for containment breaches;<br>• **Draft Farm Management Statement (FMS):** The FMS commits to farm the Proposed Development following the principles and procedures currently in place at the existing fish farm within CoGP FMA W-4. Specifically, sea lice interventions will be synchronised across the two fish farms to ensure greatest efficiency;<br>• **Veterinary Health and Welfare Plan (VHWP):** The VHWP details the procedures and documentation relating to health and welfare. All procedures are targeted at preventative rather than remedial action. These best practice procedures will help maintain fish health throughout the production cycle and limit disease and parasite loading;<br>• **Escapes Contingency Plan (ECP):** The plan outlines the mechanisms that will be in place to ensure effective maintenance of the containment units. The plan also clearly outlines the actions to be taken in the event of an escape and the post-notification actions. The thorough maintenance schedule will help minimise the overall magnitude of impacts associated with escape events; | Design and Operation. |

| Environmental Subject Area | Mitigation Proposed | Timing |
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| | • **Predator Control Plan (PCP):** Escapes of farmed Atlantic salmon may occur as a result of containment failure due to predatory interactions. The PCP outlines the control measures available, and is anticipated to help reduce the overall magnitude of impacts associated with escape events;<br>• **Environmental Management Plan (EMP):** The Proposed Development will be operated under the requirements of the Loch Odhairn EMP. This EMP has four primary aims, that include; report on the level of sea lice released into the environment, identify the likely areas of sea lice dispersal from the farms, provide details of the monitoring data that will be collected to assess potential interactions with wild salmonids, and provide details on how this monitoring information will feed back to management practice**;**<br>• **Integrated Sea Lice Management (ISLM) Plan:** The aim of the ISLM Plan is to actively reduce the use of medicinal products, prioritising the use of biological control and systems that physically remove sea lice. The priority of proactive sea lice management is anticipated to help maintain sea lice at negligible levels. In the worst-case scenario partial and full depopulation of the Proposed Development will be considered. The ISLM plan is anticipated to significantly reduce the overall magnitude of impacts associated with sea lice transfer from farmed to wild salmonids; and<br>• **Health Intervention Capacity:** In line with the ISLM Plan, BFS actively prioritises mechanical and freshwater interventions over traditional chemical interventions. In order to effectively carry out this intervention strategy, BFS has invested heavily in fish health intervention vessel capacity, with vessels equipped with FLS delousing systems. Specific FLS intervention vessels have a FLS treatment capacity of 50 T of salmon per hour per line, with a total of four lines. Therefore, at maximum capacity it would be possible to treat 200 T of salmon per hour. Therefore, based on this treatment capacity, it would be possible to treat the Proposed Development, at peak biomass (4,680 T), in 24 hours. In addition to specific FLS vessels, BFS also has internal access to wellboats, equipped with reserve osmosis freshwater and FLS. These wellboats allow BFS to implement a rolling freshwater intervention strategy across all marine operations. As such BFS have current capacity to effectively treat the Proposed Development to ensure high levels of fish health and welfare. | |
| **Section 11: Impacts on Species and Habitats of Conservation Importance** | Embedded mitigation measures, both through design and best practice operation, are anticipated to sufficiently mitigate potential impacts to ensure no significant effects occur. These embedded mitigation measures include:<br>• **Development Location:** The development location has been selected to reduce and, where possible avoid impacts on species and habitats of conservation importance. The high dispersion potential of the location is anticipated to reduce the overall magnitude of impacts on the benthic environment; | Design and Operation. |

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| | • **NewDEPOMOD Modelling:** Model outputs have indicated the maximum biomass that results in satisfactory outputs in terms of Mixing Zone requirements. This is anticipated to reduce the overall magnitude of environmental impacts;<br>• **Containment Net Strategy:** The utilisation of higher rigidity primary netting, with correct tensioning will ensure that the netting presents as a 'solid wall'. This will help reduce the overall magnitude of impacts associated with sub-surface entanglement and entrapment;<br>• **Bird Nets:** Pole mounted top nets will be installed, with a ceiling mesh size of 100 mm and a sidewall mesh size of 75 mm. Daily checks and re-tensioning will be carried out with records maintained onsite. This is anticipated to help reduce the overall magnitude of impacts associated with surface entanglement and entrapment;<br>• **Feed Storage and Feeding:** Feed will be stored in purpose built, fully sealed silos. Feed will be delivered to each pen via a high-pressure air system, with all feed spreaders facing down and set to distribute feed evenly. High-definition cameras will monitor feeding to ensure all equipment is working correctly. This is anticipated to reduce the overall magnitude of impacts;<br>• **Acoustic Deterrent Devices (ADDs):** BFS has committed to not using ADDs as standard practice at the Proposed Development. In circumstances of exceptional welfare concern for stocked fish, BFS will consult with NS, the LPA, and the MD-LOT to discuss how best to proceed and to obtain approval for any ADD use. It is likely that a European Protected Species (EPS) licence will be required and an EPS licence can be applied for via the MD-LOT who will consult with NS on any applications;<br>• **Anti-Predator Nets:** The Proposed Development will not utilise anti-predator netting at standard practice. This decision is anticipated to reduce the overall magnitude of impacts associated with sub-surface entanglement and entrapment;<br>• **Pellet Detection Software:** BFS is implementing 'Observe' pellet detection software across all marine farms, including the Proposed Development. This software is intended to improve the efficiency of feeding operations, with the aim of reducing the amount of feed pellets used allowing BFS to be more sustainable both economically and environmentally;<br>• **Feed Control and Monitoring:** All feeding operations will be monitored by high-definition cameras, which allows for close monitoring of feed response. Feed input can be adjusted in real-time based on the observed feed response, helping to minimise the amount of feed wastage. This is anticipated to reduce the overall magnitude of impacts associated with organic deposition; | |

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| | • **Fallowing:** A minimum 28 consecutive day fallow period will be implemented between production cycles. This will result in the temporary cessation of impact generating activities. Therefore, the implementation of a fallow period is anticipated to reduce the overall of magnitude of impacts associated with the Proposed Development;<br>• **Enforcement:** In a worst-case scenario, SEPA has extensive enforcement powers to decrease the maximum biomass, if the Proposed Development is deemed to continuously not comply with benthic EQSs. This is anticipated to significantly reduce the overall magnitude of benthic impacts;<br>• **Best Practice Husbandry Procedures:** Best practice husbandry procedures will be employed to ensure fish health and welfare are maintained at a high standard throughout the production cycle, including the daily removal of mortalities. This is anticipated to reduce the overall magnitude of impacts associated with the Proposed Development;<br>• **Predator Control Plan (PCP):** The PCP details the control measures that will be in place to avoid and reduce potential interactions with predatory species. The control measures focus on passive proactive measures aimed at reducing the overall magnitude of potential impacts;<br>• **Vessel Management Plan (VMP):** The marine vessels associated with the Proposed Development will be operated in line with the VMP. The VMP details general vessel management protocols, as well as specific protocols relating to cetacean and sea bird activity. These protocols are designed to avoid or reduce the potential interactions between marine vessels and cetacean and seabirds;<br>• **Mooring Installation Micro-Siting:** During the installation process of the grid and feed barge mooring system, ROVs will be utilised to allow for micro-siting of anchors and mooring chains. The ROVs will be used to survey the proposed anchor positions to check for benthic features. If benthic features of conservation importance are identified at the proposed anchor position, the anchor deployment position to be altered slightly to ensure that the identified features are not impacts by direct physical disturbance; and<br>• **Monitoring and Reporting:** The monitoring and reporting programme is designed to provide data to better understand interactions with locally occurring species, and where appropriate adapt mitigation and management procedures to reduce the overall magnitude of impacts and interactions. | |
| **Section 12: Navigation, Anchorage, Commercial Fisheries and Other Non-** | Embedded mitigation measures, through design and best practice operation are anticipated to sufficiently mitigate potential impacts to ensure no significant effects occur. These embedded mitigation measures include: | Design and Operation. |

| Environmental Subject Area | Mitigation Proposed | Timing |
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| **Recreational and Recreational Maritime Uses** | • **Development Location:** The development location has been selected to reduce and avoid disruption and disturbance to other non-recreational maritime users, specifically commercial fishing. This is anticipated to reduce the overall magnitude of impacts associated with the Proposed Development;<br>• **Development Lifespan:** Whilst the Proposed Development is intended to be operational over the long-term with no decommissioning phase defined, the Proposed Development is completely reversible, with no permanent physical impacts on the seascape and navigational safety;<br>• **Minimisation of the Mooring Area:** Through the design process of the mooring system, efforts have been made to minimise the length of individual mooring lines to ensure the mooring area has a minimal footprint. Following installation, the majority of the area taken up by mooring lines will still be accessible for static gear fishing with full exclusion only required during maintenance of mooring lines or boat operations. This is anticipated to reduce the overall magnitude of impacts on commercial fishing;<br>• **Navigational Lighting:** The Proposed Development will be marked in accordance with NLB requirements; and<br>• **Registration with the UKHO:** The UKHO will be notified of the Proposed Development, if consented, to allow for all nautical charts to be updated with the Proposed Development's mooring area, to ensure that all mariners are aware of the presence of the Proposed Development. | |
| **Section 13: Seascape, Landscape, and Visual** | Embedded mitigation incorporated during the design process is anticipated to avoid and reduce the impact of the Proposed Development on both seascape and landscape receptors. The following embedded mitigation measures have been incorporated:<br>• **Development Location:** The development location is classified as open and expansive coast and therefore is capable of accommodating larger structures. As a result, the selection of this development location is anticipated to help reduce the overall magnitude of impacts on seascape and landscape receptors;<br>• **Siting:** The Proposed Development will be orientated parallel to the dominant coastline with open and expansive views out to sea, which are dominated by the horizontal. This is anticipated to reduce the overall magnitude of impacts on seascape and landscape receptors;<br>• **Pens:** A reduced number of larger pens helps to reduce the amount of infrastructure required to achieve the volume needed to farm the maximum biomass. They are low profile and will be finished in a dark grey or matte black colour, this will help reduce the overall magnitude of impacts on seascape and landscape receptors; | Design. |

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| | • **Feed Barge:** The proposed feed-barge is designed to look similar to commercial marine vessels, which are common in the waters to the west of the Isle of Lewis;<br>• **Low Profile Infrastructure:** All surface infrastructure will have a low profile design, which is anticipated to allow the surface infrastructure to be accommodated within the wider context of the seascape and landscape; and<br>• **Bird Nets:** Pole mounted top nets do not require the additional pen furniture of the hamster wheel. The netting will be battleship grey in colour. The utilisation of a pole mounted system with grey netting is anticipated to reduce the overall magnitude of visual impacts. | |
| **Section 14: Socio-Economic, Access, and Recreation** | Embedded mitigation measures are anticipated to help ensure that maximum positive socio-economic benefit is gained from the Proposed Development, both locally, on the Isle of Lewis, on the Outer Hebrides, and Scotland more generally. The following mitigation measures will be implemented:<br>• **Local Sourcing:** BFS actively encourages local suppliers to tender for new developments as well as regular maintenance work. This will help stimulate both short-term and long-term economic activity within the Outer Hebrides and Scotland, more generally;<br>• **Local Staffing:** The Proposed Development is anticipated to create, at minimum, 5 new full time positions. BFS will aim, if possible, to fill these positions locally. This will help stimulate local economic activity, whilst also potentially attracting young families and individuals to the area; and<br>• **Community Fund:** The community fund programme allows external organisations and charities to apply directly for funding. This programme is open to organisations and charities on the Isle of Lewis and further afield. | Company Policy and Operation. |
| **Section 15: Noise** | Embedded mitigation measures, both through design and best practice operation are anticipated to sufficiently mitigate potential impacts to ensure no significant effects occur. These embedded mitigation measures include:<br>• **Development Location:** The Proposed Development will be located along a section of coastline that is relatively devoid of human habitation, with very limited NSRs. This lack of NSRs will reduce the impact of sound propagation from the Proposed Development;<br>• **Generator Positioning:** All generators will be located within the hull of the feed barge, as such they will be located below the water-level. The positioning of the generators below the water-level ensures that above water sound propagation is reduced;<br>• **Sound Insulation:** The feed barge will be purpose built to a high level of sound proofing, with the specific level of sound proofing specified during the design phase of feed barge construction. Each | Design and Operation. |

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| | individual generator will be housed within a sound attenuating enclosure, to ensure a high level of sound absorption;<br>• **Standard Working Hours:** In general BFS's normal working hours are from 0700 hrs to 2000 hrs, over a seven day working week. However, due to the nature of rearing livestock, additional operations will likely be required outwith the standard working hours to ensure high levels of fish health and welfare. Any operations outwith normal working hours shall be minimised, wherever possible. In addition, during certain periods of the year, equipment integral to the production cycle and ensuring high standards of fish health and welfare, will be required to run overnight. This primarily includes underwater lighting and aeration systems. Underwater lighting is likely to be deployed from stocking in Q4 to June the next year. Aeration systems will typically be used from April to October. However, this is subject to review and modification by the BFS Production and Biology Departments; and<br>• **Automatic Timers:** The feed barge will have an automatic timer installed, which will be set to turn off the generators at a specific time. This will ensure that over the night-time period, when no power is required to run support systems, the potential for noise generation and propagation will be avoided. The generators will then automatic re-start in the morning, in line with the standard working hours of the Proposed Development. | |
| **Section 16:Lighting** | Embedded mitigation measures, both through design and best practice operation are anticipated to sufficiently mitigate potential impacts to ensure no significant effects occur. These embedded mitigation measures include:<br>• **Northern Lighthouse Board Requirements:** The Proposed Development will be marked in accordance with the NLB statutory requirements only. This will limit the potential for anthropogenic light from the Proposed Development contributing to obtrusive lighting;<br>• **Lighting Installations:** Best practice luminaire installation will be followed when designing and installing all external luminaires for the Proposed Development. This will ensure that all external light sources are appropriately designed and installed and will therefore help avoid and reduce obtrusive light generation and propagation;<br>• **Underwater Lighting:** The Proposed Development will likely make use of underwater lighting within each of the eight pens from the point of stocking until the following June. However, the lighting will be installed at 6 m depth and directed downwards to reduce the amount of light reaching the surface waters;<br>• **Standard Working Hours:** In general BFS's normal working hours are from 0700 hrs to 2000 hrs, over a seven day working week. However, due to the nature of rearing livestock, additional operations will | Design and Operation. |

| Environmental Subject Area | Mitigation Proposed | Timing |
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| | likely be required outwith the standard working hours to ensure high levels of fish health and welfare. Any operations outwith normal working hours shall be minimised, wherever possible. In addition, during certain periods of the year, equipment integral to the production cycle and ensuring high standards of fish health and welfare, will be required to run overnight. This primarily includes underwater lighting and aeration systems. There is the potential for lighting to be deployed on sites stocked between the months of December and June, based on the individual requirements of each site. Aeration systems will typically be used from April to October. However, this is subject to review and modification by the BFS Production and Biology Departments; and<br>• **Best Practice Operational Procedures:** During the operation of the Proposed Development best practice lighting procedures will be followed to avoid and reduce the magnitude of potential impacts. These procedures include the lighting of active task areas only, this will ensure that redundant lighting is not active and lighting unused sections of the Proposed Development. Furthermore, the Proposed Development will have an automatic timer system in place that will shut off all electrical power at a specific time, thereby turning off all lighting, apart from navigational lighting. This will effectively avoid obtrusive light generation and propagation during the night-time period. | |

# 18 Conclusion

There is local and national support through the Outer Hebrides LDP, the National Marine Plan, National Planning Framework 4 and other material considerations. The Proposed Development would result in economic benefits including new employment, opportunities for local and regional contractors and support for existing aquaculture operations in the region.

The EIAR and associated Appendices provide a full and detailed description of the proposed infrastructure and practices to be used at the Proposed Development. The Proposed Development has been designed in such a way to ensure that environmental effects have been minimised through a combination of careful siting in an exposed, high energy location and embedded, design and operational, mitigation.

Where a potential risk to the surrounding environment has been identified, appropriate mitigation has been proposed (e.g., the layout of the pens following the coastline).

It is determined that no significant adverse landscape, seascape and visual effects are likely as a result of the Proposed Development, as the nature of the Proposed Development is characteristic of a coastal location and the receiving seascape and landscape is of such a scale that it has the capacity to absorb the Proposed Development.

The design and assessment process adopted by BFS represents a good practice approach to the reasonable development of marine aquaculture. All potential areas of significant interaction between the Proposed Development and the environment have been addressed, resulting in a well-designed development, incorporating appropriate mitigation measures, at a suitable development location.

The Proposed Development complies with, and is supported by, the aims and objectives of both national policy and the Development Plan and would make a valuable contribution towards the ambitious growth targets set for the aquaculture industry, whilst also contributing to the industry's role in achieving the UN SDGs outlined under Agenda 2030.

It is considered that the Proposed Development complies with the Development Plan and is acceptable in all other respects and there are no material considerations that would outweigh these conclusions.