

# Marine Aquaculture Site North Kilbrannan

## PLANNING APPLICATION

### Environmental Impact Assessment Report

Mowi Scotland Limited  
2020

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Copies of the Environmental Report can be requested by contacting the applicant at Stob Ban House, Glen Nevis Business Park, Fort William, PH33 6RX. Hard copies will be subject to a £50 charge.

## **NON-TECHNICAL SUMMARY**

### **Development/Project**

Mowi Scotland Limited proposes a new Atlantic Salmon farm in Kilbrannan Sound, named North Kilbrannan, situated just north of Cour Bay and about 9 km north from the existing Carradale North farm. The proposed infrastructure is 12 pens of 120 m circumference each, arranged in a 2x6 regular grid; associated moorings to the seabed; a feed barge; and 3 ancillary single point moorings. North Kilbrannan has a SEPA Controlled Activities Regulation (CAR) Licence (CAR/L/1168182) to operate up to a biomass of 2475.54 tonnes.

### ***Benthic Environment***

Uneaten food and faeces are the main components of particulate waste generated at a fish farm, which may impact the benthic environment. This assessment considers the impacts of the proposed North Kilbrannan farm, arising from organic (carbon) deposition and in-feed treatment residues.

The 2018 baseline video survey comprised 3 video survey transects, the footage of which has been viewed to identify occurring species, habitat types and zonation using the Marine Habitat Classification Hierarchy and SACFOR abundance scale from the JNCC website. The video analysis did not identify any priority marine feature species or habitats; no designations within the area of the site have been identified relevant to this benthic video survey.

Reducing organic load to the benthic environment is achieved primarily by operational measures:

- Control of food and faecal waste;
- Fallowing;
- Mechanical and Freshwater Treatments;
- Treatment Management; and
- Enforcement.

The recently updated requirements for seabed impacts for aquaculture by SEPA state that the mean deposited mass within the 250g/m<sup>2</sup> impact area (equivalent to IQI 0.64) should not exceed a certain limit that depends on the wave exposure of the location and that the total area (m<sup>2</sup>) with a mean deposited mass more than 250g/m<sup>2</sup> should not exceed the 100m composite mixing zone area (m<sup>2</sup>). Both environmental quality criteria are judged using the average seabed impact calculated over the final 90-day model (NewDepomod) period. The results of the modelling indicate that the proposed development is sustainable and within the requirements set by SEPA. This was confirmed by SEPA by granting a CAR licence for the modelled maximum biomass.

### ***Water Column***

North Kilbrannan is in an area of open water, outside of any Scottish Government Locational Guidance waterbody. However, appropriate Equilibrium Concentration Enhancement (ECE)

modelling was done to show the degree of nutrient enhancement likely to result from the proposed North Kilbrannan site and that of the neighbouring Carradale North and Carradale South farms, the only other operational sites in the vicinity. The nutrient contributions from North Kilbrannan, both singly and cumulatively, are assessed as having a minor magnitude of impact on the water column. Based on the low sensitivity of the water column as a receptor, the overall significance of the impact is assessed as minor.

The site has been modelled and consented for the use of cypermethrin, deltamethrin and azamethiphos. The SEPA-developed bath model tool was used to predict medicinal quantities appropriate for consent. The bath modelling generated levels of acceptable use of topical treatments that comply with existing EQS. Compliance with EQS is anticipated to results in minor magnitude of impact on the water column. The overall significance of the impact based on a low sensitivity of the receptor is minor.

### ***Interaction with Predators***

The development has potential to impact birds, otters, seals and cetaceans. A number of standard and responsive mitigation measures are proposed with the main aim to remove incentives for predators to visit the farm and prevent opportunities for predators to habituate to the development as a food source.

These include proper net tension, frequent removal of morts, effective use of ADDs and properly fitted bird nets. An incident at the nearby Carradale farms in 2019 resulted in the temporary entrapment of birds; this was caused by inadvertently using the wrong type of bird nets, which have now been replaced by the correct type of nets that are effective in keeping birds out. Overall, impacts to receptors are assessed as minor.

### ***Interaction with Wild Salmonids***

Atlantic salmon fish farming has potential to interact with wild salmonid fisheries (wild Atlantic Salmon and Sea Trout) primarily via:

- the transfer of disease or parasites between farmed fish and wild salmonids, and
- escape of farmed fish leading to genetic mixing between farmed fish and wild salmonids.

The proposal at North Kilbrannan will result in an increase in maximum biomass in Kilbrannan sound by 2475.54T. This assessment considers the likely potential impacts on wild salmonid fishery stocks from the proposed increase.

To reduce potential interactions, a range of mitigation measures have been developed to remove or reduce the various impacts associated with developing the site. Whilst a number of these measures incorporate traditional management practices, Mowi is investing substantially in new technologies. Mowi also complies with the Code of Good Practice.

Following discussions with the Argyll District Salmon Fishery Board and Argyll Fisheries Trust, a Regional Environmental Management Plan (EMP) has been developed for Kilbrannan Sound, covering all three Mowi operational sites. The Regional EMP will voluntarily promote and implement measures for the maintenance of healthy stocks of wild and farmed salmonid fish in the Kilbrannan Sound geographical area. The agreement provides the framework for monitoring, communication channels, sharing of data, meetings, and the desired outcomes of increased knowledge and working partnerships that will ultimately result in improved management practices.

### ***Species and Habitats of Conservation Importance***

No relevant designations for species or habitats of conservation importance exist near North Kilbrannan, but following advice by SNH, two distant protected areas are relevant. Impact assessments on the qualifying interests of protected areas are presented separately in the Shadow HRA for Endrick Water SAC (Supplementary material 2) and in the HRA Ornithology Report (Supplementary material 3) for relevant SPAs.

A Regional EMP focused on wild salmonid populations using Kilbrannan Sound is proposed, covering the only operational sites, North Kilbrannan, Carradale South and Carradale North, all of which are operated by Mowi. The Regional EMP will provide the framework for monitoring, communication channels, sharing of data, meetings, and the desired outcomes of the increased knowledge and working partnerships that will ultimately result in improved farm management practices.

### ***Navigation, Anchorage, Commercial Shipping and Other Users***

The physical presence of infrastructure has potential to obstruct or impede the activities of other maritime users, including commercial fisheries or military operations. Operational activities at the Carradales sites in Kilbrannan Sound have not generated any adverse impacts, as far as Mowi is aware, on surrounding navigational traffic. This assessment considers the predicted impacts arising from the proposed North Kilbrannan site.

Commercial shipping is assessed as a low sensitivity receptor due to the low frequency of transits. Following screening advice by RYA Scotland, recreational shipping is also assessed as a low sensitivity receptor. Commercial fisheries are classified as a low sensitivity receptor in terms of economic value due to the existing low commercially viable marine populations identified and low number of fishing vessels utilising the area on which the farm will be located. Overall significance of impact is assessed as minor.

### ***Landscape and Visual Impact Assessment***

An independent Seascape, Landscape and Visual Impact Statement (SLVIA) was commissioned by Mowi.

The findings of this SLVIA were:

- Within the context of the Kintyre Peninsular, the proposals are well located to contain Landscape and Visual Impacts. The proposals are located away from highly sensitive areas of coast, within an area of limited intervisibility and outwith interference with the valued views across the Kilbrannan Sound to Arran.
- The report finds that there are impacts upon historic sites, recreational resource and residential properties, with some higher levels of adverse effects encountered within close proximity to the proposed site, which require due consideration. However, these impacts are well contained to preserve the overall integrity of the seascape and landscape of the area both around Cour and Crossaig and the wider Kilbrannan Sound.
- Guidelines for form and layout have been adhered to, with successful reduction in potential effects through screening from landform and avoidance of interaction with sensitive landscape features and elements.

- The proposals are found to be in compliance with the Argyll and Bute Local Development Plan, with the majority of levels of significance recorded within acceptable levels of significance in EIA terms.

### ***Noise***

Noise from farming operations is predominantly intermittent and is almost entirely confined to daylight hours. This assessment considers noise generation from site operational activities on human receptors.

No significant potential receptors to noise impacts were identified within the 1km buffer from the farm site. No high sensitivity receptors were identified within the buffer area (residential housing, schools or places of worship).

Although a range of transiting marine receptors and other land-based receptors (mainly walkers) may experience some temporary noise from both vessel traffic and site feed infrastructure near the development, overall the significance of noise in the context of normal marine traffic such as fishing and recreational vessels is assessed to be of minor significance due to the distance from the shore and low levels of marine activity in the area.

### ***Cultural Heritage***

Cultural heritage refers to archaeological sites, historic structures, gardens and designated landscapes, historic battlefields and other historic features. In a marine context this can also extend to wrecks and paleo landscapes.

Historic Environment Scotland advised “there are no heritage assets within our remit, as listed above, within the proposed development area or its vicinity. We are therefore content for impacts on cultural heritage assets within our remit to be scoped out of the assessment stated that heritage assets may be scoped out”.

However, Argyll and Bute Council advised that “[t]he proposed fish farm would be located to the north of Cour House, a category A Listed Building. The impacts of the fish farm development on the setting of the listed building requires consideration.”

Cour House, situated farther than 2km from the site will experience small adverse visual effects from partial views of the farm.

### ***Waste Management***

Waste management processes are currently certified under ISO 14001, a respected, international set of standards used to design and implement effective environmental management systems. The existing management system ensures that any waste generated by fin fish farm operations is minimised and disposed of appropriately.

### ***Socio Economic and Recreation***

An independent socioeconomic assessment was commissioned by Mowi. A summary of the impacts is noted below.

Factor	Detail
<b>Direct Economic Impact</b>	Jobs Supported per Year of Construction 41
	Annual Construction GVA Impact £1.7m
	Total Construction GVA Impact £2.1m
	Total Peak Operational Jobs FTE 10
	Annual Operational GVA Impact £0.75m
<b>Total Economic Impact</b>	Total Construction Employment (Local Level) 64
	Total Construction Employment (Scotland Level) 68
	Total Construction GVA Impact (Local Level) £2.9m
	Total Construction GVA Impact (Scotland Level) £3.2m
	Operational Peak Employment Jobs FTEs (Local Level) 14
	Operational Peak Employment Jobs FTEs (Scotland Level) 15
<b>Cost-Benefit Analysis of Total Economic Impact</b>	Operational Annual GVA Impact (Local Level) £1.1m
	Operational Annual GVA Impact (Scotland Level) £1.2m
	Cost-Benefit Ratio (Local Level) 1:3.4
	Cost-Benefit Ratio (Scotland Level) 1:4.0

### ***Traffic and Transport***

Traffic generated by the existence of a marine fish farm can include both marine and terrestrial transport. Traffic and transport has not been identified as a potentially significant issue during the scoping process. Argyll and Bute Council concluded that “an additional fish farm with additional staff is likely to result in additional journeys to and from the shore base both by sea and land, however, it is not considered that this would be significant”. The assessment in this report reaches the same conclusion.

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## 1 Introduction

### 1.1 Background

Mowi Scotland Limited proposes a new Atlantic Salmon farm in Kilbrannan Sound, named North Kilbrannan, situated just north of Cour Bay and about 9 km north from the existing Carradale North farm.

The proposed infrastructure is 12 pens of 120 m circumference each, arranged in a 2x6 regular grid; associated moorings to the seabed; a feed barge; and 3 ancillary single point moorings.

North Kilbrannan has a SEPA Controlled Activities Regulation (CAR) Licence (CAR/L/1168182) to operate up to a biomass of 2475.54 tonnes.

## 2 The Applicant

### 2.1 Mowi Scotland Limited

Mowi Scotland Limited is part of the Mowi Group, a global leader in salmon production and currently the largest salmon producer in Scotland, harvesting 38,444 tonnes of salmon in Scotland in 2018, and employing around 1500 people. In line with Scottish Government aspirations to grow the existing aquaculture economy to 210,000 tonnes a year by 2030, Mowi aims to incrementally increase production to contribute to this target. This aim is underpinned by an internal capital investment and policy programme to enhance the overall sustainability of the existing fin fish developments.

### 2.2 EIA Team

This Environmental Impact Assessment has been prepared in-house by Mowi. Expert advice on particular subjects was provided by independent consultants as required. The following individuals contributed to, reviewed and edited the assessment:

#### *Greg Moschonas, Environmental Analyst*

Greg has a BSc Honours in Applied Marine Biology from Bangor University and a PhD in Marine Science from the University of Aberdeen. He undertook his PhD research at SAMS, where he also taught in the UHI Marine Science course and worked part-time as recompression chamber assistant. Following his studies, Greg led the economic growth of food and drink and marine science for Argyll and Bute Council for three years, then briefly worked as policy manager for university research and knowledge exchange for the Scottish Government. His love and aptitude for data analysis and the natural environment steered him to the role of Environmental Analyst with Mowi Scotland.

#### *Yvonne Booth, Environmental Analyst*

Yvonne began her career with Mowi Scotland Limited in 2017 after graduating with a MSc. in Oceanography from the University of Southampton. She began her aquaculture career as a freshwater Farm Technician then as a Hatchery Technician before joining the Environmental Team in November 2017 as an Environmental Analyst. She has since gained experience in aquaculture planning and licence application processing and gained Associate Membership of the Institute of Environmental Management and Assessment (IEMA) in 2019. Prior to this Yvonne accumulated 19 years' experience in the oil and gas industry after graduating from the University of Aberdeen with a BSc. Honours in Petroleum Geology and MSc. in Soil Science. Working internationally, primarily as a Senior Wellsite Geologist and Operations Geologist, she worked with multidisciplinary teams, stakeholders, government and third-

party contractors to plan and gain permissions to drill offshore wells. During drilling operations, she worked offshore leading the contract teams responsible for gathering geological data. In this role she also developed an advanced level of sample and digital data analysis and interpretation. As an Operations Geologist her role was focused on planning, resource management, data interpretation and management as well as reporting to stakeholders and regulatory authorities. In the later part of her oil and gas industry career Yvonne mentored and gave formal training to many graduate employees within client companies.

*Stephen MacIntyre, Head of Environment Team*

Prior to commencing employment with Mowi Scotland Limited Stephen accumulated 27 years of environmental experience with regulatory agencies, initially the former Highland River Purification Board and latterly with SEPA where he was employed as an Environmental Protection Officer for 11 years and then as a Senior Environmental Protection Officer for 10 years. Stephen's areas of experience include Incident Investigation and Reporting, Environmental Legislation, Pollution Control Guidance and Construction Best Practice, Applications for Environmental Licences and Environmental Licence Compliance. During his regulatory career Stephen participated in numerous working groups to support policy development and initiatives to ensure effective and efficient protection of the water environment with a specific focus on the aquaculture sector. He has undertaken continuous professional development to acquire and maintain professional credentials through organisations such as the Chartered Institution of Water and Environmental Management and personal and professional learning opportunities situated in workplace achieved through training courses, coaching, mentoring, reflective supervision and technical assistance.

*James Morrison, Oceanographer*

Since gaining a B.Sc. in Computing Science in 2003 from the University of Edinburgh, James has developed extensive expertise in software engineering. James has specialised in a range of projects covering land surveys, maritime sensor deployment, data acquisition and data processing and recently led the technical implementation of novel maritime radar technology for remote sensing metocean data. James has also been involved in a range of commercially focused contract research activities from tank testing wave energy converters and provided GIS support for floating offshore wind site localisation. In addition to commercial project experience, James has both led, and collaborated in several published scientific papers based on data processing and representation of the marine resource. James was also lecturer at degree and HND level with the University of Highlands and Islands and is a Member of the Institute for Engineering and Technology.

*Philip Gillibrand, Senior Oceanographer*

Dr Philip Gillibrand is a coastal oceanographer and hydrodynamic modeller. After completing a BSc. in mathematics and physical oceanography and a PhD in physical oceanography at the University of Wales, Bangor, he worked at the Fisheries Research Services (now Marine Scotland Science) in Aberdeen for 13 years. Here he developed and applied a range of computer models to address questions relating to the circulation and exchange of Scottish coastal waters. A particular focus at the time was the development of computer models to predict the dispersion of waste products from the burgeoning finfish aquaculture industry, and to understand the environmental effects of the industry on water quality in the sealoch basins. In 2003, he moved to the Scottish Association for Marine Science (SAMS) in Oban and continued to work on models of sealoch and coastal dynamics and the environmental impacts of aquaculture.

From 2007 to 2014, Philip lived and worked in New Zealand and Australia, developing hydrodynamic models to address coastal water quality concerns and to predict potential impacts from coastal hazards such as tsunami and storm surges. He returned to Scotland in 2014, joining the UHI to study marine energy, before joining Mowi in 2017. Here Phillip runs the models required for licensing, in addition to developing models to that will contribute to optimising site selection such that production can be increased while minimising environmental effects.

#### *Dr Digger Jackson, Atlantic Ecology Limited*

Dr Digger Jackson heads Atlantic Ecology Limited, a consultancy based in Scotland that specialises in ornithological impact assessment studies and survey work. Digger has 32 years' work experience, initially as a research biologist with RSPB and since 2005 as an ornithological consultant; he setup Atlantic Ecology in 2016. Digger has a particular interest in the ecology and conservation of waders, divers and seabird species. Most of his recent work has been related to bird survey and impact studies for over 30 marine projects in particular large renewable energy developments (offshore wind, tidal stream and wave projects) but also marine fish farms and port developments. He also has wide experience with bird consultancy and surveys for onshore projects including large wind farms, hydro-electric projects, transmission lines projects, and even a proposed spaceport. His consultancy work has also included commissions from the Scottish governments and Scottish Natural Heritage to undertake monitoring surveys of designated sites and to write bird survey guidance.

### **3 Legislative Context**

'Intensive fish farming' is listed under Annex II of the EC Environmental Impact Assessment Directive (85/337/EEC, as amended by Directives 97/11/EC, 2011/92/EU and 2014/52/EU), allowing member states to determine the need for EIA on a case by case basis. A Screening and Scoping request was issued and registered by Argyll & Bute Council on 20 November 2019 (19/02422/SCRSCO). Argyll & Bute Council responded that "an EIA Report will be required to accompany a planning application for this development".

#### **3.1 Legislative Framework**

Current policy is spread across several institutions in Scotland and is extensive in scope. In terms of planning, the planning application for the proposed modifications is determined by Argyll & Bute Council under the provisions of the Town and Country Planning (Scotland) Act 1997 as amended by the Planning etc. (Scotland) Act 2006. The key consents and permissions associated with planning consent and associated timelines are detailed in Table 1.

*Table 1: Key regulatory regimes related to fish farm site development requirements.*

<b>Regulatory Regime</b>	<b>Authority</b>	<b>Comment</b>
Planning Permission under the Town and Country Planning Act 1997 (As Amended by the Planning etc. Scotland Act 2006)	Argyll & Bute Council	A Screening and Scoping request was issued and registered by Argyll & Bute Council on 20 November 2019 (19/02422/SCRSCO). Argyll & Bute Council responded that "an EIA Report will be required to accompany a planning application for this development".
Licence under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR)	Scottish Environment Protection Agency	SEPA issues CAR licences by setting site specific limits on the amounts of fish that can be held in pens in addition to controls on medicines and

Licence)	(SEPA)	chemicals. North Kilbrannan has a SEPA Controlled Activities Regulation (CAR) Licence (CAR/L/1168182) to operate up to a biomass of 2475.54 tonnes.
Marine Licence under the Marine (Scotland) Act 2010	Marine Scotland	Marine Scotland issues licences for the placement of infrastructure on the seabed, primarily for navigational purposes. An application for a Marine Licence will be made at the same time as an application for Planning Consent.
Crown Estate Act 1961 Scottish Crown Estate Act 2019	The Crown Estate Scotland	North Kilbrannan has an Option for Lease (XX100/326) with Crown Estate Scotland.
The Aquatic Animal Health (Scotland) Regulations 2009	Marine Scotland	The Aquatic Animal Health (Scotland) Regulations 2009 ('the 2009 Regulations') require all Aquaculture Production Businesses (APBs) to be authorised by Scottish Ministers.

Other authorisations required to operate a fish farm, for example well-boat licence are referenced in the relevant sections where appropriate.

## 4 Environmental Impact Assessment

### 4.1 EIA Methodology

The assessment follows legislative requirements and draws on several established guidance documents, to determine levels of significance of identified effects on receptors. General methodologies referenced include:

- Planning Circular 1 2017: Environmental Impact Assessment (Scotland) Regulations 2017;
- The Highways Agency, Scottish Government, Welsh Assembly, Department for Regional Development, NI. 2008. Design Manual for Roads and Bridges; Volume 11, Part 5 – The Assessment and Management of Environmental Effects; and
- Scottish Natural Heritage. 2018. A Handbook on Environmental Impact Assessment v5. Guidance for competent authorities, consultees and others involved in the Environmental Impact Assessment Process in Scotland (Scottish Natural Heritage, 2018).
- Chartered Institute of Ecology and Environmental Management (2018). Guidelines for Ecological Impacts Assessment in the UK and Ireland.

The purpose of EIA is to influence design and ensure mitigation is focused on significant effects. The overall impact of a site is expressed in 'significance'; an evaluation which is a function of the magnitude of an impact, the likelihood of its occurrence and sensitivity of a receptor.

A systematic methodology to assess significance demonstrates, in a transparent manner, how specific conclusions regarding impacts have been reached and how, they have been addressed in the design of the proposal.

A general methodology for assessing significance has been developed based on:

- Assign value or sensitivity of a receptor;
- Assess the magnitude of impact; and
- Assess significance.

A framework for assessing value or sensitivity of a receptor is provided in Table 2. Example criteria are provided to justify sensitivity / value calculations.

*Table 2: General criteria for assessing sensitivity of an environmental receptor.*

Assessment	Example Criteria for Receptor Sensitivity / Value			
Assessment	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Marine Benthos	<ul style="list-style-type: none"> <li>Internationally designated site e.g. SAC;</li> <li>Rare species or habitats of international / national importance with restricted distribution, limited range or threatened populations.</li> <li>High density or numerous Priority Marine Features (PMFs) species or habitats.</li> </ul>	<ul style="list-style-type: none"> <li>Regularly occurring substantial population of national or regionally important species including Priority Marine Features and species listed on UK Biodiversity Action Plan.</li> <li>Marine Protected Area (MPA)</li> <li>Moderate density of PMF species or habitats.</li> </ul>	<ul style="list-style-type: none"> <li>Site contains one or more PMFs but do not qualify for national designation e.g. patches of reef-forming organisms that do not qualify as a reef.</li> <li>Site of local value</li> </ul>	<ul style="list-style-type: none"> <li>May contain some infrequent examples of features of classified under PMF / UK or local Biodiversity Plans.</li> </ul>
Water Quality	<ul style="list-style-type: none"> <li>Vulnerable environment (very enclosed sea loch, or poor hydrodynamic conditions) and very limited ability to absorb change without significantly altering character.</li> <li>Areas classified as Category 1 under Scottish Government Locational Guidelines.</li> </ul>	<ul style="list-style-type: none"> <li>Limited ability to absorb change without significantly altering character.</li> <li>Areas classified as Category 2 under Scottish Government Locational Guidelines.</li> </ul>	<ul style="list-style-type: none"> <li>Areas classified as Category 3 under Scottish Government Locational Guidelines.</li> <li>Relatively robust environment (semi-open water location) and moderate capacity to absorb change.</li> </ul>	<ul style="list-style-type: none"> <li>Open water</li> <li>No classification under the Scottish Government Regional Locational Guidelines</li> <li>Tolerant of change with only minor detriment to characteristics.</li> </ul>
Wild fisheries	<ul style="list-style-type: none"> <li>Rare species or habitats of national importance;</li> <li>Highly limited range and /or threatened populations.</li> </ul>	<ul style="list-style-type: none"> <li>Relatively rare species or habitats of national importance;</li> <li>Limited range and /or threatened populations.</li> </ul>	<ul style="list-style-type: none"> <li>Locally important species, rare or uncommon or on edge of range.</li> </ul>	<ul style="list-style-type: none"> <li>Species which may be of regional importance but which are only present infrequently or on low numbers</li> <li>A regularly occurring, substantial population.</li> </ul>
Protected Sites	<ul style="list-style-type: none"> <li>An internationally designated site or candidate site e.g. SPA, SAC, Ramsar Site;</li> <li>Globally threatened habitats (e.g. IUCN list)</li> <li>A site or habitat essential for maintaining internationally- or nationally-significant populations of internationally important species.</li> </ul>	<ul style="list-style-type: none"> <li>A nationally designated site e.g. SSSI, MPA</li> <li>Other features identified as wildlife corridors or migration routes for nationally or internationally important species.</li> </ul>	<ul style="list-style-type: none"> <li>A locally designated site e.g. Local Nature Reserve (LNR).</li> <li>A viable area of Local Biodiversity Action Plan priority habitat or of smaller areas of such habitat that is essential to maintain the viability of a larger whole.</li> <li>Areas of key habitat</li> </ul>	<ul style="list-style-type: none"> <li>Areas that may contain some features of local value, including Local Biodiversity Action Plans.</li> <li>May provide limited local foraging or nursery habitats but not essential to maintain the viability of the larger whole.</li> </ul>

			<p>identified as being of regional value and integrity.</p> <ul style="list-style-type: none"> <li>• Other features e.g. migration routes.</li> </ul>	
Protected Species	<ul style="list-style-type: none"> <li>• Globally threatened species (e.g. IUCN threatened species)</li> </ul>	<ul style="list-style-type: none"> <li>• Species subject to special protection (e.g. EPS, WCA Schedule 1, EU Annex 1) and that have an unfavourable conservation status (e.g. for birds, BoCC red-listed).</li> <li>• Species for which individuals affected are part of qualifying interest of a designated site (e.g. SPA or SAC)</li> </ul>	<ul style="list-style-type: none"> <li>• Species subject to general protection and that have a unfavourable conservation status</li> <li>• Species subject to special protection (e.g. EPS, WCA Schedule 1, EU Annex 1 species ) and that have a favourable conservation status</li> <li>• Significant populations of a regionally important species</li> </ul>	<ul style="list-style-type: none"> <li>• Species subject to general protection only and that have a favourable conservation status</li> </ul>
Navigation, Shipping and Commercial Fisheries	<ul style="list-style-type: none"> <li>• Major anchorage, frequently used or important for safety</li> <li>• Conflicts with major passenger ferry route;</li> <li>• Recognised international shipping lane;</li> <li>• An area of major fishery supporting international fleets.</li> <li>• Areas licenced to other sea users</li> <li>• Exclusion areas</li> </ul>	<ul style="list-style-type: none"> <li>• Conflicts with or restricts access to important anchorage;</li> <li>• Fishery area of national commercial significance as a source of revenue or employment</li> <li>• Recognised shipping lanes or military practise / exercise areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Areas of local or regional importance for fisheries as a source of revenue and employment, area with nearby alternatives</li> </ul>	<ul style="list-style-type: none"> <li>• Areas of low intensity commercial shipping</li> <li>• Minimal value for commercial fisheries, in appropriate habitats</li> </ul>
Landscape and Visual Impact	<ul style="list-style-type: none"> <li>• Internationally designated or recognised land/seascape of exceptional quality and distinctive intact character with a large number of features and strong sense of place, and uninterrupted views (visual amenity).</li> </ul>	<ul style="list-style-type: none"> <li>• Nationally designated or recognised land/seascape of high quality and distinctive character, with a strong sense of place, and susceptible to change which would permanently alter key characteristics and elements of the landscape (National Parks and AONBs). Partial or interrupted views (visual amenity).</li> </ul>	<ul style="list-style-type: none"> <li>• Locally designated or recognised land/seascape with some distinctive characters features in reasonable condition. Capable of tolerating low levels of change without affecting key characteristics and elements (e.g. Local Green Space).</li> <li>• Partial or interrupted views (visual amenity).</li> </ul>	<ul style="list-style-type: none"> <li>• Undesignated land/seascape of defined character type, but of low quality.</li> <li>• Capable of tolerating moderate levels of change/ improvement/ enhancement.</li> <li>• Views lack distinctive characteristics and/or are of low quality (visual amenity).</li> </ul>

			<ul style="list-style-type: none"> <li>• Receptors where external noise may be a distraction; offices, restaurants, cafes, sports grounds where external noise may be intrusive</li> </ul>	<ul style="list-style-type: none"> <li>• Receptors where external noise may be a relative distraction; tourist attractions.</li> </ul>	<ul style="list-style-type: none"> <li>• Distraction or disturbance from noise minimal; building not occupied during office hours, factories or operations with existing high noise levels, sports grounds where spectator noise normal part of event.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• Receptors where people or operations are very sensitive to noise: residential properties, schools, hospitals, places of worship.</li> </ul>			<ul style="list-style-type: none"> <li>• Local status importance</li> <li>• Moderate visitor numbers / users, regional level popularity.</li> <li>• Site is used by clubs for training or local competitions.</li> </ul>	
Socio Economic and Recreation	<ul style="list-style-type: none"> <li>• International status recreational / tourism receptor</li> <li>• Very high visitor numbers</li> <li>• Impacts a high number of people or at a national level.</li> <li>• Site may represent an international competition venue</li> </ul>	<ul style="list-style-type: none"> <li>• National status receptor or high visitor numbers</li> <li>• Site may host or be important for international competitions</li> </ul>		<ul style="list-style-type: none"> <li>• Cultural heritage asset of national importance (e.g. Scheduled ancient Monuments, Historic Naval Battles, Designated Wrecks and Historic NMPAs)</li> </ul>	<ul style="list-style-type: none"> <li>• Locally important sites, wrecks or areas.</li> </ul>
Cultural Heritage	<ul style="list-style-type: none"> <li>• World heritage site or other cultural heritage asset of international importance (World Heritage Sites)</li> </ul>		<ul style="list-style-type: none"> <li>• Regionally important routes or transits</li> </ul>	<ul style="list-style-type: none"> <li>• Locally important routes or transits</li> </ul>	<ul style="list-style-type: none"> <li>• Locally important routes or transits.</li> </ul>
Traffic and Transport	<ul style="list-style-type: none"> <li>• Sensitivity to marine traffic flow; passenger ferry routes, international shipping lanes.</li> </ul>				

The general criteria for assessing magnitude of an impact, or degree of change generated by a development is provided in

*Table 1.* Magnitude is generally quantified according to characteristics around the likelihood of an event occurring, reversibility, recoverability, the area of impact, the relative change to the baseline, the duration and frequency of the impact.

*Table 1: General criteria for assessing magnitude of an impact.*

Magnitude	Typical criteria descriptors
Major	<ul style="list-style-type: none"> <li>• Major loss or major alteration to key elements of the baseline (pre-development) conditions such that the post-development character / composition / attributes will be fundamentally changed.</li> <li>• Impacts of the project at regional or national scale, or with a large number of people impacted over a long duration.</li> <li>• Definite or likely impact.</li> </ul>
Moderate	<ul style="list-style-type: none"> <li>• Loss of resource, but not adversely affecting the integrity, partial loss of / damage to key characteristic, features or elements. Medium to long term impacts.</li> <li>• Large number of people impacted over medium term, or large-scale impacts affecting a small number of people.</li> <li>• Likely impact.</li> </ul>
Minor	<ul style="list-style-type: none"> <li>• Minor shift away from baseline conditions; change arising from the loss / alteration will be discernible but underlying character / composition / attributes of the baseline condition will be similar to the pre-development situation.</li> <li>• Impacts a small number of people over a short period.</li> <li>• Unlikely impact (e.g., at the population level to wildlife receptors).</li> </ul>
Negligible	<ul style="list-style-type: none"> <li>• Very minor loss or detrimental alteration to one or more characteristics of features. Short term.</li> <li>• Unlikely to occur.</li> </ul>

Assessing overall significance of an impact is based on considering the sensitivity to a receptor against the overall magnitude of the impact. A framework for this assessment is provided in Table 4. Other relevant information and expert judgement will also be taken into consideration in determining significance. Whilst these categories are based on adverse effects, it is noted that beneficial impacts may also be generated and identified under the same methodology.

*Table 4: Assessment framework for defining significance.*

		Negligible	Minor	Moderate	Major
Receptor Sensitivity / Value	Low	Negligible	Minor	Minor / Moderate	Moderate
	Medium	Minor	Minor / Moderate	Moderate	Moderate / Major
	High	Minor	Moderate	Moderate / Major	Major
	Very High	Minor	Moderate/ Major	Major	Major

The proposals represent modifications to an existing site. The EIA has drawn upon and benefitted from existing data including monitoring reports and surveys. These have been integrated into the assessment to more accurately characterise the nature of impacts, and the likely magnitude of these.

## **4.2 Consultation**

Consultees contacted during Scoping as part of the EIA process are listed below. Specific issues, further development of topics and agreement of the scope and content of individual surveys and assessments were followed up in email correspondence, meetings or telephone discussions. Responses from consultations and how they have been addressed in the EIA are provided in the individual assessments:

- Historic Environment Scotland
- Argyll District Salmon Fisheries Board
- Marine Scotland Science
- Clyde Fishermens' Association
- Scottish Environment Protection Agency
- Scottish Natural Heritage
- Argyll & Bute Council

In addition to the above consultees, organisations that were consulted prior to the planning application being submitted include:

- Ministry of Defence
- East Kintyre Community Council
- Tarbert and Skipness Community Council
- Carradale Community Trust
- Royal Yachting Association Scotland
- West Coast Regional Inshore Fisheries Group

## **4.3 Environmental Impact Assessment Report**

This Environmental Report describes the findings of the EIA, which aims to identify the significant environmental effects of the development, the extent of these effects and establish solutions to reduce the significance of these effects.

## **5 Project Rationale and Alternatives**

As part of its policy to increase sustainable economic growth, the Scottish Government has identified the food and drink sector as a key economic area for development. Aquaculture, including fish farming, is one of the key priorities for growth<sup>1</sup>. Aspirations published by the sector in 2016 set out plans to double the size of the existing industry already worth £1.8 billion<sup>2</sup>. Similarly, Scotland's National Marine Plan, adopted in 2015, sets out a national plan to ensure sustainable economic growth of marine industries while considering environmental protection.

In parallel, recent developments in the availability of modelling software designed to assess impacts on the benthic environment provides an option for developers to expand maximum standing biomass to levels greater than the previous cap of 2500 tonnes. Previously, a particle tracking model known as AutoDepomod was adopted to simulate the dispersion of particulate material from marine fish farm pens. Model inputs include flow measurements taken close to the farm, as well as parameters describing the release, settling and resuspension of particles. A new version of the model, NewDepomod, was released by SAMS in 2017; it includes many significant improvements to the previous version including a

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<sup>1</sup> [Value of Scottish Aquaculture, 2017](#)

<sup>2</sup> [Aquaculture Growth to 2030: a strategic plan for farming Scotland's seas, 2017](#)

more accurate model for sediment deposition responding to varying bathymetry and an ability to generate more realistic flow patterns<sup>3</sup>.

In line with Government targets, and recent changes in SEPA's regulatory regime, Mowi proposes to increase biomass through both modifying selected sites and identifying new sites for development. One of the identified new sites is North Kilbrannan. Mowi Scotland uses geospatial analysis to identify suitable locations for new sites. Relevant criteria include distance from the coast, water depth, relative location to disease management areas, wind and wave exposure, distance from protected areas and priority marine features, shipping and fishing intensity and distance from sensitive visual receptors.

The proposed location of North Kilbrannan is close enough to the coast to avoid obstructing shipping routes, but not close enough to be too shallow. Its depth is over 25 m, which provides enough space for comfortable placement of pens and associated moorings. It does not overlap with two or more disease management areas. It is exposed enough to the wind, waves and currents to ensure adequate dispersal of organic matter, but not too exposed that it cannot be operated effectively. It is not near protected areas or priority marine features and does not lie in busy shipping lanes or high value/effort fishing regions. It is not near large settlements or other sensitive visual receptors. Finally, it is far enough from the two Carradale farms in the south to avoid any significant cumulative impacts but close enough to be able to utilise common land infrastructure. Therefore, on balance, the proposed location for North Kilbrannan is very suited for an Atlantic Salmon farm, relative to other locations along the east coast of the Kintyre peninsula.

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<sup>3</sup> SEPA. 2018. Regulatory Modelling Guidance for the Aquaculture Sector. Air and Modelling Unit, SEPA

## **Project Description**

### **6 Introduction**

#### **6.1 Location**

The proposed location of North Kilbrannan farm is located just north of Cour bay on the east coast of the Kintyre peninsula (Annex 1). The surrounding area is predominantly rural, with the nearest settlement being the hamlet of Grogport, which is located approximately 6.5 km south of the proposed location. The development is located within the Argyll and Bute Council region, in the Kintyre and Islands electoral ward.

#### **6.2 Bathymetry**

Bathymetry data for the study area were obtained from the UK Hydrographic Office which utilises a variety of sources (e.g. digital bathymetry datasets, Admiralty charts and multibeam surveys). Depth (Annex 1) under the proposed pens area ranges between 25 m and 35 m.

#### **6.3 Hydrography**

A hydrography of the location was based on data gathered from several deployments of Acoustic Doppler Current Profilers (ADCP).

The ADCP deployments were made on the following dates:

- ID146 – 22 February 2017
- ID188 – 06 October 2017

In total the combined dataset extends just over 90 days; the data has been used for NewDepomod modelling. A summary of the mean and residual speeds recorded at the site are provided in Annex 2.

#### **6.4 Sediments**

A video survey (Annex 3) identified the sediment composition of the seabed at the proposed location of North Kilbrannan as circalittoral mixed sediment where the seabed consists of a shell, cobble and pebble mix embedded in sandy mud, with large areas of exposed rock.

## **7 Site Equipment**

#### **7.1 Summary**

This proposal is for new fish farm with a maximum standing biomass of 2475 tonnes held in 12 circular pens of 120m circumference in a 2x6 layout, supported by a 75m mooring matrix. Submerged nets will be 12m deep and pole-supported top nets will be 5-6m high.

Figure 1 illustrates the proposed site infrastructure layout with the modifications in comparison to the existing infrastructure. The proposed development will comprise the following infrastructure, discussed in detail in the remainder of Section 7.

- **Circular pens:** 12 circular plastic pens of 120m circumference. Each pen will be attached to and held in position by a 75m<sup>2</sup> submerged mooring grid. The pen layout will be 2x6.
- **Submerged nets:** ‘Environet’, at a depth of 12m;
- **Moorings:** A sub-surface moorings matrix ensures pens are maintained in a grid configuration. The matrix will be held in position by mooring legs (comprising of rope, chain and anchors or blocks) which extend out from the grid;
- **Top Nets:** Top nets, supported by poles will be used to minimise interactions with birds;
- **Lighting:** The corner point of each matrix grid cell will be marked with a grey surface buoy, in addition underwater lighting may be used to control stock maturation rates; and
- **Navigational Markers:** Navigational markers will be installed to mark the periphery of the site and moorings.
- **Feed barge:** 400-600t feed barge
- **Ancillary moorings:** 3 ancillary moorings

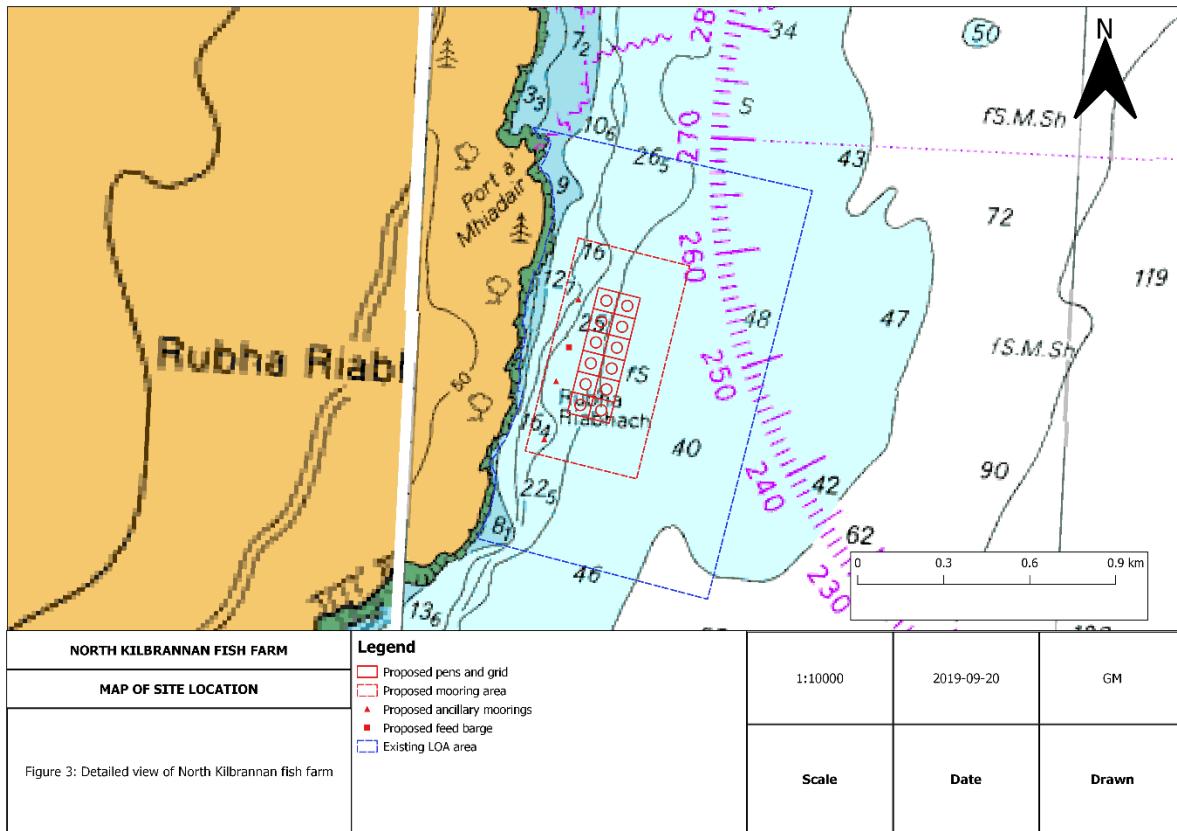


Figure 1: Admiralty chart showing proposed North Kilbrannan site layout.

## 7.2 Circular Pens

Fish at the site will be held in circular pens measuring 120m in circumference (38.2m in diameter). At the surface, each pen will consist of a buoyant walkway, which sits on two pipes that float on the surface around the perimeter of the pen. A low handrail will be located above the floating walkways at a height of approximately 1.35m. Nets will be attached to the ring at the surface and will extend below the water towards the seabed. A weighted tube will

be installed at the base of the net to hold the net in position under tension. Annex 4 provides general assembly diagrams of typical pen designs measuring 120m in circumference.

### **7.3 Subsea Nets**

It is proposed that Environets, with a depth of 12m, will be utilised on site. Environets are designed for removal and inspection every 10 – 14 days. The pen netting used to contain the site fish will initially consist of 18mm mesh with a breaking strength of 118kg and move to 25mm with a breaking strength of 138kg when the fish are at approximately 500g. The frequent removal and cleaning of Environet specification means that there is no antifoulant incorporated into the material.

### **7.4 Moorings**

A typical layout of the proposed infrastructure is provided in Annex 4: Equipment Plans and Elevations. All the mooring and equipment specifications will be designed with engineered tolerances to stand up to a 1-in-50-year storm. Moorings are designed using wave-climate analysis and site-specific setups devised to ensure that they are the most suitable for each location.

The moorings comprise of a mixture of ground chain, rope and embedment anchors. The proposed moorings spread will occupy a maximum of 30.6ha. Moorings are designed in accordance with Section 5 of the Technical Standard for Scottish Finfish Aquaculture<sup>4</sup>.

An Equipment Attestation Letter is provided in Annex 5 which provides confirmation of the design parameters of the proposed infrastructure. The equipment supplier will provide third party validation to attest that equipment specifications will be designed with engineered tolerances to stand up to a minimum of a 1-in-50-year storm. To support infrastructure design and load calculations, Mowi has gathered about 90 days of current data using ADCP deployments at the development location to record real time measurements to inform the design of the equipment. As verified in the Equipment Attestation letter (Annex 5), equipment purchased for installation at the new site will meet the Technical Standard for Scottish Finfish Aquaculture.

### **7.5 Top Netting**

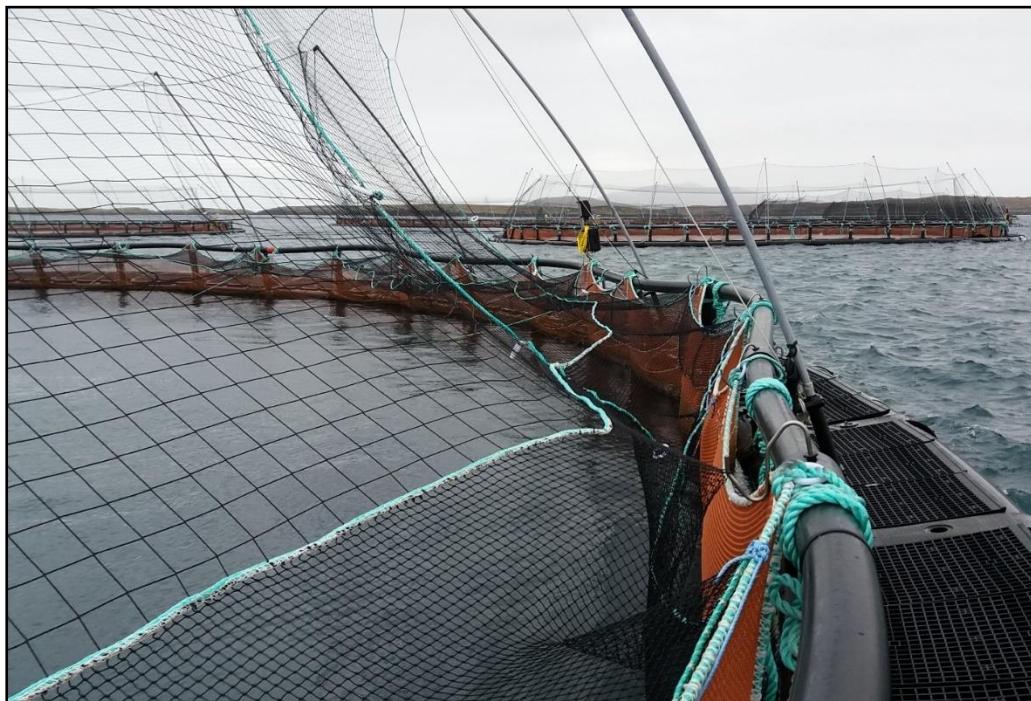
Netting will be installed over stocked pens to mitigate against predation by wild animals, primarily diving birds. Poles around the perimeter of the pen walkway that support and secure the top nets, which will be tensioned to prevent entanglement. This structure is at a height to ensure the nets are kept at a safe distance from the water and the feed rotor. A photograph of the top net configuration is provided in Figure 2. A general assembly diagram of the pen and net support structure is provided in Annex 4. Figure 3 illustrates a typical top net mesh; the mesh size will be 100mm. Nets will be dark grey to black in colour.

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<sup>4</sup> [A Technical Standard for Scottish Finfish Aquaculture, Marine Scotland, 2015](#)



*Figure 2: Typical pen design measuring 120m in circumference. This shows poles at the perimeter of the pen which support the top/bird netting and white pipes delivering the feed from the barge.*



*Figure 3: Image showing typical top-nets.*

## 7.6 Feed Barge

Feed for the proposed site will be delivered by boat to the feed barge for storage and distribution. Equipment installed at the barge blows the feed through plastic transport pipes to the pens. These pipes provide a permanent connection between the feed system and the pen, and each pen is fed in turn via a mechanical selector system. The feed is then

distributed at the pen via a rotor. The feed barge will have the capacity to store 400-600 tonnes of feed.



*Figure 4: An example of a feed barge at sea.*

## **7.7 Rafts**

No rafts are presently proposed for North Kilbrannan.

## **7.8 Lighting**

There are two different forms of lighting which are used at fish farms, underwater lighting and navigation.

### *7.8.1 Navigational Lighting*

Navigational lights are used for marking and safety purposes. Two lit pole markers will be installed at either side of the pen group (Figure 5). A dedicated navigation light will be installed on the feed barge, with a range of 2nmi and a defined flashing configuration. Final specifications will be defined by the Northern Lighthouse Board (NLB).

### *7.8.2 Underwater Lighting*

Removable underwater photoperiod lights (400-1000w) may be used in each pen during the first year that smolts are put to sea, to control maturation in the stock. Underwater lights are generally used between November and May, and being submerged, produce a localised glow at night (Figure 6). Each pen of 120m circumference typically requires 4 lights.



*Figure 5: Typical navigational markings including the buoy specification used to mark the corners of the pen matrix (left), and yellow pole markers for either side of the pen group (right)<sup>5</sup>.*



*Figure 6: Photo showing the use of underwater lighting at a fish farm pen.*

## 7.9 Navigational Markers

Navigational lighting and buoy configuration will be defined by the NLB.

## 8 Operational Characteristics

### 8.1 Operating Times

The site will be worked within the normal working hours of 0800 to 1700 over a seven-day working week. This is likely to be slightly longer in the summer and shorter in the winter. There may be some occasions when longer hours are required, but this is kept to a minimum as much as possible.

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<sup>5</sup> <http://hydrosphere.co.uk/datasheets/applications/hydrosphere aquaculture v 2 01 sep 14 web.pdf>

## 8.2 Stocking and Grading

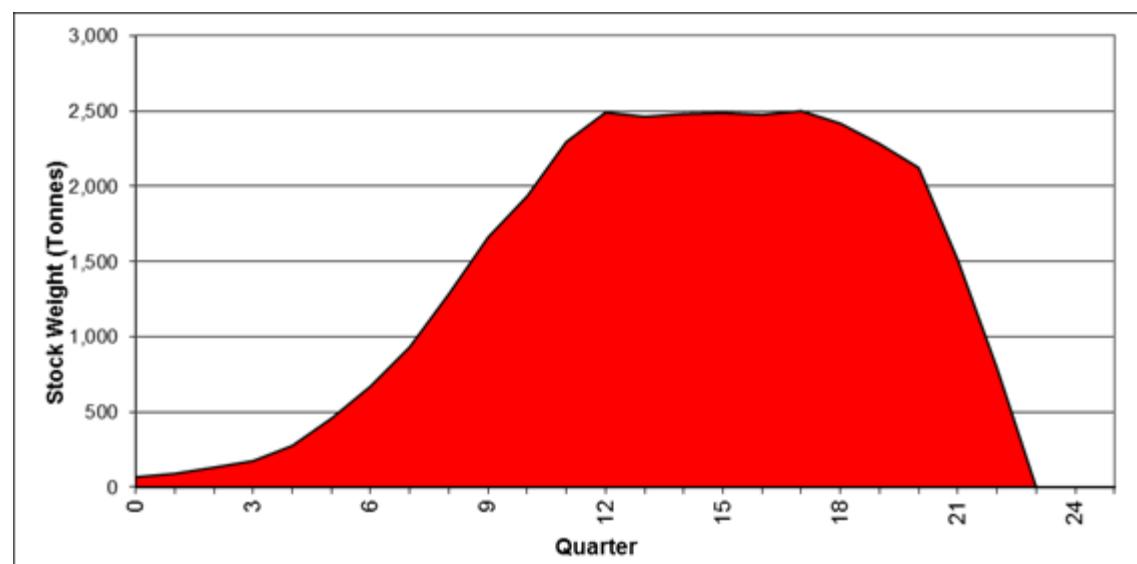
The company plans to stock North Kilbrannan in Q3 of 2021, to coordinate production with the neighbouring Carradale sites. Mowi operates a single year class stocking regime at all sites i.e. fish are transferred into the pens by boat at the start of the production cycle.

Smolts raised from Mowi freshwater farm sites or land-based recirculation units are transported via well-boat to the site. During the production cycle fish are graded. Grading is a standard husbandry procedure, involving sorting fish into different size classes to maintain a uniform size within each pen to reduce aggression, reduce feeding competition, allow for consistent removal of maturing fish and enable uniform uptake of feed within the pen. This process involves the use of a net panel facilitating selection of different fish size classes. Fish are usually only graded once throughout the seawater farming cycle.

Stocking density at the site is based on the maximum site biomass, pen area, and the working depth of the pens, and will comply within Royal Society for the Prevention of Cruelty to Animals (RSPCA) Freedom Foods<sup>6</sup> criteria. Densities are monitored on a weekly basis so that appropriate action can be taken to maintain specified densities and remain within the site's maximum standing biomass limit.

## 8.3 Production

A typical production plan based on the proposed biomass of 2,500T is provided in Figure 7. However due to the nature of farming there may be deviation from the typical growth profile. The annual production figure based on this production profile is 3,611tonnes and associated



Feed Conversion Ratio (FCR) is 1:07.

Figure 7: Typical production plan based on a maximum biomass of 2,500T.

## 8.4 Harvesting and Processing

Harvested salmon are pumped into compartments in a well-boat containing re-circulating water and transported to the harvest station in Mallaig for dispatch. The fish are then

<sup>6</sup> RSPCA. 2015 (updated 2017). RSPCA Welfare Standards for Atlantic Salmon <https://www.berspcaassured.org.uk/media/1251/rspca-welfare-standards-salmon-sept-2015-with-august-2017-updates.pdf>

transported by lorry to the processing facility in Fort William where they are gutted and prepared for market.

### **8.5 Feed Monitoring**

Feed will be delivered from the Mowi feed plant at Kyleakin directly to the feed storage system at the marine site by boat. All pens are monitored throughout the day via underwater cameras. This allows for staff to respond to changes in feeding behaviour by increasing or decreasing the amount of feed or timetable through a remote-control system. This practice can significantly reduce feed waste and improve the FCR at the site.

### **8.6 Stocking and Coordination**

Stocking and coordination will be undertaken in conjunction with the Carradale sites. A Farm Management Statement (Annex 6) provides details on how the proposed site configuration will be stocked and coordinated.

### **8.7 Removal of Fish Mortalities**

Mortalities will collect in a cone located at the bottom of each pen and will be retrieved using an integrated lift system. Site staff will aim to remove mortalities from the base of the pen daily. Stock mortalities removed from the pens will be stored in a sealed ensiler system located on the feed barge and will be transported by a licensed waste carrier for disposal at a licensed facility. Should a mass mortality event occur, internal protocol is as follows:

- Notifications to Marine Scotland, senior management, and the health veterinarian at Mowi;
- Staff should ensure all nets are above the water-line to contain moribund fish;
- Diver inspection of nets for damage or displacement; and
- Samples will be taken of any moribund or very fresh dead fish to identify the cause.

The method to extract and dispose of the fish will depend on the cause of the event and will be decided by senior management. The use of trawlers to pump the fish from the pens for further ensiling or incineration has been adopted in the past. In the event of a significant disease causing a mass mortality event, Mowi would agree the final location for disposal in conjunction with Marine Scotland.

### **8.8 Certifications**

As a member of The Scottish Salmon Producers' Organisation (SSPO), the trade association for the salmon farming industry, Mowi is committed to following the CoGP<sup>7</sup>. The CoGP sets out the standards that farmers must demonstrate compliance with when independently audited by United Kingdom Accreditation Service (UKAS) approved inspection services. It covers more than 300 main specific compliance points covering all aspects of finfish good practice including: Fish Health, Protecting the environment, Welfare and husbandry, and annexes giving further technical guidance on good practice, including the National Sea Lice Treatment Strategy, Integrated Sea Lice Management, Containment, and a Veterinary Health Plan.

### **8.9 Site Servicing**

The North Kilbrannan fish farm will be serviced from the existing shore base at Carradale Harbour. This is a shore base that Mowi inherited from a previous operator and there are constraints associated with this location, primarily space, however we have been working to improve management procedures and the working environment directly within our own

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<sup>7</sup> Scottish Salmon Producers Organisation. 2015. Scottish Salmon Farming; Code of Good Practice <http://thecodeofgoodpractice.co.uk/chapters/>

operational area and with other local users concerning the wider harbour environment. To accommodate the increased operational needs short term improvements to the present shorebase building are proposed (not in this planning application) in line with the development timelines for the North Kilbrannan fish farm and the plans are presented in Figure 8. We are also engaged with stakeholders regarding more significant improvements to the shore base in conjunction with local development plans for the harbour area. In the longer term the preferred option is that the site will be serviced via a significantly redeveloped shore base located within Carradale harbour aligned with the aspirations for the harbour that are outlined in the the East Kintyre Local Development Plan, produced by The Carradale Community Trust and East Kintyre Community Council.

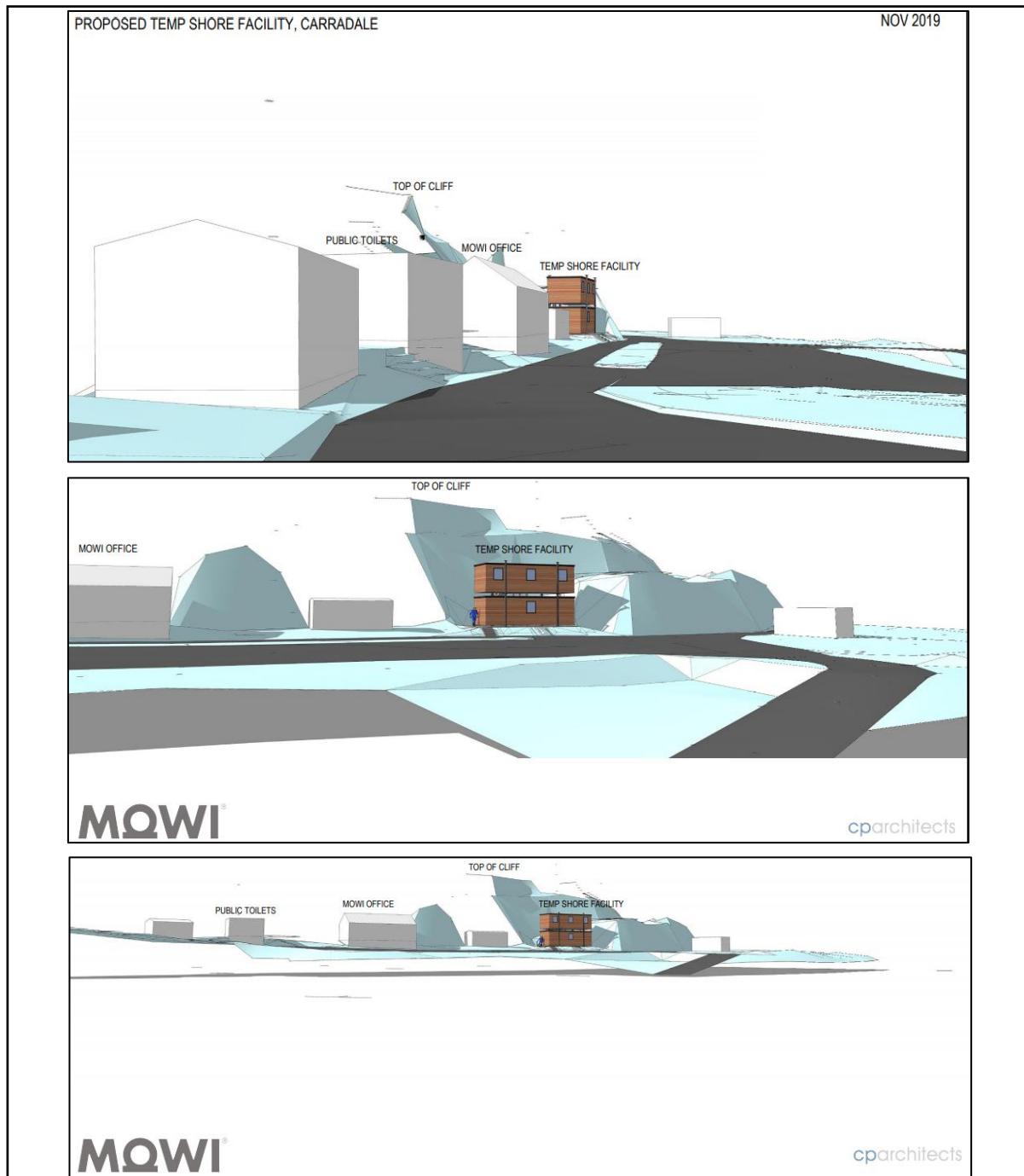


Figure 8: Architect drawings of potential shore base facility at Carradale Harbour.

## **8.10 Veterinary Treatments and Disease Prevention**

### **8.10.1 Medicinal Treatments**

Operational requirements include a range of activities associated with veterinary treatments and disease prevention. North Kilbrannan currently holds a CAR licence (CAR-L-1168182) for the following medicinal treatments described in Table 5. Medicinal treatments will be administered both as an in-feed and as bath treatments.

*Table 5: Treatments authorised by the current CAR licence.*

Treatment	Administration	Current Discharge Limit
Azamethiphos	Total quantity discharged in a 24 hour period (g)	343.8g
Cypermethrin	Total quantity discharged in a 3 hour period (g)	0.328g
Deltamethrin	Total quantity discharged in a 3 hour period (g)	32.9g

### **8.10.2 Non-Medicinal Treatments**

A range of non-medicinal treatments are available as part of a veterinary treatment plan, primarily to control sea lice. These include the use of cleaner fish (wrasse and/or lump suckers), which will be stocked at North Kilbrannan as an ongoing measure to control sea lice within pens. Several water-based treatments, based on changes of temperature and pressure are also available to be administered to treat sea lice as part of a treatment programme at North Kilbrannan. Freshwater treatments are administered by specialised well boats using locally sourced licensed freshwater abstraction points. Further details on these treatments are provided in Section 13.

## **8.11 Operation and Maintenance**

Scheduled operation and maintenance activities are defined by the nature of the infrastructure and pen specification. The principal maintenance activity is mechanised net cleaning in an approximate 10 to 14-day rotation, including camera inspections. Annual inspections of the moorings are also undertaken by divers.

## **8.12 Personnel**

The site will likely require seven to ten permanently employed members of staff (or equivalent) and potentially additional seasonal workers in the busier summer periods in the second year of the production cycle

## **8.13 Construction and Decommissioning**

Construction at the site would take up to 30 working days. This work would involve the standard site vessel/ workboat. Vessels would return to the site shortly after to inspect infrastructure and undertake net tensioning and repositioning if necessary. Decommissioning would follow a similar process.

# **9 Policy Framework**

This section provides an overview of the key national, regional and local planning policies directly relevant to the project and assessment of potential environmental impacts.

## **9.1 The Need for Fin Fish Farming**

Fin fish farming dominates the aquaculture sector in Scotland and is an increasingly important industry, sustaining economic growth in the rural and coastal communities of the north and west and generating Scotland's most valuable food export. The impact of the sector extends through the supply chain providing demand for feed, research, engineering,

and downstream logistics and processing opportunities, providing a range of employment and revenue streams for a diverse range of sectors throughout Scotland. Due to the economic benefits generated by the sector, The Scottish Government has set specific targets to support the sustainable growth of the industry, including a target to grow marine finfish sustainably to 210,000 tonnes (whole, wet fish) by 2020<sup>8</sup>.

## 9.2 Marine Planning

The current approach to marine planning is established via three levels:

1. The Marine Policy Statement is a general vision at UK level to establish clean, healthy productive and biologically diverse seas, and articulates a series of high level principles for marine planning.
2. Secondly, the National Marine Plan (NMP) was published in 2015 by the Scottish Government for the purposes of providing overarching policies to guide the management of Scottish seas at a national level. Policy objectives contained within the NMP need to be incorporated into the decision-making framework of relevant authorities. In addition, public authorities must take authorisation or enforcement decisions in accordance with the NMP unless relevant considerations indicate otherwise. The NMP contains a chapter dedicated to the aquaculture sector (Chapter 7)<sup>9</sup> which is generally supportive and the proposed objectives are summarised below:
  - Ensure an appropriate and proportionate regulatory framework within which the industry can achieve sustainable growth targets;
  - Support the industry and other stakeholders to increase sustainable production by 2020 (from a 2011/ 2012 baseline) of
    - marine finfish to 210,000T (159,269T in 2011);
    - domestic juvenile salmon production to satisfy the salmon sector growth aspirations;
  - Secure quality employment and sustainable economic activity in remote and rural communities;
  - Improve business confidence and industry investment by identifying areas where sustainable aquaculture growth is optimal;
  - Maximise benefits to Scotland from the Scottish aquaculture value chain.
3. Finally, under UK and Scottish legislation, there is an option to prepare Regional Marine Plans. To date a Regional Marine Plan for the Argyll and Bute Council area has not been prepared.

## 9.3 Argyll and Bute Local Development Plan<sup>10</sup>

No dedicated Regional Marine Plan has been published by the Argyll and Bute Council, however provisions for guiding aquaculture developments have been published in the Argyll and Bute Local Development Plan (ABLDP) published in 2015 which sets out a settlement strategy and spatial framework for how the council wants to see Argyll and Bute (excluding Loch Lomond and Trossachs National Park) develop to 2024 and beyond.

In response to one of the key challenges for the region, Key objective D in the ABLDP is to support the continued diversification and sustainable growth of Argyll and Bute's economy with a particular focus on sustainable assets including aquaculture.

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<sup>8</sup> <http://www.gov.scot/Publications/2015/03/6517>

<sup>9</sup> <http://www.gov.scot/Publications/2015/03/6517/8>

<sup>10</sup> <https://www.argyll-bute.gov.uk/lbp>

Policy LDP DM1 in the ABLDP sets out the approach to development within the Development Management Zones:

*“Encouragement shall be given to sustainable forms of development as follows:-*

*.....(F) Within Very Sensitive Countryside encouragement will only be given to specific categories of development on appropriate sites. These comprise:*

*(iii) Development directly supporting agricultural, aquaculture, nature conservation or other established activity.”*

Section 4.3 of the ABLDP goes on to state that delivery of the sustainable growth of the economy “will be achieved by a greater focus on our potential main growth sectors i.e. Renewables, Forestry, Food and Drink (including Agriculture, Fishing, Aquaculture and Whisky) and Tourism, which are areas of comparative advantage for Argyll and Bute;”.

A second Local Development Plan is being prepared which will set out planning and development proposals for the period from 2020 to 2030. The first stage of producing the report was the Main Issues Report<sup>11</sup> which highlighted the preferred vision for the Argyll and Bute area to be as follows:

“.....one of an economically successful, outward looking and highly adaptable area, which enjoys an outstanding natural and historic environment. This will be achieved through a simple, flexible, deliverable spatial strategy which continues to grow the population of Argyll and Bute through sustainable economic development.”

The Argyll and Bute Outcome Improvement Plan (ABOIP) is used as guidance for the production of other local development plans. The overall objective of the ABOIP for the 10 years to 2023 is that “Argyll and Bute’s economic success is built on a growing population.”

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<sup>11</sup>[Argyll and Bute Council LDP2 Main Issues Report 2017.pdf](#)

# Environmental Impact Assessment

## 10 Benthic Environment

### 10.1 Introduction

Uneaten food and faeces are the main components of particulate waste generated at a fish farm, which may impact the benthic environment. Similarly, some medicinal treatments to manage fish health and sea lice infestation have the potential to bind to sediments. This assessment considers the impacts of the proposed North Kilbrannan farm, arising from organic (carbon) deposition and in-feed treatment residues. Impacts from bath or topical treatments are considered in Section 11.

### 10.2 Consultation

A Screening and Scoping Opinion was issued by Argyll and Bute Council on 31 January 2020.

Table 6 below outlines the responses received and how they have been addressed throughout the EIA for this topic.

Table 6: Consultation Responses - Benthic Environment

Consultee	Date	Comment	Response
MSS	Scoping	<p>As a new site, benthic impacts should be assessed. We would request that suitable modelling be submitted with any future planning application / Environmental Report, demonstrating the acceptability of the proposed cage arrangement and biomass.</p>	NewDepomod results discussed in Section 10.6 of the EIA. Modelling Report in Annex 7.
SEPA	Scoping	<p>Two baseline seabed surveys (one visual and one benthic) were carried out at this fish farm in 2017. SEPA has received the visual survey, which indicated a seabed consisting of sandy mud and slightly gravelly sandy mud. There were no PMF species or habitats identified in the video, however there were several sightings of the green spoon worm (<i>Boniella viridis</i>) which is rarely found in Scottish waters. The benthic survey received indicated a seabed mainly of mixed well-oxygenated sediments with diverse faunal community.</p> <p>Modelling of the proposed location and cage configuration predicts a benthic footprint area of 12,228m<sup>2</sup> around the cage group (~7% of the allowable 100m mixing zone area under CAR).</p>	North Kilbrannan currently holds a CAR licence (CAR-L-1168182)
CFA	Scoping	<p>Chemical Pollution and Sewage</p> <p>Our members have gotten in touch to express that they have concerns over the current fish farms in the area, in respect to what they consider significant effect on fishing due to sewage and chemical pollution. Therefore, any new site would be unacceptable to our fishing members. The recent findings of a study carried out in Shetland by SEPA, in respect to the impact of fish farming on the surrounding eco-system, is of concern to us as considering similar testing has not been conducted in our areas, where the concentration of fish farm sites is much greater. We would seek to see a halt to future developments of new fish farms and to extensions of existing farms, until similar testing and sediment testing is carried out in the Clyde by SEPA and its findings are fully considered.</p> <p>We note that in recent weeks fish farm applications in Orkney have not been granted for similar reasons to those which we have outlined, this gives us unexpected</p>	North Kilbrannan currently holds a CAR licence (CAR-L-1168182). NewDepomod results discussed in Section 10.6 of the EIA. Impacts from bath or topical treatments are considered in Section 11.

		hope that finally our long held concerns may now be taken somewhat seriously. On the West Coast of Scotland it has been very rare that other marine users interests, such as fishermen, have been considered fully or equally.	
SNH	Scoping	<p>This screening / scoping application relates to a proposal to install a marine cage fish farm consisting of 12 x 120 m circumference cages and a feed barge with a maximum standing biomass of 2475.54 tons.</p> <p>A new baseline visual survey has already been carried out for this proposal. We have not yet assessed the footage but the benthic survey report provided with the application indicates that no PMF habitats or species are present or likely to be impacted by this proposal. If this is correct then none of the sensitive receptors identified within section 4.3 of the template are likely to be impacted. On this basis it would be our opinion that, based on the information provided by the applicant, the benthic impacts as a result of this proposal are unlikely to result in any significant effects on any of the sensitive receptors identified within section 4.3 of the template.</p> <p>However, we would caveat the above advice by restating that we have not been provided with the visual survey footage. Until we have assessed the footage ourselves we cannot provide definitive advice on the presence of PMF habitats or species in the vicinity of the proposal. As such we would recommend that the applicant provides us with a copy of the survey footage and includes an assessment of the significance of impacts on the benthic habitats and species that are present. In addition, the applicant should submit modelling reports to identify the depositional footprint of waste and chemical chemotherapeutics for the proposed site</p>	Baseline video survey footage has been shared with SNH.

## 10.3 Methodology and Information Sources

### 10.3.1 Information Sources

The following information sources were used to assess the impact on the benthic environment:

- 2018 North Kilbrannan Video Survey Report (Annex 3)
- Annex H, Fish Farm Manual, SEPA  
<https://www.sepa.org.uk/regulations/water/aquaculture/fish-farm-manual/>;
- SNH, 2016. SNH Commissioned Report 406; Descriptions of Scottish Priority Marine Features [SNH Commissioned Report No. 406](#);
- Marine Scotland Feature Activity Sensitivity Tool (FEAST)  
<http://www.marine.scotland.gov.uk/FEAST/Index.aspx>;
- Mowi Scotland Ltd. North Kilbrannan Hydrographic Report, 2017(Annex 2);
- Mowi Scotland Ltd. North Kilbrannan Modelling Report, 2018 (Annex 7);
- SEPA. Interim Compliance Assessment Report. 10 August 2017;
- SEPA. Fish Farm Monitoring Report: 4 July 2016;
- SEPA, 2018. Regulatory modelling guidance for the aquaculture sector. Scottish Environment Protection Agency, Air & Marine Modelling Unit, SEPA, February 2018, 75pp.
- [SEPA Regulatory Modelling Guidance for the Aquaculture Sector Version 1.1, July 2019](#);
- [SEPA Regulatory Modelling Process and Reporting Guidance for the Aquaculture Sector Version 1.1, July 2019](#); and

- <https://www.sepa.org.uk/regulations/water/aquaculture/regulatory-framework/2019>  
SEPA Regulatory Framework for finfish aquaculture

### 10.3.2 Modelling methodology

The modelling methods used follow the SEPA guidelines set out in February 2018. The modelling report (Annex 7) includes further details.

### 10.3.3 EIA Assessment

The degree of deposition of both carbon and in-feed residues is predicted based on modelled outputs. The level of significance of the impact is determined by the extent and carbon load of the depositional footprint on the benthic environment. The criteria for evaluating the impacts on the benthic environment are provided in Section 4.

## 10.4 Baseline Environment

### 10.4.1 Priority Marine Features

The video survey covered predicted impacted areas (Annex 3 and 7) for North Kilbrannan.



Figure 9: North Kilbrannan video survey; footage locations

The 2018 baseline video survey comprised 3 video survey transects, the footage of which has been viewed to identify occurring species, habitat types and zonation using the Marine Habitat Classification Hierarchy and SACFOR abundance scale from the JNCC website (2017). The full video survey report can be found in Annex 3.

### Transect 1

The biotope identifiable within the footage mainly consists of circalittoral mixed sediment where the seabed consists of a shell, cobble and pebble mix embedded in sandy mud SS.SMx.CMx. This biotope was assessed as the likely classification based largely upon the occurrence of characterising species *Cerianthus lloydii*, *Pomatoceros triqueter*, *Pagurus bernhardus*, *Liocarcinus depurator*, *Buccinum undatum*, *Asterias rubens*, *Pecten maximus* and *Echinus esculentus* and the visual assessment of substrate type.

Within this biotope are compact areas which consist of larger areas of exposed rock, however there is no unique bio-encrusting epifauna that varies over the course of the transect. The species identified show reasonable even distribution over the course of the transect with a slight move towards higher percentage of exposed sandy mud towards the end.

### Transect 2

The biotope in transect 2 matches the main transect; circalittoral mixed sediment where the seabed consists of a shell, cobble and pebble mix embedded in sandy mud SS.SMx.CMx. This biotope was assessed as the likely classification based largely upon the occurrence of characterising species *Pomatoceros triqueter*, *Pagurus bernhardus*, *Liocarcinus depurator*, *Asterias rubens*, *Pecten maximus*, *Crossaster papposus* and *Echinus esculentus* and the visual assessment of substrate type. There appears to be a higher portion of fine sediment at the start of the transect in the deeper water as would be expected.

### Transect 3

The biotope in transect 3 matches the previous transects; circalittoral mixed sediment where the seabed consists of a shell, cobble and pebble mix embedded in sandy mud SS.SMx.CMx. This biotope was assessed as the likely classification based upon the characterising species *Pomatoceros triqueter*, *Pagurus bernhardus*, *Buccinum undatum*, *Asterias rubens*, *Pecten maximus* and *Echinus esculentus* and the visual assessment of substrate type. There appears to be a higher portion of fine sediment at the start of the transect in the deeper water as would be expected and as was also showing in transect 2.

The video analysis did not identify any priority marine feature species or habitats and no designations within the area of the site have been identified relevant to this benthic video survey.

It is noted that Sea Trout and Atlantic Salmon are PMFs and these are discussed in Section 13.

#### 10.4.2 Protected Sites

Impacts on protected species and habitats are covered in Section 14. North Kilbrannan is not located within or near any designated areas of habitat or species conservation. The closest designation to the area of the site with features relevant to the benthic biotope assessment, at 20 km away, is:

- **South Arran MPA**

Designated for: Burrowed mud

Maerl beds

Kelp and seaweed communities on sublittoral sediment

Maerl or coarse shell gravel with burrowing sea cucumbers

Of these, all are considered relevant to this benthic video survey and footage has been assessed for occurrences.

The video analysis did not identify any priority marine features; this combined with the large distance of about 20 km between the proposal and the MPA leads to the conclusion that there is no risk to the South Arran MPA as a result of this proposal.

## **10.5 Mitigation**

Reducing organic load to the benthic environment is achieved by primarily operational measures:

- Control of food and faecal waste;
- Fallowing;
- Mechanical and Freshwater Treatments;
- Treatment Management; and
- Enforcement.

### *10.5.1 Control of Food and Faecal Waste*

Accurate feed management is the main control over the amount of food waste that reaches the seabed. Feeding is controlled by automated monitoring equipment and the waste generated is consequently relatively low at 3%. The controls over feed include:

- *Feed composition*: the amount of particulate deposition as a result of faecal waste is determined by the digestibility of the feed. Modern feeds are easily assimilated and provide good FCRs. The lowering of FCRs has led to reduced waste inputs to the environment per unit production. The FCR for the modified farm will be budgeted at 1.07:1, where 1.07 kg of feed is required to produce 1 kg of harvested fish;
- *Management*: feed is ordered by support staff based on forecasts which are predicted using bespoke software packages (AquaFarmer and AquaFuture). These systems use parameters including the number of fish stocked at a site and the size of the fish to determine the appropriate feed rate for any given time of year and the production cycle;
- *Surveillance*: feed to each pen at the farm is delivered from the feed barge via pipes. Cameras installed within the pens allow employees to monitor and respond to the appetite of the fish; and
- *Training*: the company ensures that all farm staff undertake a high standard of training to reduce feed waste. Efficient use is a performance indicator incorporated within individual appraisal targets.

### *10.5.2 Fallowing*

Fallowing is standard practice following a production cycle to provide an opportunity for the decomposition of organic matter and to allow seabed recovery. Faunal community alterations arising from accumulation of benthic carbon during the growing cycle are expected to be temporary and reversible. Similarly, residues from in-feed treatments have further opportunity to degrade. The pens will be left fallow for a period of at least 6 weeks at the end of each production cycle to assist seabed recovery.

### *10.5.3 Chemotherapeutics*

Medicinal treatments are applied either as bath treatment, or integrated within the feed:

- *Topical Treatments*: administration using a “bath treatment” method which involves the use of a well boat or deployment of a tarpaulin that fully encloses the

pen forming a shallow pool. The fish to be treated are exposed to the medicine for a short period (30 – 60 minutes) before the tarpaulin is released and the nets dropped back to their full depth. This enclosed technique reduces the required volume of medicine and limits release of treatments to the environment;

- *Infeed Treatments*: the in-feed medicine emamectin benzoate, administered within the trade product Slice®, is currently subject to an EQS review by SEPA. Currently the regulator has set significantly stricter draft interim environmental limits subject to a full set of ecotoxicology studies being completed.

#### 10.5.4 Regulation and Enforcement

Existing regulation provides an effective means of controlling the use of lice medicines and promoting alternative non-medicinal treatments, for example expected changes to the regulation around Slice® treatments are likely to generate significantly lower thresholds for Slice® use, requiring a review of this particular treatment in the future.

Similarly, whilst a worst-case scenario, SEPA has extensive enforcement powers to decrease site biomass if the site is deemed not to comply with EQS. Enforcement is a final, but an available option should sites not meet required criteria.

### 10.6 Impact Assessment

#### 10.6.1 Carbon Deposition

The principle source of organic material from the farm comes from the release of uneaten feed and faecal matter. Most of this material will sink to the seabed while other parts will be suspended or dissolved and then transported within the water column. Carbon, nitrogen and phosphorus are the main nutrient components of this discharged material. Phosphorus is discharged in comparatively low amounts and is considered to be insignificant. Nitrogen is discharged within ammonium which is generally dissolved within the water column. Carbon is generally considered to be the most significant nutrient which is discharged as part of marine fish farming and therefore organic material deposition from farms is often simply referred to as ‘carbon’.

Whilst the deposition of organic material can initially represent an increased food supply for fauna living on, and within, sediments, more intense deposition and the effect of smothering in low energy locations can lead to habitat alteration. Larger, longer living macrofauna can be excluded and a reduction in the diversity of the infauna can occur, creating communities dominated by a low number of specialised, ‘opportunist’ species such as *Capitella capitata* and *Malacoboceros fuliginosus*. In such circumstances the abundance of these species can be high. The extent of this impact depends on a number of variables, including: level of waste input; the rate at which this material can be dispersed; and the amount of material assimilated to the sediment.

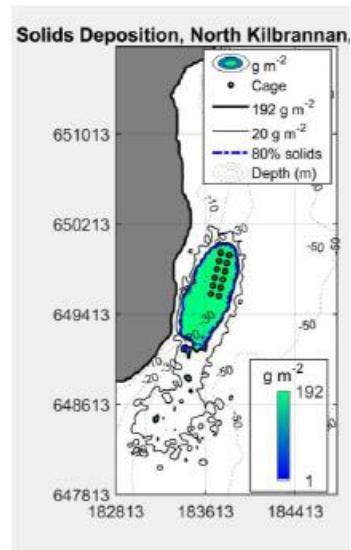
#### Compliance with Regulatory Requirements

Impacted sediments are now quantitatively defined in terms of the total area ( $m^2$ ) with a mean deposited mass in excess of  $250 \text{ g m}^{-2}$ . IQI is an index combining species richness, a measure of overall pollution sensitivity of a benthic assemblage and the evenness of abundance of different taxa. IQI values close to one indicate benthic invertebrate communities are close to their natural state; those near zero indicate a high level of pollution or disturbance. SEPA guidance specifies that IQI values of greater than 0.64 indicate an approximately non-impacted seabed community, whereas values below this represent impacted sediments. The recently updated requirements for seabed impacts for aquaculture state that the mean deposited mass within the  $250\text{g/m}^2$  impact area (equivalent to IQI 0.64)

should not exceed a certain limit that depends on the wave exposure of the location and that the total area ( $m^2$ ) with a mean deposited mass more than  $250g/m^2$  should not exceed the 100m composite mixing zone area ( $m^2$ ). Both environmental quality criteria are judged using the average seabed impact calculated over the final 90-day model period.

The previous licensing system used a different standard for assessing the impact of the farm and defining the spatial extent of the impact zone, based upon 30 ITI which corresponded to an Allowable Zone of Effect ( $192g\ cm^2/yr$ ). This value was another metric defining the intensity of benthic impacts. North Kilbrannan was modelled and was granted a CAR licence based on this standard.

The output of NewDepomod modelling for North Kilbrannan are provided in Figure 10; with further detail in the modelling report (Annex 7). Under full flow conditions, particulate waste was dispersed widely, with about 23% of the released solids predicted to be exported from the farm area. Current data recorded at the site results in a moderate vector average residual of  $0.07\ m/s$  to the south-southwest ( $205^\circ N$ ), with the tidal ellipse orientated between south-west and northeast. The predicted deposition footprints indicate dispersal of waste material predominantly to the southwest with relatively little residual transport of waste to the north. This pattern of deposition predominantly to the north is consistent with the known southward transport of water through the Kilbrannan Sound.



*Figure 10: Predicted mean benthic impact for days 250-365 of a year-long simulation as maximum biomass for 2475 tonnes with full flow.*

Using full modelled flow, with a maximum biomass of 2475 tonnes, the model predicts the impacted area to be  $846,250\ m^2$ . The predicted mean 80% solids area is  $279,375\ m^2$  while the 80% solids flux is expected to be  $290.7\ g/m^2$  (Table 7), with a corresponding ITI value of 26.3. This is well below the required flux of  $1553\ g/m^2$  (ITI = 10). The mean flux in the benthic cage group area was not predicted to exceed the trigger value of  $10,000\ g/m^2/year$ , with a mean deposition rate under the cages of  $8,7711\ g/m^2$ . The benthic sampling area (defined by the ITI = 30, or flux =  $192\ g/m^2$ , contour) was expected to be  $319,375\ m^2$ .

*Table 7: NewDepomod simulation results for full flow after 365 days maximum biomass*

	Mean	Maximum
Mass of solids released (kg)	1,012,903	1,012,903
Total mass of solids present (kg)	778,625	800,577

Area > 192 g/m <sup>2</sup> (m <sup>2</sup> )	319,375	319,375
Mean 80% solids area (m <sup>2</sup> )	279,375	278,750
80% solids flux (g/m <sup>2</sup> )	290.7	298.5
80% solids ITI	26.3	26.0
Benthic sampling area (ITI = 30, m <sup>2</sup> )	319,375	319,375

The results of the modelling indicate that the proposed development is sustainable and within the requirements set by SEPA. This was confirmed by SEPA by granting a CAR licence for the modelled maximum biomass.

#### *Impacts on Benthos*

The 2018 baseline survey identified no priority marine feature species or habitats and no designations within the predicted impacted area.

#### *10.6.2 In-feed Residues*

No in-feed treatments are consented for North Kilbrannan, therefore impact assessment of their impact on the benthos is irrelevant in this case.

### **10.7 Monitoring and compliance**

Benthic monitoring and compliance will follow SEPA's current regulatory regime. The recommended approach is to calculate an allowable impact zone as an ellipse that spans the site. The ellipse is calculated from the 0.64 IQI boundary, determined from samples along four approximately-orthogonal transects. For the site to comply with regulatory requirements, the area of the ellipse must be less than the 100m mixing zone area, which is defined as the combined area 100m from all pen edges.

### **10.8 Summary**

Efficient operational practices keep the organic load to the benthic environment at a minimum. The video analysis did not identify any priority marine feature species or habitats and no designations within the predicted area of benthic impact by the proposed site. The results of the modelling indicate that the proposed development is sustainable and within the requirements set by SEPA. This was confirmed by SEPA by granting a CAR licence for the modelled maximum biomass. Benthic monitoring and compliance will follow SEPA's current regulatory regime

## **11 Water Column**

### **11.1 Introduction**

Whilst most uneaten food and faeces sink to the seabed, a small component will be suspended or dissolved and then transported within the water column. Carbon, nitrogen and phosphorus are the main nutrient components of discharged material, with nitrogen considered to be a limiting nutrient for phytoplankton growth in the temperate north Atlantic. In addition to dissolved nutrients, some medicines are administered topically using bath treatments. On completion of the treatments, medicines are released into the water as a dissolved plume. This assessment considers the potential impacts on the water column arising from both nutrient enrichment and bath treatments from the proposed North Kilbrannan farm.

### **11.2 Consultation**

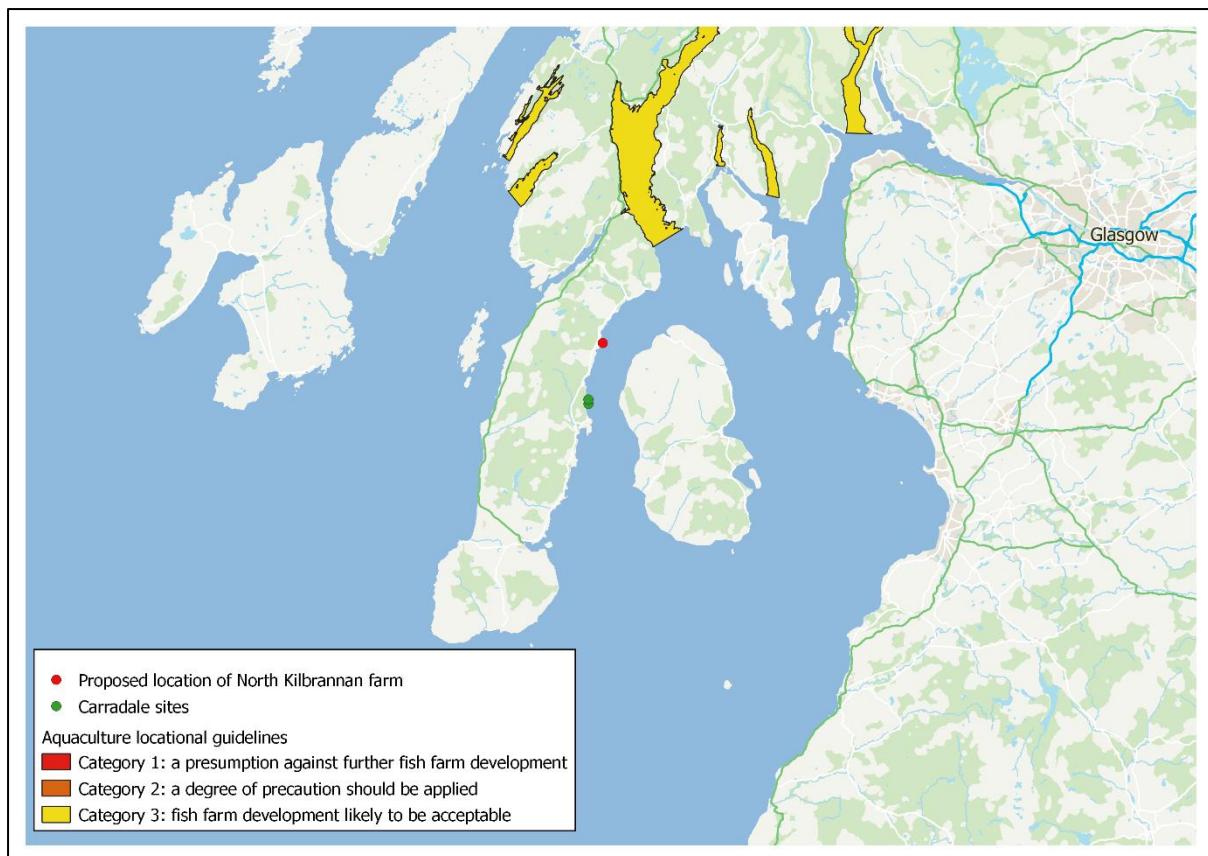
Responses received during the Scoping process, relevant to the assessment on Water Column are summarised in Table 8.

*Table 8: Consultation responses relating to impacts on the water column.*

<b>Consultee</b>	<b>Date</b>	<b>Advice / Information</b>	<b>Response</b>
MSS	Scoping	The proposed site does not sit within a Locational Guidelines categorised water body. The nutrient assessment submitted indicates that the proposed biomass should not result in unacceptable impacts to the water column at the site. The applicant has concluded that a cumulative assessment, which includes the proposed and existing site at Eilean Gianain, should not result in unacceptable impacts within the wider area. We would request that full details of this assessment, including full details of the cumulative calculation, should be included with any future planning application / Environmental Report.	Site specific and cumulative ECE modelling results discussed in Section 11.
SEPA	Scoping	The fish farm is situated in the receiving waters of Kilbrannan Sound, which is uncategorised according to Marine Scotland (Science) locational guidelines.  The applicant is required to submit an Equilibrium Concentration Enhancement estimate of nutrient loading to the water body due to the increase in biomass. Nutrient enhancement models are described in the Marine Science Scotland website linked below. Marine Science Scotland mathematical models	Site specific and cumulative ECE modelling results discussed in Section 11.

#### *11.2.1 Baseline Environment*

Locational Guidelines published by Marine Scotland Science (MSS) designate delineated waterbodies such as lochs and voes based on calculated indices to estimate nutrient enhancement and benthic impacts. North Kilbrannan is not within a Locational Guidelines categorised water body (Figure 11). However, appropriate Equilibrium Concentration Enhancement (ECE) modelling has been undertaken to show the degree of nutrient enhancement likely to result from the proposed North Kilbrannan site and that of the neighbouring Carradale North and Carradale South farms, the only other operational sites in the vicinity (Tables 11, 12).



*Figure 11: Water bodies categorised by Aquaculture Locational Guidelines near the proposed North Kilbrannan farm. The proposed site is not within a categorised water body.*

*Table 9: Active sites within waterbody selected for cumulative ECE modelling.*

Site Name	Owner/Operator	Current consented MSB (tonnes)	Proposed MSB (tonnes)	Active (Y/N)	Locational Guidance Water Body
Carradale North	Mowi	2500	-	Y	Not applicable
Carradale South	Mowi	2500	-	Y	Not applicable
<b>Total</b>		5000	-		

The receptor, for the purposes of the assessment, is the water column and associated chemical characteristics. In line with the criteria specified in Table , the sensitivity is classified as low, primarily based on its status as an open water location.

### 11.3 Methodology and Information Sources

The methodology to characterise the nutrient contribution from North Kilbrannan, is structured into the following sections:

- Nutrient Budget: calculation of the nutrient budget provides a relative representation of the quantity of nutrients released from the site based on the consented maximum biomass of 2475.54 tonnes;
- ECE Calculation: an ‘open water’ box model uses basic hydrodynamic characteristics of the site and development characteristics to derive an indicative level of enhancement; and
- Cumulative ECE Assessment: calculation by addition of each ECE calculation described above for open water sites in Kilbrannan Sound;

- Bath Treatment: a separate model is used to assess the discharge of spent bath treatments in the water column. Assessment is based on guidance derived from Annex H of SEPA's Fish Farm Manual<sup>12</sup>. The maximum quantity of chemical allowable in a single growth cycle is determined by the maximum quantity of chemical applied in a single dose that does not exceed SEPA's standards (EQS values) within particular areas of the seabed. This approach represents a worst-case scenario of the maximum amount of chemical being applied in one single treatment.

#### 11.3.1 Information Sources

In addition to consultation responses received in the Scoping Opinion, the following information sources were referenced to undertake the assessment:

- UK Technical Advisory Group. 2007. Environmental Standards and Conditions (Phase 2) Final. WRF UK TAG;
- Scottish Government. 2017. Locational Guidelines for Marine Fish Farms in Scottish Waters. December 2017;
- Gillibrand, PA, Gubbins MJ, Greathead, C and Davies IM. 2002. Scottish Executive Locational Guidelines for Fish Farming: Predicted Levels of Nutrient Enhancement and Benthic Impact. Scottish Fisheries Research Report Number 63/ 2002. Fisheries Research Services;
- Edwards, A. and Sharples, F. 1986. Scottish Sea Lochs - a Catalogue. Scottish Marine Biological Association/Nature Conservancy Council; and
- Scotland's Aquaculture Website <http://aquaculture.scotland.gov.uk/>

#### 11.3.2 Nutrient Enhancement Budget

Nutrient enhancement budgets are calculated to provide a relative representation of the volume of dissolved nutrients released from salmon fish farming. The volume of particulate and soluble nutrients can be determined based on a calculation of feed manufacturer's value for nutrient content and the relative nutrient content in fish. A summary of the nutrient enhancement budget summary is provided in Table.

*Table 10: Nutrient enhancement budget summary.*

Parameter	Definition / Source	Value
Maximum Standing Biomass (T)	Proposed project biomass	2475.54
Stocking Density	Proposed project stocking density	15
Annual Production (T/yr)	Production calculation based on in house modelling	3611
Feed Conversion Ratio (FCR)	Current figures relating to feed efficiency	1.07
Total feed input (T/yr)	Calculated based on proposed biomass and FCR	3864
Total N Input (T/Yr)	Calculated at 6.4% based on food manufacturer, Skretting.	274
Total N in Fish (T)	Calculated at 3.4% of fish mass	131
N Lost to the Environment (T/Yr)	Calculated as Total N Input minus Total N in Fish	143

#### 11.3.3 Equilibrium Enhancement Calculations (ECE)

The standard ECE Model is a simple box model which estimates the level of enhancement of dissolved nitrogen above background levels. The standard model is used mainly to rank sea lochs and other semi enclosed bodies of water by their nutrient load. North Kilbrannan is not located in a locational guideline water body, subsequently an alternative 'open water' model for ECE was adopted. The model uses current data from hydrographic surveys to calculate the rate of water exchange (Q). Using a source rate of nitrogen per tonne of farmed fish, the simple calculation estimates the enhancement of dissolved nitrogen above

<sup>12</sup> [https://www.sepa.org.uk/media/114787/ffm\\_anx\\_h.pdf](https://www.sepa.org.uk/media/114787/ffm_anx_h.pdf).

background levels due to farming activity. Data inputs to the open water ECE model are provided in Table 11 and Table 12.

*Table 11: Data inputs to the Open Water ECE model for the proposed biomass at North Kilbrannan.*

Parameter	Value
Depth of water at the site (m)	35
Diffusion Coefficient ( $\text{m}^2 \text{s}^{-1}$ )	0.1
Along shore residual velocity ( $\text{m s}^{-1}$ )	0.007
Normal residual velocity ( $\text{m s}^{-1}$ )	0.001
Along shore tidal current amplitude ( $\text{m s}^{-1}$ )	0.248
Normal tidal current amplitude ( $\text{m s}^{-1}$ )	0.042
Tidal current phase (degrees)	0
Number of pens	12
Maximum biomass (tonnes)	2475.54
Total pen area ( $\text{m}^2$ )	13750
Distance from head of grid (km)	3.7
Distance of pens from shore (km)	0.3

*Table 12: Data inputs to the Open Water ECE model for the proposed biomass at Carradale South and Carradale North.*

Parameter	Carradale South	Carradale North
Depth of water at the site (m)	35	35
Diffusion Coefficient ( $\text{m}^2 \text{s}^{-1}$ )	0.1	0.1
Along shore residual velocity ( $\text{m s}^{-1}$ )	0.014	0.004
Normal residual velocity ( $\text{m s}^{-1}$ )	0.013	0.002
Along shore tidal current amplitude ( $\text{m s}^{-1}$ )	0.233	0.270
Normal tidal current amplitude ( $\text{m s}^{-1}$ )	0.054	0.053
Tidal current phase (degrees)	0	0
Number of pens	12	12
Maximum biomass (tonnes)	2500	2500
Total pen area ( $\text{m}^2$ )	13750	13750
Distance from head of grid (km)	3.316	3.843
Distance of pens from shore (km)	0.5	0.5

The methodology to assess level of change follows the UKTAG<sup>13</sup> procedure to assess coastal waters using the winter mean of dissolved inorganic nitrogen<sup>14</sup>. Assessment levels define a level of natural variability in the water plus a ‘slight’ disturbance (defined as background level, increased by 50%). UKTAG uses this methodology to define reference conditions for the Water Framework Directive. Reference values for coastal waters (at salinity 32) at the ‘high to good’ boundary for dissolved inorganic nitrogen are 168µg/l or 12µM/l.

#### 11.3.4 Cumulative Impacts

Effects were assessed cumulatively from North Kilbrannan, Carradale North and Carradale South sites. The body of water and relevant sites are illustrated in Figure 11. A search of active and inactive marine pen fish farm sites within this area was carried out using the environmental data sets available via Scotland’s Aquaculture website.

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<sup>13</sup> UKTAG is a partnership of the UK environmental regulators and conservation agencies which provide coordinated UK approach to the technical and scientific requirements of the Water Framework directive - setting common UK wide environmental standards for instance.

<sup>14</sup>[http://wfd.uk.org/sites/default/files/Media/Environmental%20standards/Environmental%20standards%20phase%202\\_Final\\_110309.pdf](http://wfd.uk.org/sites/default/files/Media/Environmental%20standards/Environmental%20standards%20phase%202_Final_110309.pdf)

Stocking will be synchronous for all three sites, the ECE calculation has been done using the proposed biomass at all three sites. The cumulative maximum standing biomass (MSB) is approximately 7475.54T to the nearest tonne.

To calculate the cumulative ECE from all farms in Kilbrannan Sound water body, the open water ECE model outlined by Gillibrand *et al* (2002) was used for North Kilbrannan, Carradale

North and Carradale South separately (Figure 12), then the ECE values added together to

The figure consists of three vertically stacked windows, each showing the results of an ECE model run. The top window is titled 'NORTH\_KILBRANNAN OPEN WATER NUTRIENT MODEL' and displays 'NITROGEN ECE = 0.1375 UMOL/L' and 'INDEX = 1'. The middle window is titled 'CARRADALE\_NORTH OPEN WATER NUTRIENT MODEL' and displays 'NITROGEN ECE = 0.0652 UMOL/L' and 'INDEX = 1'. The bottom window is titled 'CARRADALE\_SOUTH OPEN WATER NUTRIENT MODEL' and displays 'NITROGEN ECE = 0.0756 UMOL/L' and 'INDEX = 1'. All windows have a path 'C:\Users\ENVIRO~1\DOCUME~1\ECEMOD~1\OPE' in the title bar.

get the cumulative values (Table 13).

Figure 12: Results from OPENECE model runs: Carradale North and Carradale South

*Table 13: Data inputs to the cumulative ECE calculation.*

Name	MSB (tonnes)	ECE (ug/L)	ECE (umol/L)
North Kilbrannan	2475.54	1.93	0.1375
Carradale North	2500	0.91	0.0652
Carradale South	2500	1.06	0.0756
Total	7475.54	3.90	0.2783

#### 11.3.5 Bath Treatments

Modelling was undertaken in line with the methodology described above on the proposed site (12 pens) and stocking density of 15kg/m<sup>3</sup>. Typically, the topical treatment solutions that are used in marine pen fish-farms to treat infestations of sea-lice are rapidly broken down in the water, making them unavailable to marine life. The SEPA-developed bath model tool has been used to predict medicinal quantities appropriate for consent at the proposed site. The results of the bath modelling are summarised in Table 14. The pen treatment depth used for the bath treatments was 3m.

*Table 14: Modelled bath treatments.*

Treatment	3 hour modelled treatment value	24 hour modelled treatment value	Number of Pens Treatable in 3 Hours	Number of Pens Treatable in 24 Hours
Azamethiphos	484.1g	343.8g	1.4	1.0
Cypermethrin	87.6g	N/A	5.1	N/A
Deltamethrin	32.9g	N/A	4.8	N/A

## 11.4 Potential Impacts

Elevated nutrients can cause eutrophication, excessive growth and biomass of algae and plants, with adverse effects. Nitrogen can be a limiting nutrient to primary (phytoplankton) production in the temperate marine environment. Therefore, excess nitrogen can in theory cause eutrophication conditions, in which degradation of dying algae and other associated organic material by microbes can lead to large reduction in dissolved oxygen levels. These conditions are rare in the well-flushed, near-pristine marine areas where fish farming takes place in Scotland.

The ECE value for the proposed North Kilbrannan farm based on a maximum standing biomass of 2475.54T was calculated as  $0.1375\mu\text{mol/L}$  or  $1.925\mu\text{g/l}$  and Index 1<sup>15</sup>. The background level for dissolved available inorganic nitrogen is  $12\mu\text{mol/L}$  or  $168\mu\text{g/l}$ . The calculated value represents 1.1% of the background and does not exceed the 150% value trigger specific in UKTAG procedures. The nutrient contributions from North Kilbrannan are assessed as having a minor magnitude of impact on the water column. Based on the low sensitivity of the water column as a receptor, the overall significance of the impact is assessed as minor.

### 11.4.1 Cumulative Impacts

The cumulative enhancement levels were calculated as  $3.90\mu\text{g/l}$  or  $0.2783\mu\text{mol/L}$ , representing 2.3% of the background value. The mitigation measures to control nutrient release to the marine environment are specified in Section 10.5.

SEPA previously stated: “Kilbrannan Sound is an uncategorised area under Marine Scotland locational guidelines. Background levels of maximum winter Dissolved Available Inorganic Nitrogen (DAIN) for Lochgilphead is  $104.3\mu\text{g/L}$  (Gubbins et al 2003)”

When this is added to the cumulative ECE value for Kilbrannan sound, it yields a value of  $108.2\mu\text{g/L}$ . This is well below the SEPA EQS of  $168\mu\text{g/L}$ . Also, Kilbrannan Sound is a well flushed water body and so it is expected that any nutrient discharges from the site will be dispersed quickly.

Therefore, the cumulative enhancement levels are assessed to have a minor level of impact on the water column. Based on the low sensitivity of the water column as a receptor, the overall significance of the impact is assessed as minor.

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<sup>15</sup> Derived from Locational Guidelines Nutrient Enhancement Index which specify a scale from 1 – 5 depending on predicted ECE for nitrogenous nutrient arising from fish farming: <http://www.gov.scot/Uploads/Documents/Report63.pdf>

#### *11.4.2 Bath Treatments*

The site has been modelled and consented for the use of cypermethrin, deltamethrin and azamethiphos. Cypermethrin and deltamethrin are considered to bind readily to particles and therefore are removed from the aqueous phase relatively quickly after discharge. These medicines are subject to EQS constraints which limit their concentrations in the environment. For cypermethrin, a mean concentration within the discharged plume of less than 16ng/l is required 6 hours following treatment. In the case of deltamethrin a mean concentration of less than 6ng/l is required at the same point in time<sup>16</sup>. The modelling results provide the appropriate maximum quantity of each chemical to meet these limits for safe use in the water environment.

Azamethiphos remains in the aqueous phase until broken down according to a half-life of 8.9 days. Therefore, this medicine is subject to additional constraints over a longer time frame. A short-term EQS requires a mean concentration within the discharged plume of 250 ng l-1 to be attained 3 hours following treatment. A longer term EQS requires that the area of concentrations which exceed 40 ng l-1 should be <0.5 km<sup>2</sup> or <2% of the receiving water body area 72 hours after treatment. In addition, the maximum concentration must not exceed 100 ng l-1 after 72 hours<sup>30</sup>.

The bath modelling has generated levels of acceptable use of topical treatments that comply with existing EQS. Compliance with these EQS is anticipated to have a minor magnitude of impact on the water column. The overall significance of the impact based on a low sensitivity of the receptor is minor.

### **11.5 Summary**

North Kilbrannan is in an area of open water, outside of any Locational Guidance waterbody. Nutrient inputs arising from the proposed operations at North Kilbrannan were calculated on the basis of both the individual site, and cumulatively to include Carradale North and Carradale South. The open water status of the location was assessed to have relatively low sensitivity to changes in nutrient enrichment. Nutrient contributions cumulatively represent 2.3% of background value, below the UKTAG trigger of change. The magnitude of this impact is considered minor in terms of EIA and is assessed to be minor in terms of magnitude of change and overall significance. The bath modelling has generated levels of acceptable use of topical treatments that comply with existing EQS. Compliance with these EQS is anticipated to have a minor magnitude of impact on the water column. The overall significance of the impact based on a low sensitivity of the receptor is minor.

## **12 Interaction with Predators**

### **12.1 Introduction**

The intensive stocking and feeding of farmed fish has the potential to attract predators (taken to include scavenger species also). Potential predators of farmed fish stock can include otters, birds and seals with interactions between fish farming operations and predator species having potential impacts on both the species and the development. This assessment considers the potential interactions and impacts that may arise from the proposed North Kilbrannan development in terms of predator interactions. This assessment should be read in conjunction with Section 14.

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<sup>16</sup> SEPA. 2018. Regulatory Modelling Guidance for the Aquaculture Sector. Air and Modelling Unit, SEPA

## 12.2 Consultation

Consultation was undertaken primarily through the Screening and Scoping process. Advice provided regarding the scope of this assessment is provided in Table 15.

*Table 15: Consultee responses relevant to the assessment of predator interactions.*

Consultee	Date	Advice / Information	Response
SNH	Scoping	<p>If inappropriate netting is installed there is potential for some bird species to become entangled (see section 5 for further details). It is therefore imperative that details on nets and tensions are provided to inform our assessment. With respect to top nets, SNH consider that mesh sizes of 50-75cm represent best practice with respect to minimising entanglement risk. However, this does not remove all risk in all circumstances (see following advice on monitoring). Sub-sea predator exclusion nets are mentioned within Section 3 'interactions with predators', and we agree with the applicant that these should not be used at this site unless first reviewed with and approved by SNH. Mesh size and tensioning are the most important factors determining entanglement risk in top nets and cage nets. Further descriptions of the nets proposed for the new fish farm should be provided to ensure the mesh size is in line with SNH recommendations. There should be no use of drift nets or vertical static nets to recover escaped fish.</p> <p>We recommend that the requirement to record and report bird entanglement in a systematic and context-specific format should be a consenting condition for any development of a finfish farm in this location to inform both adaptive management, if appropriate, and future development applications. Whilst any bird species should be recorded, this particularly relates to potential entanglement risk for gannets and gulls in top nets and gannets and guillemot in sub-sea nets. Entanglement recording proformas and a guide for entanglement recording can be provided if required. Whether any entangled birds are adults or non-adults should also be recorded where known.</p>	<p>The development has embedded mitigation in the form of a tensioned anti-bird netting system designed to safely prevent birds accessing fish pens. The proposed netting system is the same as that deployed at other Mowi fish farms where it has proved to be highly effective.</p> <p>The development also has embedded mitigation in the form of best practise protocols and on-site facilities to inspect and maintain the anti-bird netting system, to safely deal with any bird entrapment/entanglement incidents and for the systematic recording of and reporting of such incidents.</p> <p>Escapes/containment plan is provided in Annex 14.</p>
SNH	Scoping	<p>All species of cetacean qualify as European Protected Species (EPS) and are therefore considered sensitive species as identified in section 4.3 of the template. The use of acoustic deterrent devices (ADDs) can in some instances be capable of causing disturbance to cetaceans. As such this proposal could result in an impact which may have an effect on the receptors or issues identified in sections 4.1 to 4.4.</p> <p>We would suggest that best practice measures should be adopted to ensure that the risk of any impacts on cetaceans as a result of the use of ADDs will be minimised. In order to do so we would recommend that the applicant develops and adheres to an ADD deployment plan which</p>	See Annex 9 for ADD Use Policy. Proposed ADD Site Plan and ADD Deployment Plan are provided in Annex 10.

		sets out appropriate measures to be followed to ensure any potential impacts on cetaceans will be minimised.	
SNH	Scoping	<p>The proposed new site at Cour Bay, North Kilbrannan is not within an SPA for marine bird features, but there is connectivity with SPAs within foraging range of qualifying features. Most relevant for this new proposal is Ailsa Craig SPA and an assessment of the potential effects on this SPA should be made, in view of the site's conservation objectives.</p> <p>Potential impact pathways for marine birds in relation to finfish farms are: fatal entanglement in top, cage or antipredator netting or in any nets deployed to recapture stock in event of escape; direct displacement from the farm footprint; disturbance in the vicinity of the farm and/or associated vessels; and, loss of or damage to prey-supporting habitats in vicinity of the farm and/or as a consequence of export of organic materials or chemicals from the farm site. Nocturnal seabirds may also be disorientated by presence of artificial lights. Likely significant effects for Ailsa Craig SPA exist for gannet, herring gull, lesser black-backed gull and guillemot, due to potential for entanglement risk. The other impact pathways are not considered to have LSE for any of the qualifying features and are therefore not considered in detail.</p>	Supplementary material 3 - HRA ornithology report
A&BC	Scoping	The applicant is requested to submit with the final planning application a site-specific Predator Mitigation/Control Plan, detailing the sequential steps and triggers for specific control measures.	Site-specific predator control plan can be found in Annex 8.
A&BC	Scoping	Harbour seals ( <i>Phoca vitulina</i> ) are protected under the Marine (Scotland) Act 2010. Large numbers of harbour seals are known to use Sgeir Bhuidhe as a Haul-Out Site, which is approximately 2km north of the farm proposal. Under the Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014, this raises an Officer concern. With this in mind, the applicant must consider and detail appropriate mitigation within their final planning application.	Section 12.6

In addition to statutory consultees, strategic level discussions are ongoing with SNH regarding the appropriate use of ADDs.

### 12.3 Methodology

A desk-based assessment was undertaken to establish the ecological importance of potential predators and interactions likely to be experienced by the site.

#### 12.3.1 Information Sources

- Marine Scotland. National Marine Plan Interactive (NMPi) <https://marinescotland.atkinsgeospatial.com/nmpi/>;
- Marine Life Information Network <https://www.marlin.ac.uk>
- National Biodiversity Atlas <https://nbnatlas.org>
- SNH Sitelink <https://gateway.snh.gov.uk/sitelink/>;

### 12.4 Baseline Environment

The farm site and its vicinity (including the vessel transit route from the Carradale shore-base) comprise inshore marine waters off the east coast of Kintyre. The seabed depth at the site is approximately 30m. The adjacent coast has sheltered rocky shore habitats and littoral

zone, with rough pasture and woodland further inland. The coast lies approximately 300 m from the site.

#### 12.4.1 Birds

The description of the baseline ornithology conditions presented below considers the bird species that regularly occur at North Kilbrannan and its vicinity, including the vessel transit route from the Carradale shore-base. It includes all relevant bird species and provides context information for the assessment of impacts presented in Sections 12 and 14.

The bird species that would be potentially affected by the development are listed in Table 16. Table 16 is based on a review of the literature and a site visit by the consultant ornithologist (D Jackson) in June 2020. The ornithological interests of the east coast of Kintyre and Kilbrannan Sound are well documented despite these areas having relatively low bird interest. These areas have received good coverage by various generic national surveys and these are the principal sources of the information presented in Table 16.

The analysis of European Seabirds at Sea (ESAS) survey data undertaken by the Joint Nature Conservation Committee (JNCC) to map seasonal seabird in UK waters (Kober *et al.*, 2010) was used as the source of information on at-sea seabird densities. The northern part of Kilbrannan Sound is well represented in the ESAS database due to inclusion of data collected from the Claonaig to Lochranza ferry route (approximately 7 km north of the Project site). The British Trust of Ornithology (BTO) *Bird Atlas* (Balmer *et al.*, 2013) was the primary source of information on the densities of seaduck, diver and grebe species, and breeding birds other than seabirds. Results from the Wetland Bird Survey (a national monitoring programme of wetland and coastal birds coordinated by the BTO) were also consulted for information on non-breeding wetland birds (Frost *et al.*, 2020). The results of Seabird 2000 national census (Mitchell *et al.*, 2004) and the JNCC Seabird Monitoring Programme online database (<https://jncc.gov.uk/our-work/seabird-monitoring-programme/>) were consulted for information on seabird breeding colonies. *Birds of Scotland* (Forrester and Andrews, 2007) provided additional information on the area's ornithology.

Table 17 provides context information on the bird species listed in Table 16, including information on legislative protection, conservation status, potential connectivity with Special Protection Areas and vulnerability to the main potential impacts of the development. A species vulnerability to an impact was informed by published literature (Furness *et al.*, 2013; Jarret *et al.*, 2018) and expert judgement.

For EIA purposes SNH recommend that bird receptor regional populations should be defined according to the appropriate SNH Natural Heritage Zones (NHZ) (Wilson *et al.*, 2015). The Project site lies within NHZ 14, 'Argyll West and Islands'. This NHZ includes the whole of the Kintyre and Cowal peninsulas and the islands of Arran, Bute, Islay and Jura.

Although the areas of marine and coastal habitat potentially affected by the development have a high degree of naturalness and experience relatively low baseline levels of human activity, the results of the literature review indicate they have relatively low attractiveness to marine and coastal bird species. These areas attract a wide range of mostly common species however in all cases the numbers typically present (as indicated by densities) are low or very low in the context of species' regional (NHZ14) population sizes. In this respect the area potentially affected appears to be broadly similar in its ornithological character to the extensive marine areas and coastline of rest of Kilbrannan Sound, southern Loch Fyne and the Sound of Bute. It is concluded that North Kilbrannan and the shore-base vessel transit route have very low or negligible importance for the regional populations of all bird species. Some highly mobile seabird species, notably gannet, common guillemot and gull

species may form temporary feeding aggregations involving birds drawn in from large areas in response to shoals of prey species such as sand eels, sprat and mackerel. It is thus considered likely that occasionally low to moderate numbers (in the context of regional population size) of these species could be present in the vicinity of the development, but only temporarily. At such times the vicinity of the development and shore-base vessel transit route would have elevated importance for these species and there would be increased potential for impacts, in particular from vessel disturbance.

*Table 2. Bird species occurring in the vicinity of the North Kilbrannan Project site and the shore-base transit route that could potentially be affected by the development.*

Species	Occurrence at North Kilbrannan	Status at site	Importance to regional population	Potential connectivity to SPAs
Great northern diver	Probably occasional, winter	Overwintering	Very low	Negligible/None
Red-throated diver	Probably occasional, breeding season and winter	Breeds in small numbers on Arran and Kintyre but probably not breeding within 10 km of the fish farm	Very low	Negligible/None
Gannet	Common in small numbers, breeding season	Commonly forages throughout Kilbrannan Sound, breeds Ailsa Craig	Very low	High, all individuals likely to be from Ailsa Craig SPA
Shag	Common, small numbers year round	Commonly forages in Kilbrannan Sound, breeds on Sanday and Arran	Very low	Negligible/None
Cormorant	Common, small numbers year round	Commonly forages in Kilbrannan Sound, breeds Sanday	Very low	Negligible/None
Common guillemot	Common, small numbers year round	Forages throughout Kilbrannan Sound, Breeds Sanday and Ailsa Craig	Very low	Some individuals likely to be from Ailsa Craig SPA
Razorbill	Scarce, occasional in breeding season	Small numbers sometimes forage Kilbrannan Sound, breeds Sanday and Ailsa Craig	Very low	Negligible/None
Black guillemot	Uncommon, occasional year round	Small numbers sometimes forage Kilbrannan Sound, breeds Sanday	Very low	Negligible/None
Eider	Common, small numbers year round	Commonly forages in Kilbrannan Sound, breeds in low numbers along coast	Very low	Negligible/None
Red-breasted merganser	Common, small numbers year round	Commonly forages inshore along Kilbrannan Sound, breeds in low numbers along inland	Very low	Negligible/None
Heron	Common, small numbers year round	Commonly forages along shores of Kilbrannan Sound, Breeds in low numbers inland	Very low	Negligible/None
Herring gull	Common, small to moderate numbers year round	Breeds in moderate numbers around coast of Kintyre & Arran	Very low	Negligible/None
Great black-backed gull	Common, small numbers year round	Breeds in low numbers on Sanday & Arran	Very low	Negligible/None

Species	Occurrence at North Kilbrannan	Status at site	Importance to regional population	Potential connectivity to SPAs
Lesser black-backed gull	Common, small numbers breeding season	Breeds in moderate numbers around coast of Arran and on Sanday	Very low	Some individuals potentially from Ailsa Craig SPA
Common gull	Common, small numbers year round	Breeds in small numbers on Kintyre & Arran	Very low	Negligible/None
Black-headed gull	Common, small numbers in autumn and winter	Winter in small numbers around Kintyre & Arran	Very low	Negligible/None
Oystercatcher	Common, small numbers year round	Breeds in small numbers on Kintyre & Arran	Very low	Negligible/None
Sea eagle	Probably occasional, year round	Occasional non-breeding visitor, may breed in future	Very low	Negligible/None

Table 3. Bird species context information on legislative protection, conservation status, potential connectivity with Special Protection Areas and vulnerability to the main potential impacts of the development.

Species	Legislative protection	Conservation status	Potential for attraction to fish farm	Top net entrapment/entanglement vulnerability	Vessel disturbance vulnerability
Great northern diver	WCA Schedule 1 EU Annex 1	Favourable	Low	Low	Moderate
Red-throated diver	WCA Schedule 1 EU Annex 1	Favourable	Low	Low	High
Gannet	General	Favourable	Moderate	Moderate	Low
Shag	General	Unfavourable (BoCC red-listed)	High	Moderate	Low
Cormorant	General	Favourable	High	Moderate	Low
Common guillemot	General	Favourable	Low	Low	Moderate
Razorbill	General	Favourable	Low	Low	Moderate
Black guillemot	General	Favourable	Low	Low	Low
Eider	General	Favourable	Moderate	Low	Low

Species	Legislative protection	Conservation status	Potential for attraction to fish farm	Top net entrapment/entanglement vulnerability	Vessel disturbance vulnerability
Red-breasted merganser	General	Favourable	Low	Low	Low
Heron	General	Favourable	High	Moderate	Low
Herring gull	General	Unfavourable (BoCC red-listed)	High	High	Low
Great black-backed gull	General	Favourable	High	High	Low
Lesser black-backed gull	General	Favourable	High	High	Low
Common gull	General	Favourable	High	High	Low
Black-headed gull	General	Favourable	High	High	Low
Oystercatcher	General	Favourable	Low	Low	Low
Sea eagle	WCA Schedule 1 EU Annex 1	Favourable (recovering following re-introduction)	Low	Low	Moderate

#### 12.4.2 Seals

The site is not located within any protected areas designated for seals nor are there any designated haul out sites or grey seal pupping sites. However, Argyll and Bute Council has noted “Large numbers of harbour seals are known to use Sgeir Bhuidhe as a Haul-Out Site, which is approximately 2km north of the farm proposal”. SNH has advised that Sgeir Bhuidhe is not a designated haul out site.

Therefore, seals are likely to be present in the area, and the National Biodiversity Database highlights sightings of both the Common (Harbour) Seal (*Phoca vitulina*), and to a lesser extent, Grey Seal (*Halichoerus grypus*). Seals have a range of legal protections including Annex IV of the Habitats Directive (European Protected Species).

#### 12.4.3 Otters (*Lutra lutra*)

North Kilbrannan will not be located near any areas designated for conservation protection features such as otters. Otters are protected under Schedule 2 of the Habitats Regulations (European Protected Species). A search of the National Biodiversity Network indicated 6 unconfirmed records of otters within a 10km radius of the proposed location after 2015.

#### **12.4.4 Non-Target Species**

All cetacean and otter species found in Scottish territorial waters are classed as European protected species. They are given protection under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).

### **12.5 Potential Impacts**

Potential impacts on predators associated with the presence and operation of the fish farm are summarised below:

- The entrapment or entanglement in nets of predators (birds, marine mammals and otter) attracted to the fish farm to forage, leading to harm or fatality;
- Vessel disturbance (both operating at the site and in transit to the local shore base at Carradale) leading to the displacement of predators (and other wildlife) from protected sites and habitat used for feeding and resting.
- Physical harm to marine mammals from the use of ADDs.
- Mortality of seals from lethal control.
- Direct habitat loss, the area occupied by the proposed fish pen array will no longer be available to foraging predators.

There could also be in combination effects with other projects, in particular the existing Mowi fish farming operations at Carradale North and Carradale South.

There are also a range of commercial implications that can arise from loss of stock, damage to infrastructure and wider welfare and environmental considerations in terms of predator interactions with farmed fish, including:

- Breach or damage to stock nets, compromising net security and fish containment;
- Seal presence around fish pens can generate a stress response in penned fish subsequently impacting feeding behaviours.

### **12.6 Standard and Responsive Mitigation**

A range of mitigation measures are embedded into the proposed development aimed avoiding or reducing interactions with potential predators. These are divided into two categories:

- Standard Mitigation Measures; and
- Responsive Mitigation Measures (seals only).

These mitigation measures are considered as ‘standard practice’ and therefore treated as being embedded within the project description when evaluating the impact pathways and undertaking impact assessment.

The principal standard mitigation for reducing predator interactions, and subsequent impacts is based on removing incentives for predators to visit the farm and preventing opportunities for predators to habituate to the development as a food source.

Standard mitigation measures reflect ongoing site management and fish husbandry practices and are designed to remove the main incentive for potential predators to associate fish farm sites with a food source. These measures will operate continually and are embedded within routine site management operations.

Responsive mitigation refers to non-routine measures to be deployed as a last resort in exceptional cases should individual seals persist in presenting challenging or aggressive

behaviours despite standard mitigation measures. As indicated above, ongoing attacks by seals can impact the integrity of containment infrastructure and generate stress responses to contained fish with subsequent impacts on feeding, health and welfare.

#### *Standard mitigation for marine mammals*

*Although primarily aimed at preventing seal predation, the measures described below are anticipated to be also effective at protecting stock from cetacean species such as dolphins and porpoise.*

- *Net Tension:* the principal method of preventing seals attacking farmed fish at the site is the continuous use of well-tensioned netting or an adequate strength. The proposed pens use weighted sinker tube technology, detailed in Section 7, to weight and thereby tension the nets. Maintenance schedules include weekly checks on net tension and condition.
- *Fish Mortality Retrieval:* seals and otters can be attracted to fallen stock at the bottom of the pens. A cone structured collection system is installed at the bottom of the nets to enable the frequent retrieval of fish mortalities. A target collection frequency is in place to collect and dispose of mortalities daily.
- *Avoidance:* Argyll and Bute council has noted that Sgeir Bhuidhe is a seal haul-out site, approximately 2km north of the farm proposal. SNH has advised that Sgeir Bhuidhe is not a designated haul out site. Nonetheless, as standard operating practice, staff will be instructed to avoid approaching the haul-out site to minimise any disturbance to seals that use it.

#### *Responsive Management Measures*

The following measures will be deployed on a reactive basis, where interactions become more challenging:

- *Predator Enclosure Nets:* predator enclosure nets are secondary net systems which completely enclose the primary fish pen net to act as a physical barrier between predators and the nets containing farmed fish. Predator nets are not routinely installed at any Mowi sites at present, and are not commonly deployed, however should specific predation issues become problematic, the developer proposes to maintain an option to install these if necessary in consultation with SNH.
- *Seal Licence:* on rare occasions, there may be a problem with a particularly aggressive and persistent seal, which is not deterred by any of the above predator control methods. Therefore, as a precautionary measure, an option to apply for a licence to dispatch seals at the site will be retained for when other control mechanisms have failed. Seal dispatch requires licensing through a separate regime, and the use of licensed and trained contractors.

##### *12.6.1 Acoustic Deterrent Devices (ADDs)*

ADDs can emit a frequency of sound which effectively deters seals from the pens. ADDs emit sounds in the frequency range 10-14kHz, where seals tend to have their best hearing. However, this frequency range is also within the hearing range of non-target species such as the harbour porpoise (*Phocoena phocoena*). Impacts on non-target species are considered in Section 14.

At present the planning permission for Carradale allows for the potential use of ADDs as an option to manage seal interaction, however this comes with the condition that Mowi must obtain written approval from the Planning Authority in consultation with Scottish Natural Heritage prior to use and that the use of ADDs must be a triggered response rather than continuous operation. The OTAQ SealFENCE system currently available for use at Carradale is a modular ADD system that allows for control of each module from the feed barge.

Mowi has recently reviewed and modified the existing company policy to develop a cohesive approach to the use of ADDs, particularly where impacts on non-target species are likely. The policy also states that the Area and Farm managers will be notified if a site falls within a protected area designated for the conservation of cetacean species, and guidance will be issued to support the considered and efficient use of ADDs.

An ADD policy has been developed in conjunction with SNH to revise both the policy and accompanying company ADD guidance for the Carradale sites. Mowi proposes to use ADDs at North Kilbrannan when appropriate (Annexes 9 and 10), similar to their use at Carradale. Use of ADDs would be according to a framework which aims to:

- Increase site operative awareness regarding the potential connection between ADD use and non-target species;
- Practice seal control measures prior to ADD use as part of a hierarchy of control;
- Monitor and discuss risk by the site and area managers;
- Develop a system for logging of ADD use;
- Develop a system of daily review of whether ADDs are still needed;
- The weekly review and recording of justification for the use of ADDs; and
- Introduction of steps to raise the question: can the ADD be switched off?

#### ***Standard mitigation for birds***

- *Anti-bird netting:* Tensioned netting is installed over stocked fish pens to prevent bird access and thereby prevent bird predation of stock fish and feed scavenging. The proposed anti-bird netting system is the same as that deployed by Mowi at its operations at Carradale and elsewhere in Scotland, and which has been shown to be highly effective. North Kilbrannan will have written procedures and provide staff training for best-practise installation, operation, inspection and maintenance of the anti-bird netting system.

The anti-bird netting system comprises top and side netting suspended from poles attached to the perimeter of the pen walkway. Nets are secured using the poles and tensioned to prevent loose netting that could pose an entanglement danger. The structure will be at a height to ensure the nets are kept at a safe distance from the water and the feed rotor. A top net height of 5 m above water level has been found to be optimum at Mowi's other sites, a height that is designed to continue to be effective even if there is moderate sag on the top net, for example caused by the weight of gulls perching on the top net. Photographs of the proposed pens and top net configuration are provided in Figure 2 and Figure 3, and general assembly diagrams are provided in Annex 4. The anti-bird netting will have a knot-to-knot mesh size of no greater than 100 mm (4 inches). Experience of operating anti-bird netting at Mowi's other fish farms has shown that this size of mesh is small enough to prevent ingress and entanglement of the relevant bird species, yet is not so small as to cause weight-related issues even when manufactured out of very strong twine.

Given that it is possible that the integrity of the anti-bird netting could fail (i.e., a hole in netting) due to damage or human error, there is a small risk that birds could occasionally get into a pen and become trapped. To mitigate against this, Mowi will daily inspect for trapped bird and provide training to staff, and have on site all necessary equipment, to affect the safe removal and release of any trapped birds. Mowi will keep systematic records of any bird entrapment or entanglement incidents and provide these to authorities as and when requested.

- *Minimising disturbance:* Vessels associated with the development operating in the vicinity of the fish farm and along shore-base transit route will at all time to vigilant for the presence of birds on the sea surface in particular auk species, red-throated diver and eider. Disturbance to these birds will be minimised by avoiding them as far as is reasonably practical, and reducing speed to below 10 knots when moderate numbers are present.

## 12.7 Impact Assessment

### *Otter*

Predation by otters is primarily through direct entry into pens, which is managed by ensuring the correct fitting of pen and top nets to create a continuous barrier against otters. Otters, a European Protected Species, are predicted to have high value / sensitivity as a receptor. The magnitude of the impact on otters associated with entanglement issues at the site is assessed to be minor based on the likely infrequency of occurrence. Overall significance is predicted to be moderate, however with maintenance of net tension and ongoing husbandry methods to reduce attraction to the site, the significance of impact is minor.

### *Seals*

A number of impacts are associated with seals. The key impact arising from the development is on hearing and potentially habitat exclusion from the continued use of ADD devices. The modular SealFence ADD system currently installed on Carradale may be used if required at North Kilbrannan; any use of ADDs at Carradale currently requires approval by Argyll and Bute Council in consultation with SNH. To ensure a targeted and appropriate use of the systems, deployment guidance for ADDs has been developed and approved by SNH for Carradale and the same approach is proposed for North Kilbrannan (Annex 10). The development and implementation of an improved deployment and recording framework for the use of ADDs is anticipated to target the use of ADDs more effectively and provide means to share data with stakeholders. Whilst the use of ADDs represents a moderate impact, the implementation of the framework following consent is expected to achieve a more effective and targeted use of ADDs.

Although the magnitude of net entanglement may be evaluated as major due to likely fatal consequences, the low frequency of this occurrence, mitigated by the use of ADDs, supports the overall classification of the magnitude as low. Based on high sensitivity of seals as a receptor the overall impact is moderate and will be further controlled by appropriate use of ADDs, maintenance of appropriate net tensions and general husbandry (including frequent mortality removals).

### *Birds*

The majority of the birds species receptors potentially affected have low sensitivity based on the criteria in Table 2. The gannet, common guillemot and lesser black-backed gull are rated

as having medium sensitivity on the grounds of potential connectivity with Ailsa Craig SPA. Red-throated diver and sea eagle are also rated as having medium sensitivity due to their elevated legal protection status (Table 17).

For all bird species receptors the magnitude of the potential impact from entrapment/entanglement in netting is rated as negligible based on the criteria in Table 3. This reflects the very low importance of the site to species in the context of their regional population size, and thus the low number of individuals potentially affected. It also reflects either the low vulnerability of a species to entrapment/entanglement in fish farm top nets, or the anticipated high effectiveness of the proposed standard mitigation measures (tensioned anti-bird netting and associated operational procedures). The assumed effectiveness of the proposed standard mitigation measures is based on recent operational experience of deploying the same measures at Mowi Carradale fish farms, and fully takes into consideration the lessons learnt from the entrapment incident that occurred there in 2019 (Supplementary material 3). The potential impact of entrapment/entanglement is judged to be not significant to all bird species receptors. This conclusion is dependent on the standard mitigation measures for anti-bird netting being fully implemented.

For all bird species receptors the magnitude of the potential impact from vessel disturbance is rated as negligible. This reflects the very low or low importance of the area potentially affected (the vicinity of the fish farm site and the vessel transit route to Carradale) to all bird species in the context of their regional population size and the effectiveness of the standard mitigation measures contained in the Vessel Management Plan to minimise disturbance to birds. The potential impact of vessel disturbance is judged to be not significant for all bird species receptors. This conclusion is dependent on the standard mitigation measures described in the Vessel Management Plan to minimise bird disturbance being fully implemented.

The footprint of the fish farm, even when buffered to 1 km, is negligible in the context of the extent of foraging areas available to seabirds either at the local level (Kilbrannan Sound) or regional level (NHZ14), and thus the magnitude of potential loss of foraging habitat is rated as negligible and not significant.

Following the installation of pens with the pole supported top net design in 2019 an incident occurred at the Carradale site when a number of gannets and gulls managed to penetrate the top nets and became entrapped (but otherwise unharmed) in fish pens. This incident was a one-off event that was primarily the result of inadvertently fitting the top nets made from netting of too large a mesh size (200 mm). The entrapped birds were safely released. The problem was solved by replacing the top nets with nets made from 100mm mesh. Since the correct netting was fitted there have been no further incidents of bird entrapment. Further details of this incident and the lessons learnt are provided in the incident note (Supplementary material 3).

## 12.8 Summary

The development has potential to impact birds, otters, seals and cetaceans. A number of standard and responsive mitigation measures are proposed, with the main aim to remove incentives for predators to visit the farm and prevent opportunities for predators to habituate to the development as a food source. Overall, impacts to receptors are assessed as minor.

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## 13 Interaction with Wild Salmonids

### 13.1 Introduction

Atlantic salmon fish farming has potential to interact with wild salmonid fisheries (wild Atlantic Salmon and Sea Trout) primarily via:

- the transfer of disease or parasites between farmed fish and wild salmonids, and

- escape of farmed fish leading to genetic mixing between farmed fish and wild salmonids.

The proposal at North Kilbrannan will result in an increase in maximum biomass in Kilbrannan sound of 2475.54T. This assessment considers the likely potential impacts on wild salmonid fishery stocks from the proposed increase.

### 13.2 Consultation

Recommendations for the content of the assessment were mainly provided via the Scoping process and are summarised in Table 18.

*Table 18: Summary of consultation responses – Wild Salmonids*

Consultee	Date	Advice / Guidance	Response
MSS	Scoping	<p>The applicant has not supplied an Environmental Management Plan (EMP) outlining how potential interactions of sea lice arising from the proposed development will be assessed with respect to wild salmonids. Should the applicant go on to submit a planning application in the future, Marine Scotland expects that a document (EMP) is included outlining how potential interactions with wild salmonids will be assessed. Marine Scotland expects that as a minimum any monitoring scheme will be able to report on the level of lice released into the environment (i.e. both farmed fish numbers and adult female lice numbers); identify the likely area(s) of sea lice dispersal from the farm; details how and what monitoring data will be collected to assess potential interaction with wild fish; and details how this monitoring information will feed back to management practice. This plan should also include a regular review process to ensure that it remains fit for purpose.</p> <p>A sea lice efficacy statement including the relevant modelling reports for the proposed cage arrangement and biomass should be submitted with any future planning application. This should include the maximum biomass that can be treated with in-feeds likely to be consented at the site and the time taken to practically administer and complete bath treatments to all cages at maximum biomass without breaching EQS.</p>	<p>Annexes 11, 12 and 13 are sea lice management and efficacy statement, Environmental Management Plan and wild fish and sea lice attestation.</p> <p>Site has already been granted a CAR licence.</p>
ADSFB	Scoping	<p>Before any further consideration is given to the proposal, the developer need to establish an EMP before any future planning application for the proposed new site and include existing developments in the Farm Management Area. More specifically an EMP need to include both the effects of fish farm escapes and management of sea lice larvae production in a farm management area as well as collecting representative data on wild fish that reflect the health of the ecosystem.</p>	<p>Annexes 11, 12 and 13 are sea lice management and efficacy statement, Environmental Management Plan and wild fish and sea lice attestation.</p> <p>Proposed monitoring is provided in the Environmental Management Plan.</p>
CFA	Scoping	<p>Finally, local fishermen are becoming increasingly concerned about dead salmon (morts) which are being recovered from the Clyde area which appear to be farmed. Our members now record mort salmon fish for testing and the location they were found.</p>	<p>Annexes 11, 12 and 13 are sea lice management and efficacy statement, Environmental Management Plan and wild fish and sea lice attestation. Proposed monitoring is provided in the</p>

		Fishermen have also become concerned about the number of fast swimming fish such as mackerel which have been caught with lice. This is unusual, and could potentially be linked to an increase in lice in the area.	Environmental Management Plan. Escapes/containment plan is provided in Annex 14.
SNH	Scoping	<p>In our view, this proposal is likely to have a significant effect on the Atlantic salmon feature of the Endrick Water SAC. Consequently, Argyll and Bute Council, as competent authority, is required to carry out an appropriate assessment in view of the site's conservation objectives for its Atlantic salmon qualifying interest. This assessment should include an appraisal of the following:</p> <p>We would recommend that as an initial step to consider the potential connectivity between this site and the Endrick Water SAC that sea lice dispersion modelling is undertaken and provided with the final application / EIA. In addition, this information will help to assess the potential connectivity between this site and any other existing and proposed sites in the Firth of Clyde which may help to inform cumulative assessment and identify appropriate areas which may require co-ordinated management in an area based EMP or similar.</p>	<p>Following discussions with SNH, an enforceable EMP is provided in Annex 12.</p> <p>A shadow HRA for Endrick Water SAC is provided (Supplementary material 2) to assist the competent authority to undertake an Appropriate Assessment.</p>
SNH	Scoping	In addition to the above, any escape of farmed salmon poses a threat to the Atlantic salmon feature of the Endrick Water SAC through the risk of subsequent genetic introgression, should escaped Atlantic salmon enter the Endrick Water SAC and breed with wild Atlantic salmon. To mitigate this risk to the SAC we would expect confirmation that the proposed fish farms will comply with the Scottish Technical Standard, in order to ensure that any equipment used is robust and will reduce the risk of escapes occur and any subsequent interbreeding with salmon in the SAC.	Annex 5: Equipment attestation
SNH	Scoping	The final application / EIA report should provide an assessment of the risk posed to wild salmonids, including details of any mitigation measures reduce the risk of significant impacts occurring. We have limited access to any detailed data on local wild salmonid populations. On this basis we are happy to defer to the DSFB and / or Marine Scotland Science to provide further advice to the Planning Authority on the local significance of any non-designated wild salmonid populations likely to be impacted by this proposal.	Annexes 11, 12 and 13 are sea lice management and efficacy statement, Environmental Management Plan and wild fish and sea lice attestation. Proposed monitoring is provided in the Environmental Management Plan.
A&BC	Scoping	Kilbrannan Sound is an important waterbody for migratory salmonids. The proposed development is between two important migratory rivers, namely: Claonaig Water and Carradale Water. With this in mind and with the existing Carradale North and South sites, it will be important for the applicant to demonstrate sea lice control, and that its stock containment is effective over one production cycle.	Details provided in Section 13.6.7 and accompanying Annexes 11 and 13
A&BC	Scoping	While the applicant has identified a number of mitigation measures to limit potential	Escapes/containment plan provided in Annex 14

	<p>effects on wild salmonids from the proposed operation of the North Kilbrannan site, further mitigation should include:</p> <ul style="list-style-type: none"> <li>• A detailed Environmental Management Plan (EMP) (to include management of sea lice larvae production in the farm production area that takes into account the Eilean Grianain (Carradale North &amp; South sites));</li> <li>• A Farm Management Statement (to include details of husbandry procedures to minimise the risk of disease being spread);</li> <li>• A site specific sea lice action/management plan;</li> <li>• An Escapes Contingency Plan;</li> <li>• An efficacy statement in terms of availability of sea lice chemical treatments, including modelling reports;</li> <li>• Operational details for other sea lice management measures including mechanical removal, and</li> <li>• Evidence of effectiveness of more recent sea lice management measures (mechanical removal).</li> </ul>	<p>Farm Management Statement provided in Annex 6</p> <p>Sea lice management/efficacy and outline treatment plan provided in Annex 11</p> <p>Evidence of effectiveness of recent management measures discussed in Section 13.7.</p> <p>EMP provided in Annex 12 that includes commitments to:</p> <ul style="list-style-type: none"> <li>• Monitor lice numbers on wild fish near the development.</li> <li>• Commitments to monitor wild salmonid stocks, with consultation from local stakeholders.</li> </ul>
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Mowi has held a number of discussions with the wild fish stakeholders on issues that must be addressed to develop best practice in gathering meaningful data that will inform farm operators and wild-fish managers as to the mitigation of potential pressure from farmed stock on the wild fish populations. These discussions also covered the requirement for a suitable agreement to be embodied in a regulatory regime which would be accountable, transparent and enforceable. Following discussions with the Argyll District Salmon Fishery Board and Argyll Fisheries Trust, a Regional EMP has been developed (Annex 12) focussed on Kilbrannan Sound, covering all three Mowi operational sites.

The Regional EMP will voluntarily promote and implement measures for the maintenance of healthy stocks of wild and farmed salmonid fish in the Kilbrannan Sound geographical area. The agreement provides the framework for monitoring, communication channels, sharing of data, meetings, and the desired outcomes of increased knowledge and working partnerships that will ultimately result in improved management practices.

### 13.3 Methodology

Feedback from consultation, including data provided by Marine Scotland has been integrated into the assessment. A desk-based assessment was undertaken to establish relative trends and populations of Atlantic salmon and sea trout in the area. Data relating to sea lice rates, compliance and treatments from Carradale sites were collated from internal sources. The following information sources were also accessed:

- National Marine Plan Interactive (NMPi, Disease Management Areas)  
<https://marinescotland.atkinsgeospatial.com/nmpi/> ;
- Marine Scotland Data <https://data.marine.gov.scot/>;
- Argyll Fisheries Trust <http://www.argyllfisheriestrust.co.uk>;
- The Code of Good Practice <http://thecodeofgoodpractice.co.uk/chapters/> ; and
- Scotland's Aquaculture Website, Escapes  
[http://aquaculture.scotland.gov.uk/data/fish\\_escapes.aspx](http://aquaculture.scotland.gov.uk/data/fish_escapes.aspx) .

## 13.4 Baseline

### 13.4.1 Salmon and Sea Trout Populations

Wild salmon are widely distributed throughout Scotland and populations are recognised as being of national and international importance. Atlantic Salmon are listed in Annex III of the Bern Convention and Annex II of the EC Habitats Directive. The species is also listed in the UK Biodiversity Action Plan (BAP) and IUCN Red List of threatened species. Sea trout are listed as a BAP species due to declining populations, particularly on the west coast of Scotland.

North Kilbrannan will be in the open waters of Kilbrannan Sound near the east coast of Kintyre. There are four main local rivers that hold salmonid populations within about 15km of the proposed North Kilbrannan fish farm: Skipness River, Claonaig Water and Carradale Water on the Kintyre peninsula and Iorsa Water and Machrie Water on the island of Arran (Annex 1). These were highlighted by the Argyll District Salmon Fishery Board (ADFSB) in its response to the Carradale screening and scoping request on 20 June 2018. Catch statistics were provided by MSS and are illustrated in Figure 13. The figures show Salmon and Grisle and Sea Trout catches in Carradale and Iorsa Statistical Districts between 1952 and 2019. MSS highlights that these figures "may not be representative of the catches in the immediate area and are only provided to give an indication of catch trends in the area". Whilst catches demonstrate variation, data shows a general reduction in Salmon and Grisle and Sea Trout catches with time in the Carradale Statistical District. In the Iorsa Statistical District any trends in catches with time are less clear. It should be noted that data is affected by a number of factors including stocking of salmon in Iorsa Water.

Carradale Water, Iorsa Water and Machrie Water, for which conservation assessments are available, all have a proposed 2020 salmon conservation grading of 3, meaning that "Exploitation is unsustainable therefore management actions required to reduce exploitation for 1 year i.e. mandatory catch and release (all methods)<sup>17</sup>

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<sup>17</sup> <https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/fishreform/licence/status>, accessed 14 October 2019

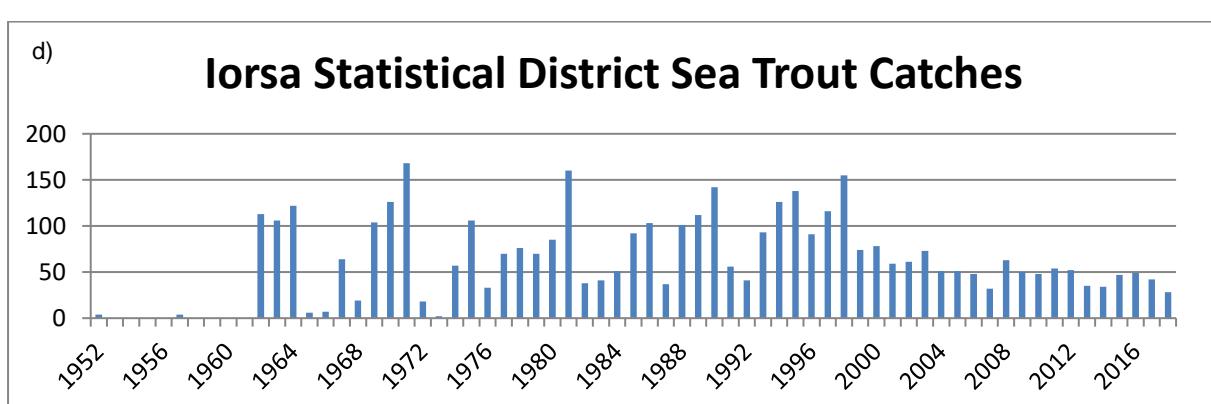
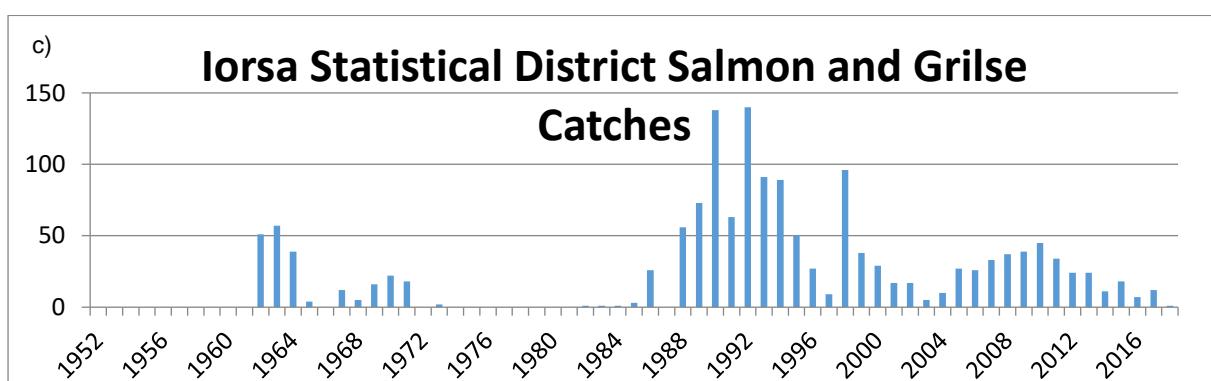
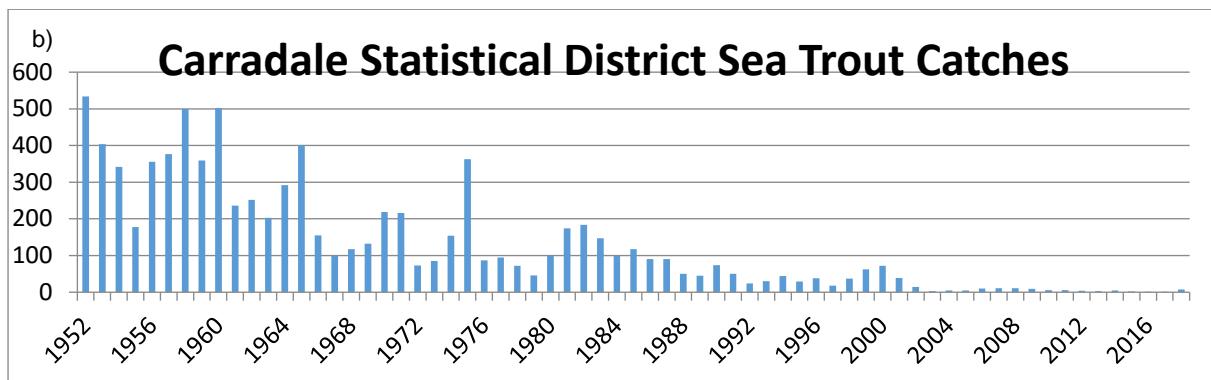
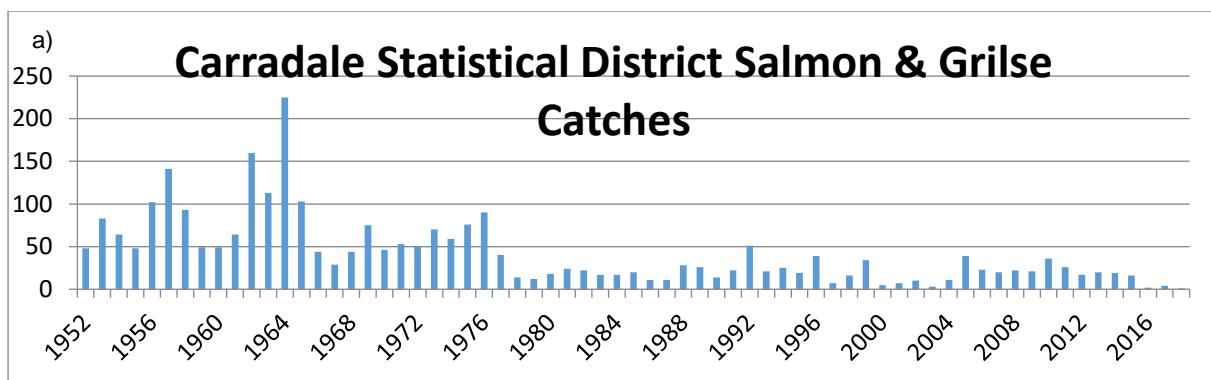


Figure 13: Local catches 1952-2019 in: a) Carradale Statistical District of Salmon and Grisle; b) Carradale Statistical District of Sea Trout; c) Iorsa Statistical District of Salmon and Grisle; d) Iorsa Statistical District of Sea Trout. Data provided by Marine Scotland Science. Note that operations at Carradale South and North began in 2010 and 2016 respectively.

The Argyll Fisheries Trust report, Isle of Arran Rivers Project, Phase 2 of 2: Survey of Fish Populations & Habitats 2008/2009 noted that in western Arran catchment rivers (including Iorsa) salmon fry abundances were generally low. The conclusion of the report states “The patchy distribution of juvenile salmon is likely to be primarily due to population shrinkage as a consequence of low numbers of adult sea returns”. The vulnerability of the salmon and sea trout populations in the catchment area classify this receptor as high sensitivity.

### 13.4.2 Disease Management Area

It is assumed that the Marine Scotland Disease Management Area 19c (East Kintyre, Figure 14a) will be expanded to include North Kilbrannan. Disease Management Areas were established by the Joint Government/Industry Working Group on Infectious Salmon Anaemia in January 2000, based on separation distances around active farms, taking into account tidal excursions and other epidemiological risk factors.

Disease Management Area 19c covers the SSPO CoGP Farm Management Area (FMA) M-47. FMAs are where farmers endeavour to coordinate many of their activities and synchronise production to reduce and manage risks posed by infectious agents and parasites which can be present in the environment, in wild and farmed fish, and in other naturally occurring biota. FMA M-47 (Figure 14b) covers the central area of Kilbrannan Sound and it is assumed that it will be expanded to include North Kilbrannan.

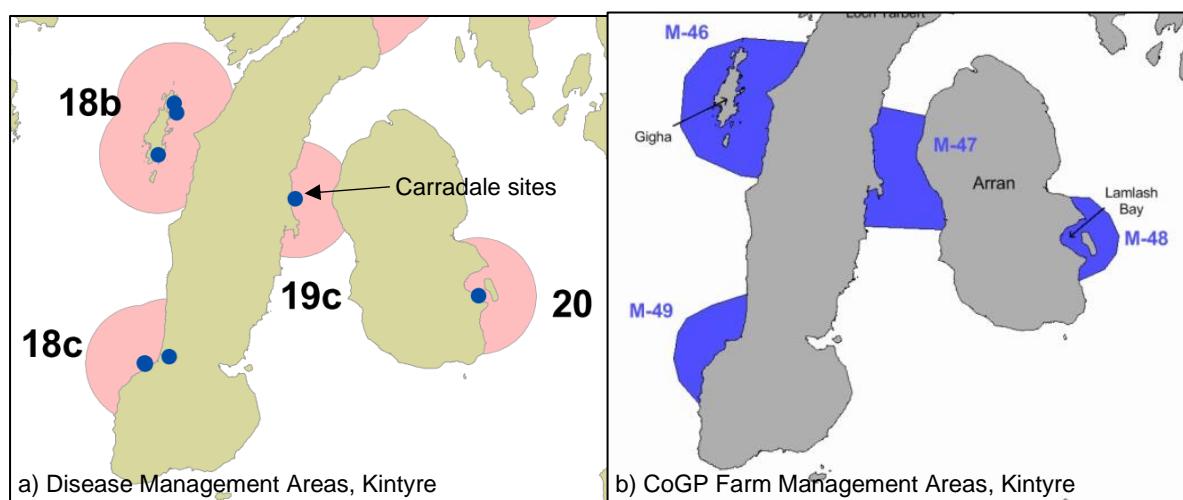


Figure 14: Regulatory (a) farm management area and (b) disease management area.

Details on measures to coordinate activities are provided in Section 13.6.7 and Farm Management Statement (Annex 6).

## 13.5 Potential Impacts

Potential impacts arising from farmed salmon on wild salmonid populations include:

- Potential lice transfer between farmed and wild salmon;
- Potential disease transfer between wild and farmed salmon; and
- Genetic mixing or competition with escaped farmed salmon.

### 13.5.1 Sea Lice Transfer

Sea lice are ectoparasites belonging to the crustacean family Caligidae. They have a complex life history involving a free-swimming stage, searching for a host. During subsequent growth phases, they can move around the host and swim unanchored from it. It

is during these later stages that acute infection can occur. Two species require control in seawater salmon farms, *Lepeophtheirus salmonis* - a salmonid specific species - and to a lesser extent, *Caligus elongatus*, a more generalist species. The intensity of infection at which sea lice become damaging depends upon the size of the fish, the species of sea-louse and the residence time of lice on the host. For example, smolts may suffer more serious damage than harvest size fish with the same intensity of infestation.

Although sea lice infection is a natural phenomenon, the process of salmon aquaculture is thought to result in elevated numbers of sea lice in constrained waterbodies and, if uncontrolled, subsequently has potential to impact populations of wild salmonids in some circumstances. The magnitude of the impact of salmon aquaculture on salmonid populations is currently unknown, however a growing body of correlative evidence suggests lice levels are higher around fish farms and that lice burdens on wild salmonids are higher with increasing proximity to farms. Sea trout are considered to be more vulnerable to infestation due to higher residence times in the coastal environment, whilst salmon tend to migrate immediately into the open sea.

### 13.5.2 Disease Transfer

Concentrated populations of salmon have the potential to act as reservoirs for other diseases and parasites. These include diseases such as Amoebic Gill Disease, a parasitic condition which can sporadically affect salmonids, and other notifiable diseases under UK legislation (The Diseases of Fish (Control) Regulations 1994).

### 13.5.3 Genetic Mixing and Competition with Escaped Farmed Stock

Escaped farmed stock is thought to impact wild populations by inter-breeding with native wild populations, which can decrease ecological fitness. Farmed stock is considered reproductively inferior to wild stock, in addition to disrupting local adaptations (Fleming *et al* 2000) with subsequent impacts on population productivity.

## 13.6 Management and Mitigation

To reduce potential interactions, a range of mitigation measures have been developed to remove or reduce the various impacts associated with developing the site. Whilst a number of these measures incorporate traditional management practices, a detailed discussion of procedures implemented since 2015 provide further details on substantial new investment in sea lice management and outcomes of these. A Sea Lice Management and Efficacy document is provided in Annex 11 and outlines the detailed strategy, and substantial policy changes / infrastructure improvements implemented since 2016 to control sea lice.

As a result of investment and development in new methods, Mowi Scotland now has access to many different effective sea lice intervention methodologies to control farm sea-lice. The suite of management measures that are now available to Mowi such as biological control, medicinal and freshwater treatments, and thermic/physical removal of sea lice now form part of an integrated sea lice control strategy. The timeline development and efficacy of each of these new methods is outlined below in Table 19.

Table 19: The emergence of new methodologies for the control of sea lice

The Emergence of New Methodologies for the Control of Farmed Sea-lice		
Method	Pre 2016	Post 2016
Cleanerfish	Few	Plenty

Freshwater	Not Available	New methodology, high efficacy
Hydrolicer	Not available	New methodology, high efficacy
Thermolicer	Not available	New methodology, high efficacy
Salmosan (medicinal)	High resistance, low efficacy	New methodology, high efficacy
AMX (medicinal)	Very high resistance, low efficacy	Very High resistance, low efficacy
Hydrogen Peroxide (medicinal)	High resistance, low efficacy	High resistance, low efficacy
Slice (medicinal)	Very high resistance, low efficacy	Very High resistance, low efficacy

These new measures have been implemented by Mowi in parallel with a major new focus and strategy against sea lice and general fish health supported by the introduction of new policies and strategies.

Mowi Sea lice control and management strategies, including mitigation measures, are summarised below in the following sections:

- Good Practice Compliance;
- Disease Control;
- Escapes Control; and
- Sea Lice Management.

#### 13.6.1 Good Practice Compliance

Mowi currently complies with the CoGP<sup>18</sup>: The CoGP was first launched in 2006 as the production standard for the farming of all finfish species in Scottish waters. Since then, the Code has been widely adopted by fish farming businesses across the international fish farming community and beyond. The Code sets out over 500 points that describe good practice in seawater fish farming. All these points are independently audited to demonstrate that good practice is being observed.

#### 13.6.2 Disease Control

Disease control methodologies are summarised below:

- *Bacterial Infection* - A programme of vaccination has been in place throughout the salmon farming industry since the eighties which has helped to significantly reduce the number of fish impacted by bacterial infections. This has subsequently led to a dramatic fall in the use of antibiotics to the extent that these are very rarely used at any production site. Antibiotics are never used prophylactically in anticipation of disease, and instead are prescribed by veterinarians in response to a clinical bacterial infection.
- *Viral Infection* - Viral Infections are uncommon in farmed Atlantic salmon, largely because vaccines are used to prevent the historically more prevalent conditions,

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<sup>18</sup> <http://thecodeofgoodpractice.co.uk/chapters/>

namely Infectious Pancreatic Necrosis and Pancreas Disease. In the past Infectious Salmon Anaemia has occurred sporadically in Scotland, but has been successfully eradicated through a program of coordinated fallowing and de-stocking of infected areas required by the statutory regulator, Marine Scotland. All fish farms are required by law to report any suspicion of Infectious Salmon Anaemia or any other Notifiable Disease to the Fish Health Inspectorate of Marine Scotland so that appropriate eradication measures can be taken.

#### *13.6.3 Training*

Husbandry staff are required to observe stock on a day-to-day basis and are trained to recognise differences between healthy and potentially non-healthy fish. Each geographical area of operation has a dedicated Regional Fish Health Manager or Veterinarian. The Regional Health Managers, Vets and Site Health Monitors form a network of fish health personnel responsible for ensuring that any stock health problems are diagnosed swiftly and remedial action taken. This may include medicinal (under veterinary prescription) and/or non-medicinal intervention, as agreed jointly by the Fish Health Team and the Production Team.

#### *13.6.4 Operating Principles*

The site will be operated in accordance with the CoGP for Scottish Finfish Aquaculture that includes over 500 points that describe good practice for seawater farming. The Code is in addition to the provisions of the extensive body of legislation and regulation relating to Scottish aquaculture.

#### *13.6.5 Sea Lice Control Strategies*

To control infections, a policy of weekly sampling to assess lice population dynamics is implemented at all sites. From this data the Fish Health and Production Teams would decide whether any intervention is required. Monitoring intensity is greater than current CoGP requirements at 20 fish per week, per pen. Mowi has adopted a new strategy to increase sea lice counts at its farms above the CoGP requirements to 20 fish at every pen.

Mowi Production and Health teams meet weekly to review the status of lice numbers at each site and to consider the appropriateness of management intervention. Sea lice management interventions are now focussed on early treatments based on an individual pen basis, instead of later treatments based on farm basis. The criteria defining treatments selected for a site is determined based on many different decision criteria to ensure a diverse range of treatments are applied to ensure continued treatment efficacy and minimal development or resistance, the type of treatment last applied and level of efficacy achieved, and finally the availability and capacity of specific treatment options.

Progressively stricter sea lice intervention thresholds for treatment have been introduced. Mowi's current threshold at sites stocked with cleaner fish is 0.2AF/pen. Moving forward Mowi strategy is now based on keeping the number of adult female lice below 0.2/fish as below this level the reproductive efficiency and thus, the population viability of sea-lice, is very low. This is illustrated in Figure 15 below. The key aim is to keep lice numbers, on farmed fish, below the point where breeding viability becomes exponential.

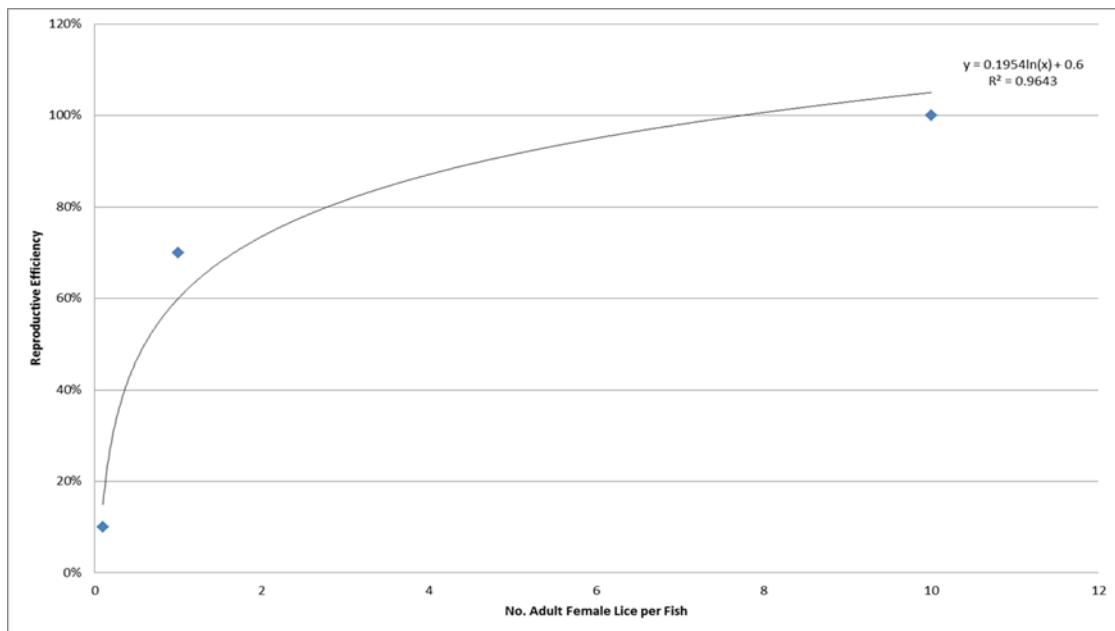


Figure 15: Number of Adult Female lice vs Breeding Success

#### 13.6.6 Sea Lice Attestation

A Sea Lice Attestation document for North Kilbrannan has been provided in Annex 13.

#### 13.6.7 Farm Management Area and Coordination

FMA M-47 includes the Carradale sites also operated by Mowi and it is assumed that it will be expanded to include North Kilbrannan. In accordance with the principles of the SSPO FMA approach, operations at farm sites within a single FMA are synchronised to ensure that the control of sea lice and fish health is facilitated by adopting similar and coordinated farming practices.

A Farm Management Statement (FMS) has been developed for North Kilbrannan, Carradale South and Carradale North, facilitating coordination of activities and synchronisation of production (Annex 6). The FMS provides a risk assessment and management strategy at the site to mitigate potential interactions between neighbouring farms. Key principles of the FMS are stocking the same year class of fish and synchronised fallowing of sites at the end of the production cycle.

#### 13.6.8 Husbandry

Interventions, such as biological control, medicinal treatments, and thermic/physical removal of sea lice are supplemented by a range of husbandry practices and other preventative measures, many of these complying with existing best practice:

- *Fallow period:* depriving parasites of available hosts through area wide contiguous fallow, i.e. no farmed salmonids in an entire area for at least 4 weeks, is highly effective in reducing the level of parasites, as free swimming juvenile infective stages will die if they cannot find hosts. Individual sites should have 6 weeks of fallow with at least 4 weeks coinciding with the fallow period of all salmonid farms in the area.
- *Single year class sites:* linked to fallow period, all sites should be stocked with new smolts within a defined period which allows all to be harvested out again in time for the agreed fallow. New smolts should not be introduced to a site that still

holds harvest-sized fish from the previous generation, which may harbour parasites or infections and transfer these to the next generation.

- *Single year class production areas*: FMAs include neighbouring sites that are within close proximity and share the same body of water. All sites within such areas should be stocked with new smolts within a defined period which allows all to be harvested out again in time for the agreed contiguous fallow, for the same reasons given above. It is assumed that North Kilbrannan, Carradale North and Carradale South will be the only farms within the Disease Management Area.
- *Regular lice counts on farms*: the CoGP requires farms to collect representative lice data at least once a week from all stocked farms in order to monitor and actively manage sea lice levels in their stock. This data is gathered at a higher level of resolution (more fish counted, from more pens) than required by the CoGP. Mowi has adopted a new strategy to increase sea lice counts at its farms above the CoGP requirements to 20 fish at every pen. This approach has been developed to understand lice dynamics relative to cleaner-fish performance and enables a better understanding at a greater resolution i.e. at and between individual pen units.
- *Coordinated treatments*: although timings of interventions and the nature of these interventions will vary, it is important to consider the interactions of interventions on different farms and the strategies of neighbouring companies in order to optimise the outcome. In this case, Mowi is the only operator in Kilbrannan Sound.
- *National Treatment Strategy*: it is important to operate to even lower thresholds of intervention during the period of wild smolt migration and the CoGP defines this as February to June. Increased effort in sea lice control during this time has the added benefit of reducing the overall numbers of sea lice when their population dynamics is least robust in terms of numbers and survivability of juvenile infective stages. All farms in a management area should be coordinating these treatments and any further treatments needed through the year. The CoGP recommends that the criteria for treating should be 0.5 adult female louse per fish in the critical period and 1 adult female louse per fish in the less critical period. These treatments have been shown to have a positive effect on subsequent lice control in management areas, thereby reducing the risk of infection to wild juvenile salmonids.
- *Regional Health Managers*: Regional Health Management transfers responsibility to a single individual who can take overall strategic control for interacting sites in an area.
- *Site Specific Veterinary Health Plan*: This is developed by the Manager of each site in conjunction with the Regional Health Manager or Vet. The plan has measures to optimise general fish health.

### 13.6.9 Biological Control

Biological control refers to the use of cleaner fish, typically wrasse and lump suckers, in providing a symbiotic 'cleaner' service to other fish species, by the removal of parasites. The Scottish Salmon industry is increasingly stocking cleaner fish in marine salmon farms: having proven effective in reducing sea lice numbers, and significantly reducing the need for medicinal treatments. Historically, cleaner fish deployment was restricted by available capacity. A series of recent internal investments have resulted in greater availability of cleaner fish stocking resulting in firm commitments to stock sites at optimum densities (see

section 4.1 of Annex 11). Cleaner fish were introduced to the Carradale sites in December 2017.

#### 13.6.10 Medicinal Control

Medicinal treatments have traditionally been used to control and remove lice should they be required. The discharge of medicinal substances at fish farms is regulated by SEPA under CAR. Medicinal Sea lice treatments are carried out in one of three ways:

- *In-feed medications*: The medicine is mixed into the salmon feed, which is then fed at a rate and for a defined period of time specified under veterinary prescription.
- *Bath treatments in-situ*: by enclosing the target pen fully with a large tarpaulin. The net is lifted up to gently crowd the fish together in the smallest safe volume. The tarpaulin is passed underneath the net and pulled up around the pen above the water level. When the fish are totally enclosed in the tarpaulin, treatment can begin. Oxygenation equipment is used to ensure the water is well oxygenated and prevent the fish from experiencing stressful suboptimal oxygen levels. Once the treatment is complete the tarpaulin is removed and the nets lowered to uncrowd the fish.
- *Bath treatments in wellboats*: These are boats that have large tanks that can safely hold a significant biomass of fish. These highly controlled environments provide ideal methods of achieving the required exposure.

There are currently five compounds available for use as sea lice medicines in Scotland: the in-feed treatment EmBz; and the bath treatments: azamethiphos, deltamethrin, cypermethrin and hydrogen peroxide. All medicines are prescribed by the company veterinarian and their use is regulated by the Veterinary Medicine Directorate as well as SEPA. There are also strict criteria and procedures for monitoring medicinal residues in farmed salmon under food safety regulations as is the case with terrestrial farmed animals.

No EmBZ is consented at North Kilbrannan. Details on bath treatments are also provided in Section 11, with results summarised as follows:

#### Cypermethrin & Deltamethrin

Permissible Quantity of Cypermethrin = 0.328g/3 hours  
Permissible Quantity of Deltamethrin = 32.9g/3 hours

#### Azamethiphos:

Permissible Quantity of Azamethiphos = 343.8g/24 hours

#### 13.6.11 Mechanical/Thermic Control

Mechanical removal of lice from salmon is based on the use of two principal technologies:

- Hydrolicer units: operation by using pressurised seawater to dislodge sea lice from the salmon without any detrimental impact on the fish; and
- Thermolicer units: exposing the fish to lukewarm water for 30 seconds which dislodges sea lice due to the low tolerance of a louse to sudden changes in temperature. Due to the significant body mass of the salmon, there is no significant change to core body temperature.

#### 13.6.12 Freshwater Treatments

Mowi has also invested in a new wellboat specifically designed to undertake freshwater treatments at seawater farms. This boat produces freshwater by desalination but can also obtain water from a number of licensed natural freshwater abstraction sources, i.e. lochs and rivers.

#### **13.6.13 Treatment Efficacies**

The life cycle generation time of sea lice is around eight weeks at 6°C, six weeks at 9°C and only four weeks at 18°C. Combined with the deployment of sea lice skirts – a permeable fabric that lets water and oxygen move freely in fish pens, whilst keeping parasites out - have been shown to delay the start of the next 'first pen' infection. Treatment failures (defined as >0.2 Adult Females per fish post treatment) should be retreated immediately, ideally with a different and higher efficacy method. Indicative treatment efficacies are provided in the Sea Lice Management and Efficacy Statement (Annex 11).

#### **13.6.14 Containment**

The site-specific containment plan and plan for the recovery of escapes has been included in Annex 14. The containment plan lays out the measures that will be taken to maintain the integrity of the holding structures and provides detail on the procedure to be followed in the event of an escape or a suspected escape. The plan follows the CoGP for Scottish Finfish Aquaculture and a copy of the plan is displayed on site.

An equipment attestation for the proposed equipment is provided in Annex 5. All equipment specifications will be designed with engineered tolerances to stand up to a minimum of a 1-in-50-year storm. The company has obtained a detail assessment of the wave climate at the site which has been determined using computer modelling, and current meters at the development site to record actual site conditions. The new equipment purchased for installation at the proposed site will meet the Technical Standard for Scottish Finfish Aquaculture and has been selected to meet the conditions likely to be experienced at North Kilbrannan.

#### **13.6.15 Environmental Management / Environmental Monitoring Plan**

As part of a suite of measures to understand impacts on and monitor wild salmon and sea trout populations; a regional EMP is designed to cover potential impacts arising from the Mowi sites within Kilbrannan Sound. The plan is provided in Annex 12. In brief the EMP has the following aims:

- To develop a framework for co-operation and transparency to build trust between the Operator and the Stakeholders in mutual support of the overarching aim of this agreement; and
- Monitoring to improve the understanding of the relationship between farmed salmon production and the health of wild salmonids in the Management Area through better science including monitoring of lice burdens on wild fish.
- To develop a framework in which management measures will be taken by the Operator in the Management Area in response to scientific evidence of negative impacts on wild salmonids arising from farming activity (i.e. practice adaptive management).

### **13.7 Impact Assessment**

#### **13.7.1 Sea Lice Transfer**

The key risk to wild salmonids is based on the potential for transmission of sea lice to wild salmonid populations, the most effective form of mitigation with the presence of the site is minimising the potential risks of infestation arising from farm operations. A suite of sea lice management measures is currently implemented to reduce the potential transmission of

larval lice stages to wild populations. Mitigation measures include a range of traditional medicinal measures, but also a series of newly developed techniques and policy modifications which have been developed and refined at Mowi farms since 2015. Section 13.6 and Annex 11 outline these measures in greater detail, including when these measures were implemented and corresponding discussions on efficacy. In summary, these include a new lice management strategy:

- Introduction and increased capacity of mechanical treatment methodologies to reduce reliance on medicinal treatments and increase range of treatment options available (and subsequent risk of resistance);
- Increased capacity of a national capability for freshwater treatments, a highly effective lice treatment with high levels of clearance;
- All fish farms to have sea lice skirts installed prior to smolt stocking;
- Introduction of stricter treatment intervention limits (0.2 lice per fish and 0.5 lice per fish);
- Significant increase in capacity of cleaner fish provision and improvements in cleaner fish husbandry; and
- Intervention actions based on early treatment of individual pens rather than later treatment on whole farm basis.

Sea lice management improvements, have been introduced incrementally and relatively recently. Sea lice data over three complete cycles plus the current production cycle for the Carradale sites is shown in Figure 16. Note that Carradale North was first stocked in July 2016 so the first cycle reflects Carradale South only. Many of the actions outlined above have been implemented over the last 2 years, specifically the introduction of cleaner fish at Carradale South and Carradale North in December 2017 and a treatment intervention target policy. These measures generated significant improvements in lice levels in comparison with past cycles. The data indicates extended periods of almost zero (<1 lice per fish) rates of infestation since the beginning of the current cycle and over the smolt migration period in 2018 however, in late 2016/early 2017 a period of non-compliance was recorded.

In October 2016 a hydrolicer was introduced to control the lice level increase when numbers briefly exceeded the CoGP target. This was a relatively new technology and lessons in its use were still being learned, but treatment was successful in bringing the numbers of adult female lice back below the target.

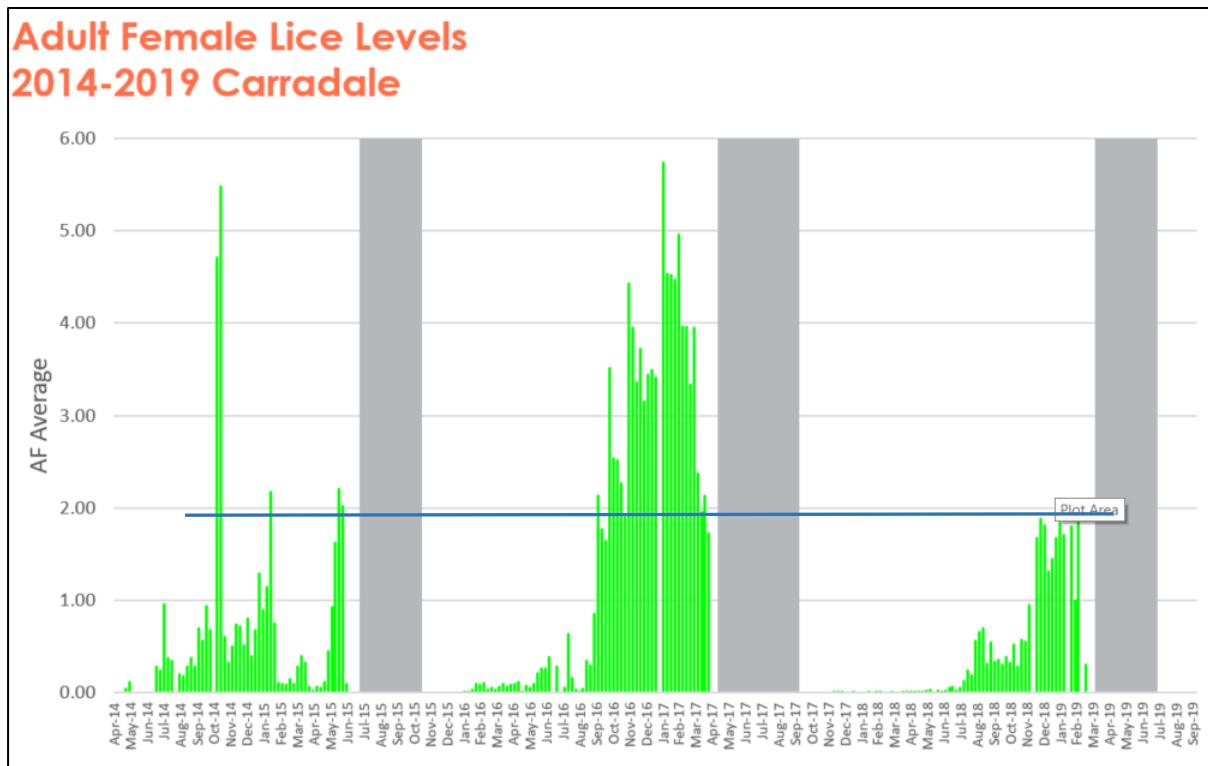
Numbers rose again in December 2016, following which Salmosan and Alphamax were administered and this brought the lice back down over a period of time to below CoGP targets. During this period administering treatments was a challenge due to sporadic adverse weather conditions. It is also worth noting that in the period from November 2016 to May 2017 (the end of the previous cycle) the salmon on both Carradale sites were being harvested, therefore the increase in Adult Female average lice numbers per fish does not necessarily reflect an increase in the total amount of lice within the sites as the total number of fish on site was decreasing over that period as harvesting progressed.

The corresponding treatment plan (Figure 17) illustrates the intensity of treatments implemented in response to the internal change of policy around higher intervention targets of 0.2 / 0.5 lice per fish, and the adoption of individual pen-based interventions as opposed to site based interventions. The treatment plan illustrates how the introduction of cleaner fish in December 2017, new policies, targets and technologies were adopted in a relatively short space of time and have resulted in the last and current cycles showing significantly reduced

rates of sea lice infestation, well below CoGP targets, and frequently remaining at a target rate of around 0 lice per fish.

Whilst Figure 16 illustrates average adult female lice levels at both Carradale sites over 5 years. Figure 18 illustrates average adult female lice levels at both Carradale sites in relation to Marine Scotland targets over the same period. During the last and current cycles, the levels have remained below the Marine Scotland thresholds.

Similarly, company-wide data is available outlining the overall trend of sea lice management, and normalised across all operational sites in terms of overall compliance with the CoGP targets. The data demonstrates an overall continual improvement in management of sea lice levels and compliance with CoGP targets.



*Figure 16: Average adult female sea lice per fish for Carradale (data combined for Carradale North and Carradale South) since 2014. Note Carradale North was first stocked in July 2016.*

## Treatments carried out 2014-2019 Carradale

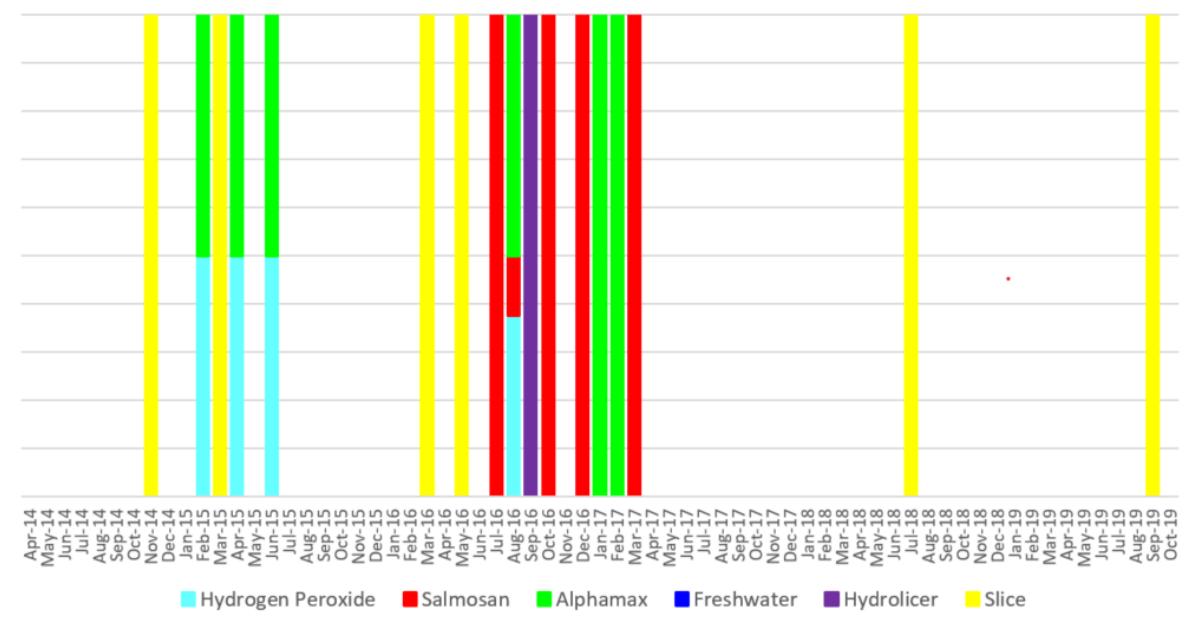


Figure 17: Treatments (medicinal and non-medicinal) administered at Carradale (data combined for Carradale North and Carradale South) since 2014. Note Carradale North was first stocked in July 2016.

## Adult Female Lice Levels vs Marine Scotland Thresholds 2014-2019 Carradale

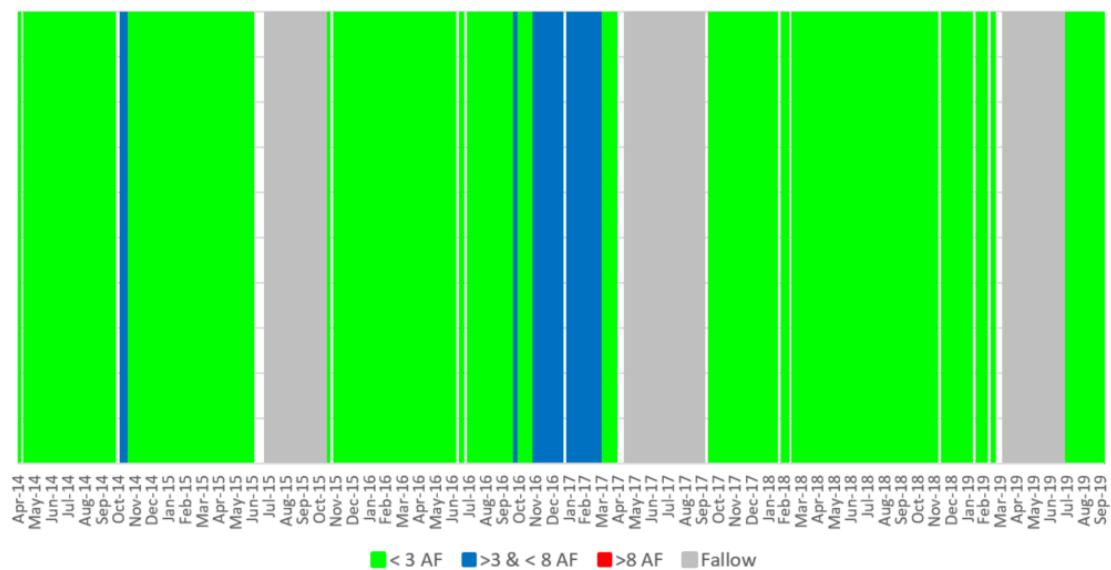
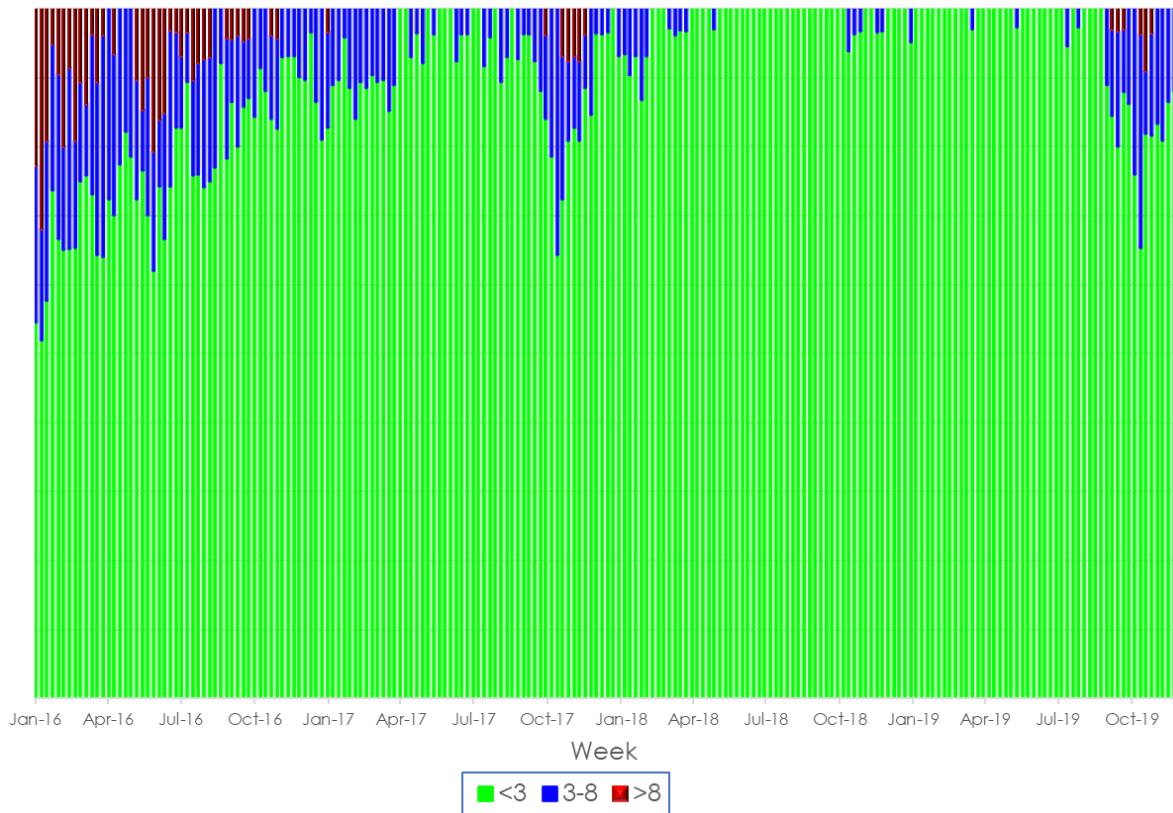


Figure 18: Average adult female sea lice per fish for Carradale (data combined for Carradale North and Carradale South) since 2014 in relation to Marine Scotland targets (<3 adult female lice until June 2019 when this was reduced to 2 adult female lice ).



*Figure 19: Percentage of Mowi Scotland Limited sites with Adult Female Lice Levels which comply with Marine Scotland Thresholds between 2016-2019.*

### 13.7.2 Escapes

The likelihood of escape is low due to advances in technical standards of equipment. An Equipment Attestation has been provided in Annex 5.

Recent commitments to technical standards (see Section 7) have increased the infrastructure requirements to reduce potential failure of marine infrastructure. Similarly, measures to reduce predator interactions, which can often result in the damage to netting, have subsequent beneficial impacts and mitigate against risk of escapes.

Containment continues to be an extremely high priority for Mowi because failures in containment are both an economic loss for the company and may result in an interaction with wild salmonids. The Company's strategy will continue to concentrate primarily on the prevention of escapes and includes appropriate systems and procedures to deal with a breach in containment, should this occur. A copy of the Containment and Escapes Contingency Plan is provided in Annex 14.

The potential risk of escapes is considered low.

## 13.8 Summary

Scoping responses highlighted concerns around the potential transmission of farm-origin sea lice to wild salmonid populations. The receptor salmonid population is considered to have high sensitivity due to the conservation value and sensitivity of salmonid populations within Kilbrannan Sound.

Site specific sea lice data returns in Kilbrannan Sound for both Carradale sites since operations began at Carradale South in 2010 indicate a challenging period over the 2016/2017 winter due to abnormally high water temperatures that lasted for extended periods and adverse weather conditions hindering boat operations and therefore treatments. A similar event is very unlikely to be repeated due to the introduction of cleaner fish that are now used at the site, additional proven technologies being available and improved management policies. Excellent compliance rates in the previous and current cycles are thought to result from the introduction of cleaner fish as well as internal policy changes for lice management within the company, in parallel with an internal investment programme in non-medicinal treatments. This is also reflected by the increasing number of sites in the company that are in compliance with Marine Scotland thresholds.

On this basis, the significance of the potential impacts to wild salmonids is considered minor. To ensure that the wild salmonid populations are monitored for population status and lice loadings, an enforceable regional EMP is proposed to enable data sharing amongst key stakeholders, allowing ongoing evaluation of the novel mitigation measures, with commitments to share data on lice levels within the farm in addition to monitoring wild salmon. The regional EMP covers the existing sites in Kilbrannan Sound.

## **14 Impacts upon species or habitats of conservation importance, including Sensitive Sites**

### **14.1 Introduction**

This assessment considers designated sites and associated species that may be affected by the proposed North Kilbrannan fish farm. This section should be read in conjunction with Section 10, Section 12 and Section 13.

In the case of birds, the potential for impacts on qualifying interests of Special Protection Areas (SPAs) is examined in detail in the Project's Habitat Regulations Appraisal Ornithology Report (Jackson, 2020) in Supplementary material 3. This identifies potential for Likely Significant Effect on Ailsa Craig SPA in relation to potential impacts to breeding seabird species.

### **14.2 Consultation**

Three statutory consultees (Argyll and Bute Council, SEPA, and SNH) provided relevant responses to this assessment during the Scoping process. Advice is summarised in Table 20. Most of the impact assessment in relation to this advice has been conducted in previous sections of the EIA.

*Table 20: Summary of advice received during the scoping process.*

<b>Consultee</b>	<b>Date</b>	<b>Advice / Guidance</b>	<b>Response</b>
A&BC	Screening	Harbour seals ( <i>Phoca vitulina</i> ) are protected under the Marine (Scotland) Act 2010. Large numbers of harbour seals are known to use Sgeir Bhuidhe as a Haul-Out Site, which is approximately 2km north of the farm proposal. Under the Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014, this raises an Officer concern. With this in mind, the	Section 12

		applicant must consider and detail appropriate mitigation within their final planning application	
SEPA	Screening	<p>There are no marine sites, designated under the Conservation (Natural Habitats, etc.) Regulations 1994 (as amended), or the Marine (Scotland) Act 2010, of concern within a 3km search radius of the proposed fish farm.</p> <p>There are records of the following PMFs within 3km of the fish farm, though none are known to be of national importance: harbour porpoise, basking shark, harbour seal, grey seal and black guillemot.</p>	Section 12
SNH	Screening	<p>The proposed new site at Cour Bay, North Kilbrannan is not within an SPA for marine bird features, but there is connectivity with SPAs within foraging range of qualifying features. Most relevant for this new proposal is Ailsa Craig SPA and an assessment of the potential effects on this SPA should be made, in view of the site's conservation objectives.</p> <p>Potential impact pathways for marine birds in relation to finfish farms are: fatal entanglement in top, cage or antipredator netting or in any nets deployed to recapture stock in event of escape; direct displacement from the farm footprint; disturbance in the vicinity of the farm and/or associated vessels; and, loss of or damage to prey-supporting habitats in vicinity of the farm and/or as a consequence of export of organic materials or chemicals from the farm site. Nocturnal seabirds may also be disorientated by presence of artificial lights. Likely significant effects for Ailsa Craig SPA exist for gannet, herring gull, lesser black-backed gull and guillemot, due to potential for entanglement risk. The other impact pathways are not considered to have LSE for any of the qualifying features and are therefore not considered in detail.</p>	<p>Section 12</p> <p>The development's shadow HRA report (Supplementary material 3) examines the potential for North Kilbrannan to have adverse impacts on the integrity of SPAs and provides information to assist the competent authority to undertake an Appropriate Assessment.</p> <p>The HRA report concludes that the potential for LSE on qualifying interests is limited to Ailsa Craig SPA.</p> <p>The detailed Appropriate Assessment information provided in the HRA report indicates that North Kilbrannan would not have an adverse impact on the integrity of Ailsa Craig SPA on account of the developments embedded mitigation measures designed to prevent impacts on birds.</p>
SNH	Screening	<p>In our view, this proposal is likely to have a significant effect on the Atlantic salmon feature of the Endrick Water SAC. Consequently, Argyll and Bute Council, as competent authority, is required to carry out an appropriate assessment in view of the site's conservation objectives for its Atlantic salmon qualifying interest. This assessment should include an appraisal of the following:</p> <p>We would recommend that as an initial step to consider the potential connectivity between this site and the Endrick Water SAC that sea lice dispersion modelling is undertaken and provided with the final application / EIA. In addition, this information will help to assess the potential connectivity between this site and any other existing and proposed sites in the Firth of Clyde which may help to inform cumulative assessment and identify appropriate areas which may require co-ordinated management in an area based EMP or similar.</p>	Section 13, Annex 12, Supplementary material 2

## **14.3 Methodology and Information Sources**

### **14.3.1 Desk Assessment**

A desk based assessment to establish baseline environment, ecological importance and potential impacts to species and habitats of conservation importance was carried out. The following resources have been referenced to inform the assessment:

- National Marine Plan Interactive (NMPi)  
<https://marinescotland.atkinsgeospatial.com/nmpi/> ;
- SNH SiteLink <https://gateway.snh.gov.uk/sitelink/> ;
- Marine Scotland Feature Activity Sensitivity Tool (FEAST)  
<http://www.marine.scotland.gov.uk/FEAST/Index.aspx> ;

Mowi submitted details of previous benthic video survey tracks to SEPA and SNH in addition to deposition modelling.

### **14.3.2 EIA**

Receptors identified are classified in value according to the selected examples described in Section 4. The overall significance is determined on the basis of the relationship of the value of the specific receptor against the magnitude of the impact to define a level of overall significance.

## **14.4 Baseline Environment**

### **14.4.1 Benthic Surveys**

The 2018 baseline video survey comprised 3 video survey transects, the footage of which has been viewed to identify occurring species, habitat types and zonation using the Marine Habitat Classification Hierarchy and SACFOR abundance scale from the JNCC website (2017). The full video survey report can be found in Annex 3 and relevant impact assessment can be found in Section 10.

The video analysis did not identify any priority marine feature species or habitats and no designations within the area of the site have been identified relevant to this benthic video survey.

### **14.4.2 Designated Sites**

A search of designated sites was carried out to identify relevant sites of conservation importance:

- A 100km search radius was applied to identify relevant SPAs designated under the EU Birds Directive;
- A 30 km search radius was applied to identify relevant SACs designated under the EU Habitats Directive;
- A 7 km search radius was applied to identify relevant SSSIs under the Nature Conservation (Scotland) Act 2004;
- Sites with exclusively terrestrial features were not included.

For non-bird taxa, no relevant internationally or nationally designated areas were identified in or near the area of North Kilbrannan. However, following scoping advice by SNH, Endrick Water SAC, located farther than 30km from North Kilbrannan, is considered relevant. In-house lice connectivity modelling shows low probability that North Kilbrannan and the Endrick Water SAC will be connected.

A shadow HRA (Supplementary material 2) for Endrick Water SAC is provided to assist the Competent Authority to undertake an Appropriate Assessment. Mowi proposes an enforceable EMP for Kilbrannan Sound (Annex 12).

#### *Acoustic Deterrent Devices (ADDs)*

The evidence of impacts on non-target species is varied and can depend on a number of variables, however it is accepted that ADDs can result in the exclusion of harbour porpoise from an area. ADDs are currently available for use at the Carradale farms with a condition attached to the permission. Mowi wishes to retain this option for North Kilbrannan. SNH, in the Management Plans for the area recommends the implementation of ADD Deployment plans and Codes of Conduct for existing developments. Section 12 details a policy and deployment guidance for the use of ADDs, which is designed to commit to targeted, discrete and auditable use of ADDs. Implementation of the mitigation measures proposed in Section 12, lack of evidence to suggest this specific area has relative importance for Harbour Porpoise, and consideration of the nature of site activities to date indicate that the magnitude of this impact is likely to be minor.

#### *Entrapment and entanglement*

Removing incentives for wildlife to be attracted to the fish farm is the main mechanism adopted to ensure natural foraging behaviours are not influenced by the potential availability of a concentrated feed source. These measures are outlined in Section 12. Specifically, net mesh specification and tensioning are effective against entrapment and entanglement events. A number of mobile bird and marine mammal species may be attracted to the site, creating a higher potential for entrapment and entanglement risk. Entanglement risk to marine mammals is managed primarily by good design and maintenance of subsea tensioned nets. Mitigation against entanglement is outlined in Section 12. The site is not located in or near a designated area for Harbour Porpoises and SNH considers the risk of entanglement from aquaculture as low<sup>19</sup>. The frequency of such an event is very rare, subsequently the overall magnitude is assessed as minor and the overall impact as moderate.

#### *Displacement*

The layout of the proposed infrastructure is outlined in Section 7. The proposed surface equipment equates to an area of approximately 1.37ha, whereas the proposed moorings equates to a maximum area of approximately 30.6ha. The area is not designated or recognised as a notable feeding or breeding ground. The magnitude of the impact is assessed as negligible and overall impact minor.

#### *Disturbance from Vessel Noise and Movement*

Vessel activity associated with the North Kilbrannan site will include small rapid staff transfer boats, a workboat and larger fish stocking/ harvest vessels. The proposed location is in an area with relatively low commercial and recreational vessel movement.

Argyll and Bute council has noted that Sgeir Bhuidhe is a seal haul-out site, approximately 2km north of the farm proposal. SNH has advised that Sgeir Bhuidhe is not a designated haul out site. Nonetheless, as standard operating practice, staff will be instructed to avoid approaching the haul-out site to minimise any disturbance to seals that use it.

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<sup>19</sup> <https://apps.snh.gov.uk/sitelink-api/v1/sites/10508/documents/59>

In SNH's management guidelines, no further management is required, provided best practices are followed. The magnitude of the impact under the context of existing baseline activity is considered negligible and overall significance, minor.

#### *Eutrophication*

The assessment undertaken in Section 11 indicates that nutrient enrichment will be within the threshold criteria both on the basis of the individual North Kilbrannan site and cumulatively with Carradale North and Carradale South, the only other operational fish farm in Kilbrannan Sound. The magnitude of the impact is classified as negligible and the overall significance is assessed as low.

### **14.5 Monitoring**

#### *EMP for wild salmonids*

Monitoring measures include implementation of a regional EMP, which in addition to commitments on synchronous stocking of farmed salmon, sea lice targets of 0.5 adult females per fish for pens with cleaner fish (0.2 adult females per fish for pens not stocked with cleaner fish) and transparent data sharing, outlines details of how lice are monitored within fish farms. The proposed EMP is provided in Annex 12.

A commitment to undertake annual wild salmonid surveys both locally, and across selected coastal waters, if required, is also provided. Stakeholder meetings and publication of Statement of Operational Practice (SOP) will be published covering the control of sea lice and other matters in the EMP on the Kilbrannan Sound fish farms. The SOP will encompass the minimum operational fish health standards that Mowi aim to achieve and cover the range of issues highlighted in the EMP. In addition:

- Site staff will be required to record all lethal and non-lethal incidents involving predators and to review each incident to determine if measures can be put in place to prevent reoccurrence in the future and record the nature and extent of interactions with wildlife. This will be collated on a regular basis by the company's auditing team.
- The Predator Management Plan outlines specific commitments to log and record specific information relating the use of ADDs.

#### *Birds*

Mowi will routinely record all bird entrapment and entanglement incidents as outlined in Section 12. No other bird monitoring is proposed.

#### *Marine mammals*

Mowi will routinely record all seal predation incidents and the use of ADDs as outlined in Section 12. No other marine mammal monitoring is proposed.

#### *Benthic communities*

Mowi will monitor the benthic environment according to the North Kilbrannan Seabed and Water Monitoring Plan (SWMP) associated with the site's SEPA CAR licence.

### **14.6 Summary**

No relevant designations for species or habitats of conservation importance exist near North Kilbrannan, but following advice by SNH, two distant protected areas are relevant. Impact assessments on the qualifying interests of these protected areas are presented separately in

the Shadow HRA for Endrick Water SAC (Supplementary material 2) and in the Shadow HRA Ornithology Report (Supplementary material 3) for relevant SPAs.

A Regional EMP focused on wild salmonid populations using Kilbrannan Sound is proposed, covering the only operational sites, North Kilbrannan, Carradale South and Carradale North, all of which are operated by Mowi. The Regional EMP will provide the framework for monitoring, communication channels, sharing of data, meetings, and the desired outcomes of the increased knowledge and working partnerships that will ultimately result in improved farm management practices.

## 15 Navigation, Anchorage, Commercial Fisheries, other non-recreational maritime uses

### 15.1 Introduction

The physical presence of infrastructure has potential to obstruct or impede the activities of other maritime users, including commercial fisheries or military operations. Operational activities at the Carradale sites in Kilbrannan Sound have not generated any adverse impacts, as far as Mowi is aware, on surrounding navigational traffic to date. This assessment considers the predicted impacts arising from the proposed North Kilbrannan site.

### 15.2 Consultation Responses

Statutory and non-statutory stakeholders were consulted at the pre-application stage and over the scoping period. Responses to the scoping request are summarised in Table 21.

*Table 21: Summary of advice received during the scoping process.*

Consultee	Date	Advice / Guidance	Response
A&BC	Scoping	<p>The farm is proposed to have a moorings area of 30.6ha. In the final planning application, the applicant is requested to provide an assessment of how the footprint of the farm (surface and seabed mooring area) will affect or interact with navigation, commercial sea fishing (prawn/crab trawling/creeling), and recreational interests (sea angling, recreational boating &amp; kayaking).</p> <p>ScotMAP data (December 2019) has identified the surrounding marine area of the farm as being of low-medium value for nephrops/crab creel and trawl fishing. However, the overall moorings area (30.6ha), might interact with fishing activity, and could be considered significant. With this in mind, and as the proposed site is new, the applicant is advised to consult with the West Coast Regional Inshore Fisheries Group (WCRIFG), and the Clyde Fishermen's Association (CFA) via the Chair in the first instance to discuss pre-planning.</p> <p>The applicant should seek to take cognisance of local inshore fishing concerns and discuss with the WCRIFG and the CFA how mitigation might be achieved in the context of aquaculture installations or expansions.</p> <p>The applicant should seek to locate and design</p>	Section 15.5

		<p>proposals in a way that minimises impacts on local inshore commercial fishing interests.</p> <p>In the final planning application, the applicant is requested to submit mooring and cage coordinates, including details of equipment attestation, and maps detailing pen group. In addition, the applicant is requested to provide full details of underwater and navigation lighting within the final application.</p>	
CFA	Screening	<p>As the largest fishing association in the Clyde Marine Area, representing just under 60 boats and around 200 fishermen at any one time, many of who would be directly impacted by the proposed development, we have not been approached by MOWI and as such have received no relevant data or negotiation or compromise regarding what would be entailed for the development prior to this formal request. Therefore, we cannot support this proposal, with reasons following.</p> <p><b>Cooperation</b></p> <p>In years gone past, the local fishing industry would seek to cooperate aquaculture companies to find a compromise on space sharing. Of course, the fishing sector was always the party to lose access as the initial marine user, but they understood that it was sensible to try and work together to deliver the best possible outcomes for all. Initially, the aquaculture sector also seemed to understand the importance of cooperation with marine neighbours. Today however, local fishermen feel that these co-operative methods have now changed and plans are submitted by aquaculture companies without discussion or co-operation with local fishing interests. Indeed, they may submit being fully aware of conflict with local fishing.</p> <p><b>Loss of Fishing Ground to Indigenous Wild Fishermen</b></p> <p>The local fishing community are becoming increasingly concerned with the increasing loss of indigenous fishing grounds to aquaculture developments. We are of the opinion that the current level of fish farms in the area are already in excess of what seems sensible. We are not in any way against sustainable fish farming, but we do feel that it should be in balance with existing activities, not in favour of. Please note that indigenous, wild fishing frequently loses space to various projects, from cable laying, MPAs, NTZs, leisure pursuits, the Royal Navy and to expanding aquaculture. We wish to be good neighbours who are supportive of other businesses and activities, but we cannot continue to lose fishing grounds in all directions. Fishing can only happen in particular areas, we firmly want to ensure that we continue to have a strong fishing sector, as well as other sectoral development, but to do this we must start to moderate the loss of space. This particular proposal will take away significant safe fishing grounds for prawn fishing. We understand that salmon farming brings some jobs to the local</p>	<p>Mowi discussed the development with CFA by e-mail and in a conference call.</p>

		<p>area, but so do other sectors and in some of those cases profit is more likely to stay in Scotland than it is with salmon farming which is often owned by multi national companies, like that of MOWI. The expansion of aquaculture should not be at any cost and it should not threaten local indigenous marine professions such as fishing.</p> <p>We would be happy to provide the fishing tracks of local generational fishing boats to help establish that local boats have fished in this area for many years if they should be requested.</p> <p><b>Loss of Shelter/Safe Grounds and Economic Loss</b></p> <p>The location of fish farms are frequently in safe fishing areas, which means that when the weather is poor, if safe and sheltered fishing grounds are increasingly dedicated to fish farms, fishermen either face the choice of no safe areas to fish and so may tie up, or they are forced to take unreasonable risks to remain economically viable. We do not support this site as it will encroach further into safe, wild fishing grounds.</p>	
MOD	Pre-application	[T]he MOD has No Objection regarding this activity in the location specified	Section 15.5.4
RYAS	Pre-application	<p>As can be seen on the AIS heat map of recreational sailing on NMPi (Productive/ Leisure and recreation/ Recreational AIS intensity), most recreational vessels on passage through the Sound keep more towards the Arran shore. Although only about a quarter of recreational vessels transmit an AIS signal, their tracks are good representations of where most boats go. Local boats and those tacking against the wind may go closer inshore but the proposed farm is still close enough to the shore to not pose a problem. The nearest anchorage listed in the Clyde Cruising Club Sailing Directions and Anchorages Firth of Clyde volume (currently being revised) is Grogport about 6 km to the south. Thus I see no obvious risk posed to recreational navigation by the proposed farm</p>	Section 15.5.1

### 15.3 Information Sources and Methodology

The following information sources were accessed to inform the assessment:

- National Marine Plan Interactive (NMPi)  
<https://marinescotland.atkinsgeospatial.com/nmpi/> ;
- Admiralty Charts; and
- Marine Harvest (Scotland) Limited 2009 Environmental Statement in support of planning application 09/00905/MFF;
- Marine Harvest (Scotland) Limited 2015 Planning Application (15/01939/MFF) Supporting Information

The assessment methodology for assessing significance is outlined in Section 4.

### 15.4 Baseline Assessment

The following non-recreational marine users and activities were identified near North Kilbrannan:

- Kilbrannan Sound is in a Military Exercise Area which covers most of the West Coast of Scotland;
- The nearest port, harbour, marina or slipway is the Claonaig ferry terminal approximately 7.2km away;
- There are no ferry routes near North Kilbrannan;
- Fishing effort and relative value of fishing in the area around the proposed location of North Kilbrannan are medium. Most of the fishing effort and value are concentrated over on the other side of Arran in the Firth of Clyde.

#### *15.4.1 Other Leaseholders*

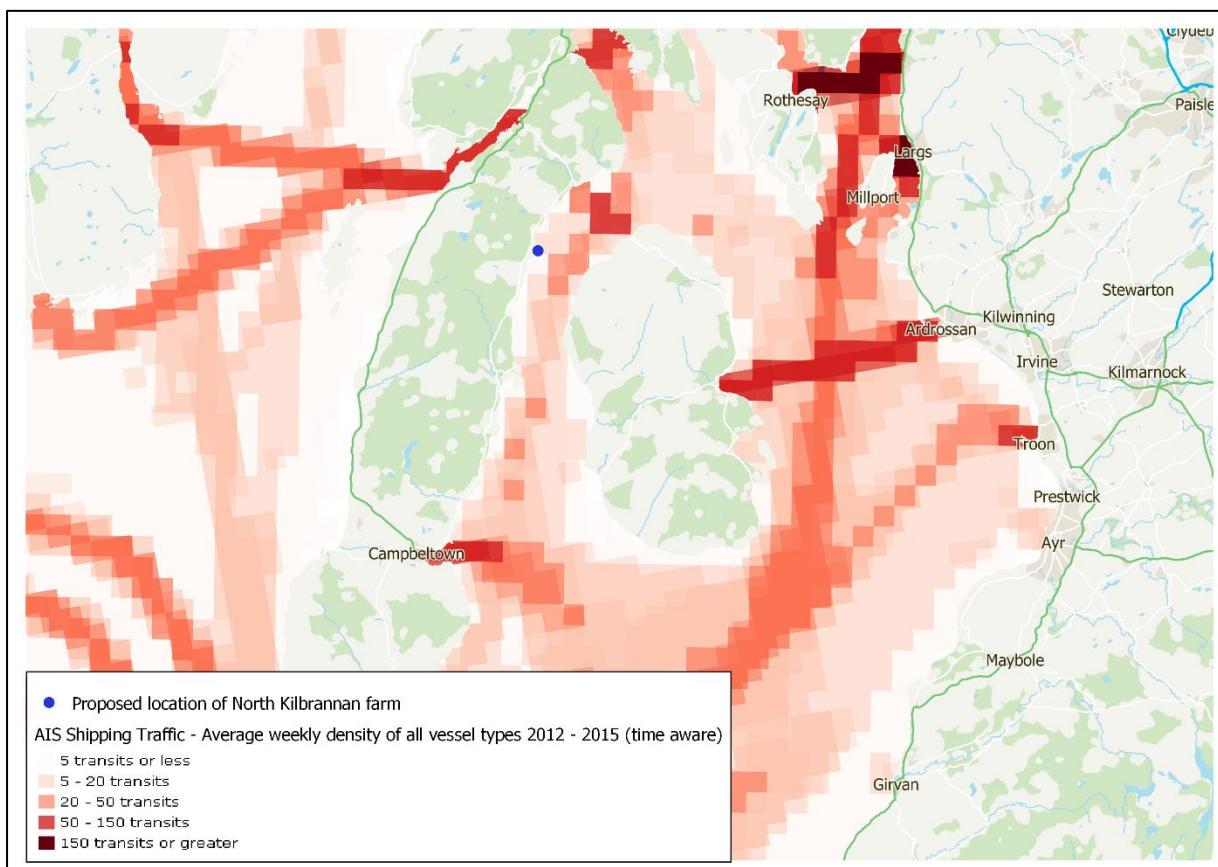
No other leaseholders are present in the area.

### **15.5 Impact Assessment**

#### *15.5.1 Navigation*

Site infrastructure can potentially pose a navigation risk both to commercial and recreational traffic, mainly through restricting movement and conflicting with shared infrastructure. The proposed development is a new fish farm. The site will be lit and marked in accordance with specifications as advised by the NLB.

North Kilbrannan is located inshore, at the western periphery of the Kilbrannan Sound. Key navigational receptors include fishing vessels and recreational vessels, both of which show a low level of intensity within Kilbrannan Sound. The site is in an open area of water, maintaining a safe passage for vessel traffic (Section 21). Figure 20 illustrates that the most heavily used shipping transits in the area are concentrated to the very north of Kilbrannan Sound, around Campbeltown and through the Firth of Clyde between the island of Arran and the mainland.



*Figure 20: Shipping Traffic in the study area between 2012-2015.*

Commercial shipping is assessed as a low sensitivity receptor due to the low frequency of transits. The location of the farm, inshore and out with the main route through Kilbrannan Sound, indicates that the magnitude of the impact will also be low. Overall impact on commercial navigation is assessed as minor.

Following screening advice by RYA Scotland, recreational shipping is assessed as a low sensitivity receptor. The location of the farm, inshore and out with the main route through Kilbrannan Sound, indicates that the magnitude of the impact will also be low. Overall impact on recreational navigation is assessed as minor.

#### 15.5.2 Commercial Fisheries

The key potential impacts associated with the proposed modifications at North Kilbrannan are:

- The physical displacement of fishing activity from the area;
- Impacts arising from the depositional footprint of carbon and infeed residues; and
- Impacts on navigation and safety arising from additional infrastructure.

Data from the Marine Scotland NMPi indicates that most commercial fishing vessels in the area operate in the Firth of Clyde (Figure 21) with an average of 14 to 20 vessels operating in Kilbrannan Sound.

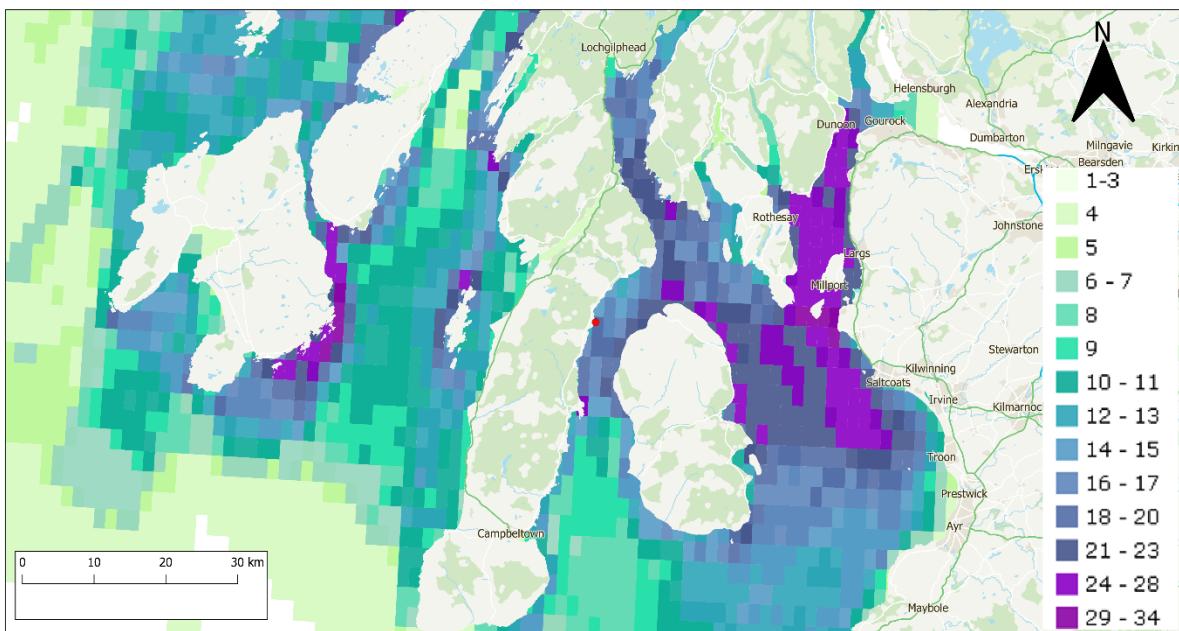


Figure 21: Number of inshore fishing vessels operating 2007-2011

Commercial fisheries populations are classified as a low sensitivity receptor in terms of economic value due to the existing low commercially viable marine populations identified. The number of fishing vessels utilising the area is also low, therefore, overall significance on commercial fisheries is assessed as minor.

Mowi had several discussions with key local stakeholders with fishing interests in the area several times during the past year.

#### 15.5.3 Other Leaseholders

No other leaseholders were identified in the area.

#### 15.5.4 Military

The site is in a military exercise area which covers much of the West coast of Scotland. The MOD Safeguarding Estates were contacted to inform them of the proposal. The response was that "the MOD has No Objection regarding this activity in the location specified".

### 15.6 Summary

Impacts on navigation, commercial shipping and fisheries were assessed drawing on publicly available data and consultation. Kilbrannan Sound represents a relatively low intensity shipping route. The proposed location of North Kilbrannan, within inshore waters, close to the coast, is unlikely to impact normal shipping traffic and activities. Overall impacts on navigation and shipping were assessed to be minor.

Public data and consultations regarding the proposed modifications indicate that although the area is utilised for inshore fisheries, fishing intensity is low. Therefore, the development is not expected to have a significant impact on commercial fisheries. Finally, the MOD and RYA Scotland were consulted at the pre-application stage and had no objections.

## **16 Landscape and Visual Impact Assessment**

### **16.1 Summary**

The complete Seascapes, Landscape and Visual Impact Statement (SLVIA) is in Annex 15. Appendices to the report with large pictures can be provided upon request.

The SLVIA refers to proposals by MOWI (Scotland) Ltd. for the development of a finfish farm to the north of Cour Bay, on the east side of the Kintyre peninsula, Argyll. This report accompanies the planning application to Argyll and Bute Council for the installation of 12 pens and 400 tonne capacity feed barge as well as associated development of moorings and nets.

Munro Landscape Ltd, chartered landscape architects was commissioned by MOWI to undertake the SLVIA.

In summary, the findings of this SLVIA are as follows:

- Within the context of the Kintyre Peninsular, the proposals are well located to contain Landscape and Visual Impacts. The proposals are located away from highly sensitive areas of coast, within an area of limited intervisibility and outwith interference with the valued views across the Kilbrannan Sound to Arran.
- The report finds that there are impacts upon historic sites, recreational resource and residential properties, with some higher levels of adverse effects encountered within close proximity to the proposed site, which require due consideration. However, these impacts are well contained to preserve the overall integrity of the seascape and landscape of the area both around Cour and Crossaig and the wider Kilbrannan Sound.
- Guidelines for form and layout have been adhered to, with successful reduction in potential effects through screening from landform and avoidance of interaction with sensitive landscape features and elements.
- The proposals are found to be in compliance with the Argyll and Bute Local Development Plan, with the majority of levels of significance recorded within acceptable levels of significance in EIA terms.

## **17 Noise**

### **17.1 Introduction**

Noise from farming operations is predominantly intermittent and is almost entirely confined to daylight hours. This assessment considers noise generation from site operational activities on human receptors. Assessment of noise on other biological receptors, specifically ADDs is considered in Section 14.

### **17.2 Consultation**

Noise was considered but not identified as a potentially significant impact during the scoping process. Argyll and Bute Council responded stating that Mowi has “identified satisfactory mitigation”

### **17.3 Methodology and Information Sources**

Potential commercial and residential receptors are identified within a 1km buffer of the site boundary.

- Ordnance survey mapping 1:25:000; and
- Bing Maps.

## 17.4 Baseline Assessment

No significant potential receptors to noise impacts were identified within the 1km buffer from the farm site (Figure 22). No high sensitivity receptors were identified within the buffer area (residential housing, schools or places of worship). However potential receptors included occasional walkers associated with the coastline, recreational users (boats/ kayakers) and fishing boats. Other marine recreational users include yachts and power boats.

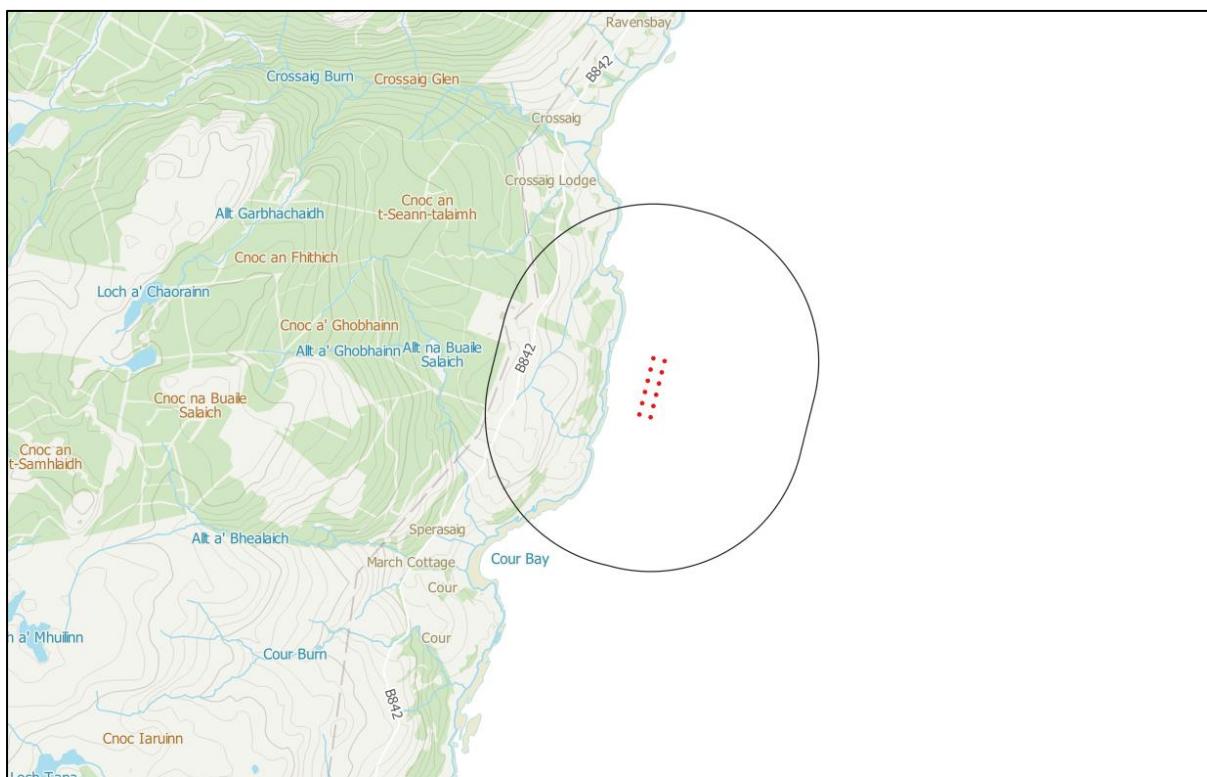


Figure 22: Noise study area; 1000m zone around fish farm.

## 17.5 Predicted Impacts

No stationary receptors were identified. Receptors are most likely to be travelling and consequently noise would be experienced during a limited section of a longer transit, and in the context of reasonable active maritime shipping associated with the transit route through Kilbrannan Sound (Section 15). There is a relatively low level of existing boating activity in the area, including power boating.

Recreational use, namely kayaking and walking are not formalised activities in the area and data suggests a low level of use near the site (Section 20). A small number of kayakers do utilise Kilbrannan Sound, however, most kayakers frequent the official Argyll Sea Kayak Trail that passes across the northern end of Kilbrannan Sound around 40km north. Receptors are assessed to be of low sensitivity and the magnitude of the impact is assessed to be minor, resulting in an overall minor impact.

## 17.6 Mitigation and Monitoring

Operation and maintenance schedules will be in place, under the responsibility of the Farm Manager to ensure site equipment is running efficiently. Should a noise issue be raised, Mowi has in place Environmental and Quality Management System procedures which require corrective actions to be generated. Corrective actions require an investigation to identify a cause and to determine and implement actions to resolve the issues. The situation

will continue to be monitored and reviewed by the Mowi auditing team, and the corrective action is closed once it is resolved.

## **17.7 Summary**

Although a range of transiting marine receptors and other land-based receptors (namely walkers) may experience some temporary noise from both vessel traffic and site feed infrastructure near the development, overall the significance of noise in the context of normal marine traffic such as fishing and recreational vessels is assessed to be of minor significance due to the distance from the shore and low levels of marine activity in the area.

# **18 Cultural Heritage**

## **18.1 Introduction**

Cultural heritage refers to archaeological sites, historic structures, gardens and designated landscapes, historic battlefields and other historic features. In a marine context this can also extend to wrecks and paleo landscapes. The assessment will consider cultural heritage assets that may be subject to direct and indirect effects arising from North Kilbrannan. The setting of a specific asset within the wider landscape can also contribute to the significance of a feature. This aspect is considered in Section 16.

## **18.2 Consultation**

Historic Environment Scotland advised “there are no heritage assets within our remit, as listed above, within the proposed development area or its vicinity. We are therefore content for impacts on cultural heritage assets within our remit to be scoped out of the assessment stated that heritage assets may be scoped out”.

However, Argyll and Bute Council advised that “[t]he proposed fish farm would be located to the north of Cour House, a category A Listed Building. The impacts of the fish farm development on the setting of the listed building requires consideration.”

## **18.3 Methodology and Information Sources**

A desk-based assessment was carried out within a study area of 2km. A review of historic features was carried out using the information sources to identify relevant features of marine cultural heritage importance:

- Historic Environment Scotland: Designations Website
- National Marine Plan Interactive (NMPi); and
- Consultation responses over the scoping period.

The EIA considers both direct and indirect impacts arising from the proposals, however impacts relating to setting are covered in Section 16. Impacts relating to recreational and sport divers are reported in Section 20. Assessment of effects will be based on the following:

- Assessment of heritage sensitivity;
- Magnitude of effect; and
- Assessment of significance of effect.

The general EIA methodology for determining significance is set out in Section 4. In summary, assessments will be carried out using professional judgement, taking into account designations and archaeological/ cultural heritage importance. Significance of effect will be based on a combination of archaeological/ cultural heritage importance, and magnitude of effect. Consideration of the impacts generated by the existing site will also be considered.

## **18.4 Baseline Assessment**

### *18.4.1 Terrestrial Features*

None of the following terrestrial features were found within a 2km radius:

- Listed buildings;
- World Heritage Sites;
- Gardens and Designed Landscapes;
- Scheduled Monuments;
- Properties in Care;
- Conservation Areas; and
- Battlefields.

However, Cour House, situated farther than 2km from the proposed farm, is considered below.

### *18.4.2 Marine Features*

- No historic MPAs were found within a 2km radius.

## **18.5 Impact assessment**

Cour House is designated for its architectural design and materials used in its construction. The building is situated more than 2km away from the proposed location of the farm. Moreover, HES did not ask for it to be explicitly included in this EIA.

The SLVIA (Annex 15) concluded that the introduction of the fish farm site, partially visible beyond the headland of Rubha Riabhach will increase the level of industrial infrastructure within the view. Inland from the headland, the 46m towers of the Cour to Inveraray powerline can be seen to the edge of the forest area and there will be a potential for a perceived connection between these elements and intruding development within the Sound. However, there will be only a small proportion of the proposed site visible, at an oblique view, with only limited change to the overall view, leading to 'Small' adverse effects and 'Moderate' levels of significance.

## **18.6 Summary**

The assessment considered the presence of features of cultural heritage importance within a 2km boundary of the site. No features of cultural heritage importance were identified, apart from Cour House, situated farther than 2km from the site, which will experience small adverse visual effects from partial views of the farm.

## **19 Waste Management (non-fish)**

### **19.1 Introduction**

The purpose of this section is to identify the potential impacts of waste (non-fish) from the development on the environment. SEPA has a statutory role as waste regulator and other consultees may consider this assessment necessary with increasing responsibilities relating to waste management, waste minimisation and recycling in line with European Directives, national statute, local recycling targets and the National Waste Strategy.

### **19.2 Consultation**

Argyll and Bute Council gave no advice or response to the waste management (non-fish) section of the scoping request.

## **19.3 Methodology and Information Sources**

### *19.3.1 Information Sources*

The following information sources have been referenced:

- Mowi Scotland Waste Management Policy;
- Mowi Scotland Waste Collection Procedure; and
- Mowi Scotland ISO 14001 Certification.

### *19.3.2 Impact Assessment*

Waste has not been subject to an assessment. Instead this section reports on general principles associated with site waste management and addresses specific queries raised by consultees.

## **19.4 Waste Generation and Storage**

### *19.4.1 Policy and Certification*

All Mowi sites are accredited to ISO14001. The ISO 14001 certification represents a core set of standards used by organizations for designing and implementing effective environmental management systems and provides a framework and a structured approach to handling waste. Mowi has an internal waste management plan in place provided in Annex 16.

### *19.4.2 Nature of Waste*

The nature of waste generated at a fish farm, its classification and subsequent management routes are detailed in Table 22. Procedures for managing and collecting waste are provided in Annex 16.

*Table 22: Waste, waste classification and management procedures.*

Type of waste	Classification & EWC Code	Disposal	Actions/comments
Household, commercial or industrial	Controlled	Skip (landfill) Council bin (landfill)	Waste transfer note issued at collection.
Fish farm mortalities	Animal by-products (02.01.02)	Ensiled Skip (landfill) Incinerator Waste	Disposal must comply with regulations. Disposal must comply with regulations Waste transfer note issued at collection.
Waste oil, oil/water mixtures, oily rags	Special waste – (13 01 var – please refer to EWC guidance)	Contractor(s)	5 part SEPA Form
Engine Oil Filters	Special waste (13.01.04)	Contractor(s)	5 part SEPA Form
Fluorescent Tubes	Special waste (20 01 21)	Contractor(s)	5 part SEPA Form
“Sharps” boxes (containing e.g. hypodermic needles, scalpels, small glass items)	Special waste	Contractor(s)	5 part SEPA Form
Batteries (lead/acid type)	Special waste (18 06 var - please refer to EWC guidance)	Contractor(s)	5 part SEPA Form
Vaccination containers/pouches	To be disposed of by Vaccination team	Vaccination Team	Disposal by vaccination team must comply with regulations. If vaccination pouches are left on site, 5 part SEPA form to be completed

Chemicals labelled as “Toxic”, “Corrosive”, “Harmful”, “Irritant” or “Carcinogenic”	Special waste (refer to EWC guidance)	Contractor(s)	5-part SEPA Form
Expired medicines/chemicals	Special waste (18 02 03)	Contractor(s)	Waste transfer note issued at collection.
Pen Waste ( <i>contact Pen and Moorings Manager</i> )	Controlled (20 01 90 / 20 01 39)	Contractor(s)	Waste transfer note issued at collection.

## 19.5 Management and Mitigation

Mowi is committed to reducing the waste generated by its fish farming operation and makes every effort to repair and re-use equipment where possible. In the event of the site becoming surplus to requirements or if the equipment needs replacing, all equipment will be removed from the site. This will be utilised elsewhere in the company, recycled, or disposed of appropriately. There are some existing and emerging markets for second hand fish farm infrastructure, for example the construction of ‘Polycrubs’<sup>20</sup>.

## 19.6 Summary

Waste management processes are currently certified under ISO 14001, a respected, international set of standards used to design and implement effective environmental management systems. There are many waste streams generated by fin fish farm operations and the existing management system ensures these are minimised and disposed of appropriately.

# 20 Socioeconomic, Access and Recreation

## 20.1 Introduction

The economic impact assessment for North Kilbrannan was undertaken by Additional Research on behalf of Mowi Scotland. The full report is available as Annex 17. This section provides a summary of the report’s findings.

## 20.2 Summary of assessment

The report sets out an assessment of the economic impact of North Kilbrannan project. The strategic fit and rationale for the project is reviewed and the project demonstrates a strong contribution to stakeholder policy at local, regional and national level. A summary of the socio-economic challenges of the local area further reinforces the need and justification for the project in addressing serious place, economic and community challenges.

Specifically, the project aims to install a fish farm with 12 circular pens of 120m circumference arranged in regular grid (2x6), including associated moorings, a feed barge as well as ancillary single point moorings. The site is located at North Kilbrannan, Kilbrannan Sound, just North of Cour Bay and approximately 9km North of existing Mowi sites Carradale North and Carradale South.

Against this context, the report estimates significant direct economic benefits from the project, including:

- 41 Jobs Supported per Year of Construction (assuming 1.25 years of construction activity)<sup>21</sup>;

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<sup>20</sup> Recycled fish farm material used for the construction of reinforced polytunnels, particularly in exposed island locations.

<sup>21</sup> Not FTE

- 10 Total Peak Operational Jobs FTE; and
- £748,208 Annual Operational GVA Impact.

The report estimates the wider economic impacts benefits of the project, as follows:

- Total Construction Employment (Scotland Level) of 68;
- Operational Peak Employment Jobs FTEs (Scotland Level) of 15;
- Operational Annual GVA Impact (Scotland Level) of £1.2m; and
- For every pound of investment in the project over a 20-year period, approximately four pounds are returned to the Scottish economy.

A brief review of previous evidence and examination of previous cases of similar Mowi projects suggests that the project is likely to have a number of wider benefits, including indirect and induced employment opportunities for residents through employee spending and local supplier linkages, contributing to community sustainability, and contributing to the overall infrastructure of the area.

In terms of maximising the local benefits, key challenges for Mowi are likely to be:

- Minimising ‘leakage’, i.e. ensuring the maximum uptake of training and employment by local residents; and
- Maximising local supplier opportunities for the construction and servicing of the new development, i.e. retaining spending within the local area.

In terms of the wider, Scotland level, economic impacts, these are likely to be most strongly influenced by product and labour market displacement and impact will be greatest when ensuring the nature and timing of the development of the fish farm portfolio remains sensitive to market need. However, this economic benefit will need to be balanced against the commercial priorities of Mowi.

### **Recommendations:**

1. Continue to develop and maintain activities to maximise uptake of direct training and employment opportunities by residents in the project development, but also boosting capacity of local people to service new developments thereby keeping employee and supplier spend within the local area;
2. Maintain an evidence-based approach to assess the market context of other portfolio development to ensure minimal displacement;
3. Continue to explore synergies with local stakeholder bodies to promote community development and employment growth; and
4. Ensure monitoring and evaluation systems are in place to fully capture future project benefits, especially the links between the project and local residents and community.

A summary of economic impact is noted in the table below.

**Table 23: Economic Impact Assessment Summary**

Factor	Detail
<b>Direct Economic Impact</b>	Jobs Supported per Year of Construction 41
	Annual Construction GVA Impact £1.7m
	Total Construction GVA Impact £2.1m
	Total Peak Operational Jobs FTE 10
	Annual Operational GVA Impact £0.75m
<b>Total Economic Impact</b>	Total Construction Employment (Local Level) 64
	Total Construction Employment (Scotland Level) 68
	Total Construction GVA Impact (Local Level) £2.9m
	Total Construction GVA Impact (Scotland Level) £3.2m
	Operational Peak Employment Jobs FTEs (Local Level) 14
	Operational Peak Employment Jobs FTEs (Scotland Level) 15
	Operational Annual GVA Impact (Local Level) £1.1m
	Operational Annual GVA Impact (Scotland Level) £1.2m
	Cost-Benefit Ratio (Local Level) 1:3.4
	Cost-Benefit Ratio (Scotland Level) 1:4.0

## 21 Traffic and Transport

### 21.1 Introduction

Traffic generated by the existence of a marine fish farm can include both marine and terrestrial transport. This assessment considered the likely changes to volume and nature of traffic arising from the proposed farm and evaluated these impacts against existing traffic.

### 21.2 Consultation

Traffic and transport has not been identified as a potentially significant issue during the scoping process. Argyll and Bute Council concluded that “an additional fish farm with additional staff is likely to result in additional journeys to and from the shore base both by sea and land, however, it is not considered that this would be significant”.

### 21.3 Methodology and Information Sources

Information has been gathered regarding existing boat movements, transit routes and vessel specifications from the Carradale sites, as an estimate of the maximum traffic that can be generated by North Kilbrannan. An estimate of the additional requirements has been undertaken based on calculations of feed requirements for the proposed maximum biomass. Further information has been extracted from:

- National Marine Plan Interactive (NMPi);
- Internal company models: feed, harvesting and stocking;
- Consultation with existing site manager; and
- Admiralty charts.

The EIA methodology, including how the assessment has evaluated the sensitivity / value of receptors is provided in Section 4.

## 21.4 Baseline Assessment

Existing shipping traffic around the proposed location of North Kilbrannan was extracted from NMPi. Data extracted from NMPi for aggregated shipping transit data between 2012-2015 is summarised in Table . Vessel types with less than 2 transits a week are not included.

Marine traffic in the area around North Kilbrannan is relatively low, as shown in Table 24. NMPi shows that most of traffic in Kilbrannan Sound is located to the northwest of Arran and around Campbeltown in the south.

*Table 24: Summary of traffic transit density in the vicinity of Carradale North (2012-2015)*

Vessel	Average weekly density (2012-2015)
Recreational Vessels	2 transits or less
Port Service Craft	2-10 transits
Fishing Vessels	2-10 transits

The Carradale sites are operational sites, currently consented at 5,000T maximum biomass together. The sites are not currently operating at full biomass capacity and existing site traffic movements are not fully representative of the site at full operational capacity. The sites are currently serviced from the existing shore base at Carradale Harbour; North Kilbrannan will be serviced from this shore base too. Marine activities associated with the existing sites currently comprise of the following:

- Equipment delivery;
- Shorebase and marine site access;
- Stocking;
- Feed deliveries;
- Treatments; and
- Harvesting.

The above activities are synchronised for the Carradale sites to streamline operations and minimise traffic movement.

Two examples of typical vessels commonly accessing the site at present are illustrated in Figure 23.



*Figure 23: Examples of typical vessels commonly accessing site, a well boat (left) used for freshwater treatments, grading, stocking etc and site-specific workboat (right).*

Current daily traffic movements from the shorebase at Carradale Harbour are serviced by a dedicated site workboat, as illustrated in Figure 23. Current traffic is mainly confined to daily workboat movements, feed deliveries, treatments and harvesting via wellboats.

## **21.5 Impact Assessment**

No new onshore infrastructure is associated with the development. The impact assessment is exclusively focused on impacts to marine traffic.

The installation work is anticipated to require no more than 30 working days. The proposed pens and moorings will be delivered by work boat directly to the site for installation during the late spring/early summer period. The magnitude of the impact is predicted to be low. The area is infrequently used by cargo and dredging vessels who were predicted to be potential high sensitivity receptors.

During operations, workboats will transit between the shore base between the start and end of the working day. Trips per day may increase occasionally to accommodate visitors or urgent equipment deliveries.

### **21.5.1 Stocking**

Fish will be delivered to the site by a dedicated fish carrier, likely to be the Ronja Commander. Stocking will be coordinated with the Carradale sites and the delivery would be combined.

### **21.5.2 Feed deliveries**

The intention is for feed to be delivered directly to the barge by boat. The amount of feed delivered over a production cycle is dependent on many factors and whilst assessments are made, feed deliveries are based on a number of variables including stage of growth, fish health, stocking level etc.

Current feed requirements for Carradale North and Carradale South combined are 10,442T per cycle (22.5 months) which equates to approximately 26 deliveries per cycle. North Kilbrannan is expected to require no more than half the number of deliveries at Carradale North and Carradale South, but likely fewer because of the synergies from combined deliveries.

### **21.5.3 Harvesting**

Salmon harvested at the site are siphoned into compartments in a well-boat and transported directly to the harvest station in Mallaig. The logistics of harvesting are affected by many factors including: the health of fish at sites throughout the company; the growth rates and maximum biomass at the sites; weather; customer and sale conditions; servicing; etc. However, harvesting ordinarily starts after the site has reached maximum biomass and this is likely to be a continual process from 12 months after stocking until the site is falled.

Due to the complexity of harvest planning, a model is used to predict the number of wellboat harvests based on predicted production volumes and the capacity of the well-boats available within the company.

## **21.6 Summary**

The proposed farm represents a small, incremental increase to existing traffic in Kilbrannan Sound. The shore base at Carradale and standard transit routes will continue to be used for movement. No significant issues were highlighted by Argyll and Bute Council during the scoping process. The overall impact of the modifications to the site will result in a slight increase in traffic during a very short construction period. During operations, there will be a small increase in the overall amount of site boat traffic.

## **22 Information Gaps and Uncertainties**

The Environmental Report has drawn on field survey work, compliance reports and modelling. Desk based assessments have drawn on material which may be out of date. The key mitigation against the inherent limitations associated with desk based derived data is consultation to ensure information is appropriate and fit for purpose for EIA.