



Maclean's Nose Atlantic Salmon Fish Farm

Environmental Impact Assessment Report

Marine Harvest (Scotland) Ltd

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Non-Technical Summary

Marine Harvest (Scotland) Limited proposes to increase the maximum biomass at an existing Atlantic salmon farm at Maclean's Nose, on the southern coastline of the Ardnamurchan peninsula, from 2,500 to 3,500 tonnes. Additional infrastructure requirements comprise four additional pens of the same specification and dimensions of existing pens (120m circumference), an upgraded feed barge with higher feed storage capacity and additional single point moorings. The proposals will also require an extension of the existing Crown Estate lease area. A summary of the modifications is outlined in the table below.

Project Component	Current	Proposed
Maximum biomass	2,500 T	3,500 T
Maximum production biomass / cycle	4,250 T	5,950 T
Surface area	1.4 ha	1.9 ha
Moorings area	36.4 ha	53.5 ha
Number of Pens	12	16
Feed Barge	C-Cap 200T	GaelForce 400T
Rafts	2 X (2m x3m)	1 x (2m x 3m) and 1 x (2m x 5m)

Scotland's National Marine Plan, adopted in 2015, sets specific industry targets, including a target to grow marine finfish sustainably to 210,000 tonnes (whole, wet fish) by 2020¹. To meet this target requires substantial effort from current fish farm operators to increase biomass sustainably. In line with this target, and recent changes in the regulatory regime to allow increases in maximum biomass in fish farms beyond 2,500 tonnes, MHS have selected the site at Maclean's Nose for expansion. Originally Maclean's Nose was progressed as one of three sites within the Loch Sunart complex to be taken forward as a combined application however, following feedback from consultees, where a number of concerns were expressed at the scale of the cumulative proposals, an incremental approach will be taken to future site expansion in the area. This approach was taken to enable stakeholders to review the performance of the site, via the Environmental Management Plan (EMP) and the suite of new management measures recently implemented to enhance environmental performance, including sea lice management and Acoustic Deterrent Device (ADD) policy.

Consultees contacted during Scoping as part of the Environmental Impact Assessment (EIA) process includes a range of statutory and non-statutory consultees. Specific issues were followed up in email correspondence, meetings or telephone discussions. An EIA methodology has been developed to assess the significance of impacts based on the sensitivity, or value, of a receptor against the magnitude of the anticipated change.

Benthic Environment

The existing site at Maclean's Nose has been operational since 2015 and has achieved passes for all compliance monitoring, since operations commenced. Impacts to the benthic environment were determined based on full flow hydrodynamic model simulations, calibrated

¹ <http://www.gov.scot/Publications/2015/03/6517>

with actual site data, based on the recently released NewDepomod software platform. In terms of carbon deposition, the total mass of solids released was estimated to be 1,429,136kg per year, and the model predicted the impacted area (0.75 Infaunal Quality Index; IQI) to be 280,625m². This complies with Scottish Environment Protection Agency (SEPA) requirements to restrict the area where IQI may fall below 0.75 to less than 0.5 km or 500,000m². An accompanying validation exercise indicated that measured IQI values were higher than the modelled IQI suggesting the impacted area is less than the modelled output.

NewDepomod modelling was carried out for both the existing and new site configuration to characterise the degree of change arising from the proposed site extension. NewDepomod modelling shows an increase of the area impacted of around 10% based on the current configuration of 2500 tonnes. The introduction of more accurate modelling techniques using calibrated models has resulted in an overall decrease of the benthic sampling area (one of the key historic metrics used to characterise impacts; Infaunal Tropic Index 30) from 155,543m² to 130,625m².

The increased area of deposition of organic material may lead to the temporary modification of benthic communities directly beneath the pen group. Burrowed mud type habitats are considered to have low sensitivity to deoxygenation and are considered to tolerate sediments relatively high in organic content². The magnitude of the impact arising from the additional site infrastructure on the benthic community is assessed as minor, due to the reversible impact on the existing benthic species assemblage, within an area that complies with SEPA requirements (0.5km²). The receptor sensitivity (benthic community) is classified as low to medium based on the classification of receptor sensitivity outlined in the EIA methodology. The higher sensitivity value is attributed to the slightly higher frequencies of *Funiculina quadrangularis* i.e. the site contains one or more Priority Marine Features (PMFs) but would not ordinarily qualify for designation. The overall significance of the impact is classified as minor to moderate.

To determine an appropriate consent mass for in feed treatments (Slice®), NewDepomod was run through a number of iterations until infeed residues did not breach the required limits. A successful pass was achieved with an Over Treatment Factor of 0.7, i.e. approximately 70% of the full biomass of 3500 tonnes can be treated and continue to comply with SEPA standards. This is equivalent to a released mass of emamectin benzoate of 770.8g. After 118 days, the peak concentration of EmBZ in the near-field area did exceed the trigger value of 7.63 µg kg⁻¹ by 94.9 µg kg⁻¹. Subsequently enhanced monitoring will be required at the site if Slice® is used.

A recent review by the Scottish Association for Marine Science (SAMS) highlighted that the key receptors most sensitive to emamectin benzoate were scavengers, particularly crustaceans. However, little impact has been identified in relation to impacts on the benthic environment. The review emphasises the precautionary nature of SEPAs standards and indicates that the threats to the PMF features should be minimal so long as standards and procedures are adhered to. Subsequently although the sensitivity of the receptor is classified as low to medium, none of the species recorded represent the most 'at risk' species (crustaceans) and the highly precautionary nature of SEPA EQSs have also independently been evaluated to generate no more than minimal impacts on the benthos. The magnitude of impacts is subsequently assessed to be negligible for this particular species assemblage,

² Marine Scotland: FEAST (Burrowed Mud Habitat) Available online <http://www.marine.scotland.gov.uk/feast/FeatureReport.aspx#0>

subject to compliant application of in feed treatments. The overall assessment of significance is negligible to minor.

Water Column

Maclean's Nose is located in an area of open water, outside of any Locational Guidance waterbody. Nutrient inputs arising from the proposed modifications to Maclean's Nose were calculated on the basis of both the individual site, and cumulatively to include four other sites present across Loch Sunart and north of the Sound of Mull. The open water status of the location was assessed to have relatively low sensitivity to changes in nutrient enrichment. Nutrient contributions from Maclean's Nose represent 5.6% of background value, below the UK Technical Advice Group (UKTAG) trigger of change, subsequently the magnitude of this impact is considered minor in terms of EIA. Similarly, the cumulative nitrogen contribution is assessed to contribute less than 1% of the background value and 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 Environmental Quality Standards (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.

Interaction with Wild Salmonids

The existing site at Maclean's Nose has been operational since 2015 and has not been linked with specific interactions with salmon, nor has the site suffered any escapes. Scoping responses highlighted significant concerns around the potential transmission of farm-origin sea lice to wild salmonid populations. The receptor salmonid population is considered high sensitivity due to the conservation value and sensitivity of salmonid populations within Loch Sunart, and potential implications for Sea trout, in particular, as host species for the freshwater pearl mussel populations in the Mingarry and Ardnamurchan Special Areas of Conservation (SACs).

Site specific sea lice data returns from Maclean's Nose indicate very high levels of compliance, and maintenance of sea lice populations well below Code of Good Practice (CoGP) requirements, in addition to consistently maintaining target levels of near zero rates of infestation. Improved compliance rates are also a result from ongoing internal policy changes for lice management within the company, in parallel with an internal investment programme in non-medicinal treatments and cleaner fish. On this basis, the significance of the potential impacts to wild salmonids is considered low. To ensure that the wild salmonid populations are monitored for population status and lice loadings, a regional Environmental Management Plan (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 will cover the existing sites across the Loch Sunart complex.

Interaction with Predators

A baseline assessment at Maclean's Nose indicates that the site will be exposed to a range of predator interactions including seals, birds and otters. Management of the site will include implementation of a range of standard mitigation measures addressing primary attraction mechanisms, to ensure that waste is minimised and feed is securely stored. This is principally achieved by ensuring barrier systems are in place via tensioned netting to remove the potential of physical interaction with the site. Responsive measures, are also proposed to address ongoing challenges by predators; mainly seals. These measures include the use of ADDs and, under extreme circumstances, humane dispatch under licence. However, tensioned

netting systems have, to date been effective at deterring seals with no requirement to operate ADDs since the site became operational.

The site is located within the Inner Minch and Hebrides candidate SAC, subsequently the use of ADDs has potential to impact a range of non-target species, including the qualifying feature of the designation; Harbour porpoise. A full assessment of the potential impact on Harbour porpoises is detailed in 'Species and Habitats of Conservation Concern'. Although ADDs have not been used on site to date, mitigation to ensure use of ADDs can be deployed - if required at the site - has been developed as a draft Policy and Deployment Guidance. The guidance provides an outline framework for the managed use of ADDs, to address specific challenges from seals and minimise impacts on non-target species.

The site's previous track record at managing predators without the use of ADDs, indicate that predators are currently managed effectively at the site. The proposed extension to the site will include the implementation of the proposed Policy and Deployment Guidance for ADDs providing a framework for a robust decision-making and recording process for the use of ADDs in the future³.

Species and Habitats of Conservation Importance

The proposals at Maclean's Nose represents an extension to the existing site which has been operational since 2015. The site lies on the northern boundary of the Loch Sunart to Sound of Jura Marine Protection Area (MPA) (Figure 22), which is designated on the basis of presence of Common skate (*Dipturus batis*) and geodiversity features (channels and troughs). Scottish Natural Heritage (SNH) indicated that reductions in prey species or degradation of egg-laying substrate as a result of the discharges, are unlikely to be significant, and concluded that the risk of this proposal impacting the protected features of the MPA is low. Similarly, Management Options papers published by SNH to support MPAs, consider mechanisms for achieving conservation objectives of each MPA. Whilst the Common skate is considered a very high sensitivity receptor, the magnitude of the impact is assessed to be negligible to low resulting in an overall significance of the impact as minor.

Information to support an Appropriate Assessment was provided separately for sites designated under the Habitat Regulations. Potential impacts arising from the use of ADDs on Harbour porpoise, as the qualifying feature of the Hebrides and Inner Minches cSAC were considered. Although ADDs have not been deployed during the operational history of Maclean's Nose, the optional use of these devices is proposed should standard mitigation not be sufficient for particularly aggressive seal challenges. The implementation of a Predator Management Plan, including a Code of Conduct and Deployment plan for ADDs, is proposed as mitigation and as a basis for a future framework for ADD use. The plan commits to targeted, discrete and auditable use of ADDs. Implementation of the framework in agreement with SNH is anticipated to reduce the magnitude of any impacts on harbour porpoise populations to minor.

The site lies adjacent to Sunart SAC. The key qualifying features of this designation which may be impacted are otters and reefs. The proposed modifications represent an increase in pen numbers. The barge and the remainder of the infrastructure will remain in place. The development is exclusively in the marine environment, approximately 100m from the shore and SAC designation boundary. The current proposals will continue the established pattern of human activity in the area, and it is anticipated that the ongoing level of activity will be maintained, with exception of some temporary disturbance during construction (maximum 30-

³ For a receptor based assessment, see Protected Site and Species.

day period). There are no proposals for ancillary onshore infrastructure or activities that may directly disturb otter holts, the intertidal area or the qualifying species of the habitat. The proposed infrastructure proposals and carbon depositional footprint of Maclean's Nose do not overlap or extend to the SAC boundaries. Models generate a small overlap with the intertidal boundary, however the small area and benthic features impact assessments defines the magnitude of this impact as negligible. The boundary of the marine component of the SAC is located 700m from the development. Magnitude of impact on the reef is predicted to be negligible, with an overall significance, based on very high sensitivity of the designation, as minor.

The site was identified to have potential connectivity to SACs designated for freshwater pearl mussel habitats via indirect impacts on resident and migratory salmonid communities. Maclean's Nose farm is located approximately 11.2km from the Mingarry Burn SAC and 15.3km from the Ardnamurchan Burns SAC, both designated for freshwater pearl mussels. A detailed summary of new mitigation measures was set out including a review of site specific sea lice data to date, and the impact of new management measures. In summary, evidence at the site suggests that the level of mitigation in place at the site has maintained populations of near zero rates of sea lice, with any exceedances of targets under control within a week. Based on the data, the magnitude of impact associated with the site extension is assessed as negligible and overall impact on the designations, minor. In considering recent advice issued by the Highland Council (18 May 2018), the publication of the data demonstrates that sufficient safeguards are in place to protect freshwater pearl mussels. Attempting to attribute cause and effect to any one farm is not possible, subsequently 'one farm, one EMP' arrangement was not considered the most effective mitigation measure. To understand potential interactions between farmed and wild fish, there is a need to conduct the studies over larger waterbody areas. A Regional Environmental Management Plan is proposed focussed on the Loch Sunart geographical area, covering the three Marine Harvest operational sites. The Regional EMP will provide the framework for monitoring, sharing of data, meetings, and outcomes of the increased knowledge and partnership working that should result in improved management practices.

The site is adjacent to the terrestrial designation of Sunart SSSI, key marine features that have potential to be impacted by the development include otters, rocky shore and egg wrack. Egg wrack and rocky shore represent intertidal features which will not be impacted by the physical footprint of the site nor carbon deposition. Modelling of in feed residues indicate a very small interaction with the intertidal area. The magnitude of the impact is considered negligible and overall impact, low.

Navigation, Anchorage, Commercial Shipping and Other Users

Impacts on navigation, commercial shipping and fisheries were assessed drawing on publicly available data and consultation. Although the Sound of Mull represents a relatively busy shipping route, the location of Maclean's Nose, within inshore waters, close to the coast, is unlikely to impact normal shipping traffic and activities. Operation of the existing site since 2015 has not generated any issues associated with navigation. As with the existing site, standard mitigation measures, including navigational marking and lighting will be installed at the development. Overall impacts on navigation and shipping were assessed to be minor.

Initially when developing the original Maclean's Nose site in 2015, key concerns were raised by the Mallaig and North West Fishermens Association (MNWFA) regarding sprat and nephrops fisheries. However, baseline assessments indicated that nephrops burrow density was relatively low and the area represented only a very small part of a large and mobile sprat fishery. Consultations regarding the proposed modifications, indicated that MNWFA had no

specific concerns regarding the proposed extension to the site. Overall significance of the impacts on fisheries was assessed as minor. Another seabed lease holder operates a wave energy demonstration project adjacent to the site, this is a partnership between Mingarry Energy WaveNet Ltd and Marine Harvest Scotland, to demonstrate wave power in aquaculture operations, subsequently no adverse impacts are associated with the development. Finally, the Ministry of Defence (MOD) was consulted to assess conflict with the Military Exercise Area. The MOD responded with no objections to the development and no further assessment was necessary.

Seascape and Visual Impact Assessment

The assessment considered the potential effects to the seascape character and visual amenity within 5km of the proposed development including one Special Landscape Area (SLA), two local coastal character areas and three viewpoints were agreed with The Highland Council. The assessment identified that the effects on the seascape and visual amenity of the study area are unlikely to be significant as the proposed development is for a relatively minor pen extension to the existing fish farm and a barge and netting substitution. The fish farm is well-sited parallel to the coastline north west of Maclean's Nose, leading to limited intervisibility with both local coastal character areas and visual receptors in the study area, due to screening from potential receptor locations by foreground topography.

Where there was theoretical intervisibility, distance to potential receptors ensures reduced magnitude of change except in the case of the seascape immediately adjacent to the proposed development on Maclean's Nose; however, seascape effects although elevated, will be of a localised nature and were assessed as not significant. No significant effects are anticipated to the Outer Loch Sunart and Islands SLA and it is therefore concluded that the integrity of this local/ regional designation would remain unaffected.

Noise

The existing site has been operational since 2015 and no issues relating to noise generation have been identified. The proposed extension is located in a more remote setting, further away from residential and most recreational receptors. 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 in close proximity to the development. Overall the significance of noise in the context of a relatively active area for marine traffic, including heavier vessels such as large passenger ferries and cargo ships, is assessed as minor significance.

Cultural Heritage

The assessment considered the presence of features of cultural heritage importance within a 2km boundary of the site. The key feature identified was the Mingarry Historic MPA. The HMPA bounds a wrecked vessel believed to have occurred during a siege of Mingarry Castle by Archibald Campbell, 8th Earl of Argyll, in 1644. An assessment of the potential impacts arising from direct impacts arising from construction and physical placement of the new infrastructure was undertaken. The presence and operation of the existing site since 2015 has not generated any identified impacts on the feature, and the proposed extension to the site is located at the SE corner of the development: the furthest point from the HMPA, at a distance of approximately 1.9km from the HMPA boundary. Transiting vessels to the shore base at Kilchoan will not interact with the HMPA boundary. NewDepomod modelling illustrates the predicted footprint of carbon deposition across the site and the boundary of carbon deposition is expected to lie 1km from the boundary of the HMPA. The overall assessment of

significance is expected to be negligible on the HMPA based on a negligible magnitude of impact and high sensitivity of receptor.

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

The proposed modifications at Maclean's Nose will result in up to four additional permanent jobs, an important contribution to the remote peripheral economy. The existing supply chain, which already serves the operational site is likely to benefit from a minor impact arising from the higher site capacity. The socioeconomic impacts are predicted to be minor (beneficial) in significance.

The physical extension of the site was assessed against in terms of a range of recreational receptors including scuba diving, recreational yachting / boating, coastal walking and kayaking. There were no nationally or internationally important museums or recreational sites identified.

A reasonably high frequency of recreational resource use was assessed, resulting in recreational receptors being considered as moderate sensitivity. The assessment predicts minor impacts to coastal walkers with regards to landscape amenity, and no impact to scuba diving site access or coastal walking access. Minor impacts were predicted on kayakers and canoeists who use the area.

Traffic and Transport

The proposed modifications at Maclean's Nose represent a small, incremental increase to existing marine traffic at the site from increased feed deliveries of up to 3 per month and additional treatments, harvesting and stocking requirements. The shore base at Kilchoan will continue to be used and standard transit routes for movement. The increased capacity of the feed barge is likely to reduce the frequency of feed deliveries. Similarly, the area is relatively active in terms of existing boat traffic particularly from passenger ferry routes and cargo vessels. No significant issues were highlighted by the Highland 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 duration construction period. Operational activities will largely remain the same, with a small increase in the overall amount of site boat traffic predicted to be minor.

Summary

Maclean's Nose has been operational since 2015, with no immediate environmental issues identified around any aspect of the site operation to date. Key modifications proposed are an additional four cages to the existing twelve cages, an upgraded feed barge and an increase of maximum biomass capacity of up to 3,500 tonnes. Throughout the operational history of the site, full compliance has been achieved with regulatory requirements. Site modelling under new software (NewDepomod) indicates that the site will continue to have the dispersive capability to assimilate the increased biomass for both carbon deposition, in feed medicines and bath treatments with these modifications.

Key potential impacts identified at scoping included the interaction with wild salmonids and protected sites and species. Site specific lice data has been provided to illustrate the impact of new lice controls, illustrating near zero levels of lice infestation and rapid recovery to zero following a target exceedance. Potential connectivity was identified between freshwater pearl mussels, qualifying features of the Mingary Burn and Ardnamurchan Burns SACs, however the demonstrable maintenance of lice levels at near zero suggests that the extension of the site will not have a significant effect of the qualifying features. The site is also located within the Minches and Inner Hebrides cSAC, designated for harbour porpoises as a Qualifying Feature. Although harbour porpoises may be impacted by proposals to use ADDs when necessary, the sites operational history – no ADD use since commencement of operations in 2015 - demonstrates that these systems are rarely required and primary mitigation measures are effective. Should ADD use be necessary, draft policy and guidance has been developed to ensure that ADD use is documented and justified.

Contents

Non-Technical Summary	2
Contents.....	10
1 Introduction.....	11
2 The Applicant	11
3 Legislative Context	14
4 Environmental Impact Assessment.....	14
5 Project Rationale and Alternatives	20
Project Description	21
6 Introduction.....	21
7 Site Equipment	24
8 Operational Characteristics	30
9 Policy Framework.....	34
Environmental Impact Assessment	35
10 Benthic Environment	35
11 Water Column	46
12 Interaction with Predators	53
13 Interaction with Wild Salmonids	59
14 Impacts upon species or habitats of conservation importance, including Sensitive Sites	72
15 Navigation, Anchorage, Commercial Fisheries, other non-recreational maritime uses.....	88
16 Landscape and Visual Impact Assessment	92
17 Noise	96
18 Cultural Heritage	98
19 Waste Management (non-fish).....	102
20 Socioeconomic, Access and Recreation.....	104
21 Traffic and Transport.....	108
22 Gaps and Uncertainties.....	110
References	111

1 Introduction

1.1 Background

Marine Harvest (Scotland) Ltd proposes to increase the maximum biomass at its existing Atlantic salmon farm at Maclean's Nose, on the southern coastline of the Ardnamurchan peninsula, from 2,500 to 3,500 tonnes. Additional infrastructure requirements comprise four additional pens of the same specification and dimensions as existing pens (120m circumference), an upgraded feed barge with higher feed storage capacity and additional single point moorings. The proposals will also require an extension of the existing Crown Estate lease area.

The site originally received planning permission to develop and stock a salmon farm in February 2015 14/02568/FUL with a maximum biomass of 2,500 tonnes. Prior to this, the site was operated from 1990 and 1993 by SAGA Seafoods, after this time the site became fallow, until Marine Harvest (Scotland) Ltd. secured the site lease. This site was stocked in 2015 and is currently in its second operational cycle. Operations are regulated by SEPA under the current CAR Licence, reference CAR/L/1009972/C1/V1.

Originally Maclean's Nose was progressed as one of three sites within the Loch Sunart complex to be taken forward as a combined application however, following feedback from consultees, where a number of concerns were expressed at the scale of the cumulative proposals, an incremental approach will be taken to future site expansion in the area. This approach was taken to enable stakeholders to review the performance of the site, via the Environmental Management Plan (EMP) and the suite of new management measures recently implemented to enhance environmental performance, including sea lice management and Acoustic Deterrent Device (ADD) policy.

2 The Applicant

2.1 Marine Harvest (Scotland) Ltd.

Marine Harvest (Scotland) Ltd. (MHS) is part of the Marine Harvest Group, a global leader in salmon production and currently the largest salmon producer in Scotland, producing over 45,000 tonnes of salmon in Scotland in 2016, and employing approximately 700 people. In line with Scottish Government aspirations to grow the existing aquaculture economy to 210,000 tonnes a year by 2030, MHS 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 finfish developments.

2.2 EIA Team

This Environmental Statement has been prepared in-house by MHS. The following individuals and subcontractors contributed to, reviewed and edited the assessment:

Laura Carse, Environmental Consultant, Western Isles Marine and Environment Ltd.

Laura initiated her career as an Environmental Protection Officer / Assistant Marine Biologist with SEPA. Since then, she has accumulated over 12 years of experience both as an Environmental Consultant, and as a developer of large-scale renewables projects. Laura has developed extensive experience in developing marine projects and has been responsible for numerous site development activities across the site development process from site identification, to post consent monitoring, and participated in numerous national level research and steering groups to support policy development and initiatives to guide consenting

processes for the marine renewables sector. Prior to working for Marine Harvest, Laura worked as a Research Associate with the Marine and Coastal Research Department at Lews Castle College, part of the University of Highlands and Islands (UHI) and as a freelance Environmental Consultant. Laura is currently working towards Practitioner level status with the Institute of Environmental Management and Assessment (IEMA).

Stephen MacIntyre, Head of Environment Team

Prior to commencing employment with Marine Harvest (Scotland) Limited Stephen accumulated 27 years of environmental experience with regulatory agencies, initially the former Highland River Purification Board and latterly with the Scottish Environment Protection Agency 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.

Yvonne Booth, Environmental Analyst

Yvonne began her career with Marine Harvest (Scotland) Ltd in 2017 after graduating with a MSc. in Oceanography from Southampton University. She began her aquaculture career as a Farm Technician at Glenfinnan freshwater farm then as a Hatchery Technician at Lochailort before joining the Environmental Team in November 2017 as an Environmental Analyst. 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 data analysis and interpretation. During her time as an Operations Geologist she worked monthly with piers in other companies across the UK to develop and improve the way in which operations were carried out with regards to geological data acquisition. This 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.

Ewan Gillespie, Consultant

Ewan's career began as a research scientist with the Government-owned Freshwater Fisheries Laboratory in Pitlochry, where he researched the impacts of atmospheric pollutants upon salmonids. He then accumulated 21 years of environmental experience with regulatory agencies, initially the former Highland River Purification Board and latterly with the Scottish Environment Protection Agency where he was employed as a Senior Marine Scientist. Ewan's areas of experience include benthic taxonomy and impacts of marine aquaculture upon the environment. During his career with SEPA, Ewan was a member of the Agency's policy-

making groups on aquaculture regulation. He also sat as a Director of the Scottish Aquaculture Research Forum and spent 2 years working with the Scottish Government aquaculture policy team. After leaving SEPA Ewan worked for 2 years as an environmental consultant with the Inverness-based Fish Vet Group. He then moved to their parent company, Benchmark Animal Health Ltd to develop the ecotoxicology component of developing novel sea lice treatments. He now works as Head of Environment for Marine Harvest (Scotland) Ltd.

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 – 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 University of the Highlands and Islands to study marine energy, before joining Marine Harvest 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.

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 survey, 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.

ASH design + assessment, Landscape Consultants

ASH is a former partnership, originally established in 1979, which supplies skills associated with a broad range of environmental issues as part of an assessment and design process, to inform the promoters of public and private development. ASH has worked throughout Scotland, the UK and Europe for central and local government agencies, developers and design and build contractors. The expertise of the company was founded upon regeneration initiatives, transport-related assessment and design and urban/ rural landscape planning.

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 combined Screening and Scoping request was issued and registered by The Highland Council on 2nd November 2017. The Highland Council responded indicating that an Environmental Report should be prepared in accordance with the requirements of The Town and Country Planning (Environmental Impact Assessment (Scotland) Regulations 2017 to support an application for Planning Consent.

3.1 Legislative Framework

Current policy is spread across a number of institutions in Scotland and is extensive in scope. In terms of planning, the planning application for the proposed modifications is determined by the Highland 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 below.

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

Regulatory Regime	Authority	Comment
Planning Permission under the Town and Country Planning Act 1997 (As Amended by the Planning etc. Scotland Act 2006)	The Highland Council	Maclean's Nose was originally granted permission in 2015 to operate a finfish farm. The Environmental Impact Report comprises of information to support the application for planning permission.
Licence under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR Licence)	Scottish Environment Protection Agency (SEPA)	The Scottish Environment Protection Agency 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 chemicals. An application for a CAR licence for the Maclean's Nose modifications is anticipated for submission in June.
Marine Licence under the Marine (Scotland) Act 2010	Marine Scotland	Marine Scotland issue licences under the for the placement of infrastructure on the seabed, primarily for navigational purposes. An application for a Marine Licence will be made at the same point as an application for Planning Consent.
Crown Estate Act 1961	The Crown Estate	An extension to the existing lease area will be required. Application to made at the submission of the planning application.

Other authorisations are required to operate a fish farm, for example Well Boat licence and Seal Dispatch licences are referenced in the relevant sections where appropriate.

4 Environmental Impact Assessment

4.1 EIA Methodology

The assessment follows legislative requirements and draws on a number of 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) Regulation's 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. 2013. A Handbook on Environmental Impact Assessment. Guidance for competent authorities, consultees and others involved in the Environmental Impact Assessment Process in Scotland (Scottish Natural Heritage, 2013).

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

		nationally or internationally important species.	<ul style="list-style-type: none"> • Areas of key habitat identified as being of regional value and integrity. • Significant populations of a regionally important species. • Species listed as EPS • Other features e.g. migration routes. 	
Navigation, Shipping and Commercial Fisheries	<ul style="list-style-type: none"> • Major anchorage, frequently used or important for safety • Conflicts with major passenger ferry route; • Recognised international shipping lane; • An area of major fishery supporting international fleets. • Areas licenced to other sea users • Exclusion areas 	<ul style="list-style-type: none"> • Conflicts with or restricts access to important anchorage; • Fishery area of national commercial significance as a source of revenue or employment • Recognised shipping lanes or military practise / exercise areas. 	<ul style="list-style-type: none"> • Areas of local or regional importance for fisheries as a source of revenue an employment, area with nearby alternatives 	<ul style="list-style-type: none"> • Areas of low intensity commercial shipping • Minimal value for commercial fisheries, in appropriate habitats
Landscape and Visual Impact	<ul style="list-style-type: none"> • 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). 	<ul style="list-style-type: none"> • 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). 	<ul style="list-style-type: none"> • 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). • Partial or interrupted views (visual amenity). • 	<ul style="list-style-type: none"> • Undesignated land/seascape of defined character type, but of low quality. • Capable of tolerating moderate levels of change/ improvement/ enhancement. • Views lack distinctive characteristics and/or are of low quality (visual amenity).
Noise	<ul style="list-style-type: none"> • Receptors where people or operations are very sensitive to noise: residential properties, schools, hospitals, places of worship. 	<ul style="list-style-type: none"> • Receptors where external noise may be a distraction; offices, restaurants, cafes, sports grounds where external noise may be intrusive 	<ul style="list-style-type: none"> • Receptors where external noise may be a relative distraction; tourist attractions. 	<ul style="list-style-type: none"> • 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.

Socio Economic and Recreation	<ul style="list-style-type: none"> • International status recreational / tourism receptor • Very high visitor numbers • Impacts a high number of people or at a national level. • Site may represent an international competition venue 	<ul style="list-style-type: none"> • National status receptor or high visitor numbers • Site may host or be important for international competitions 	<ul style="list-style-type: none"> • Local status importance • Moderate visitor numbers / users, regional level popularity. • Site is used by clubs for training or local competitions. 	
Cultural Heritage	<ul style="list-style-type: none"> • World heritage site or other cultural heritage asset of international importance (World Heritage Sites) 	<ul style="list-style-type: none"> • Cultural heritage asset of national importance (e.g. Scheduled ancient Monuments, Historic Naval Battles, Designated Wrecks and Historic NMPAs) 	<ul style="list-style-type: none"> • Cultural heritage asset of regional importance. 	<ul style="list-style-type: none"> • Locally important sites, wrecks or areas.
Traffic and Transport	<ul style="list-style-type: none"> • Sensitivity to marine traffic flow; passenger ferry routes, international shipping lanes. 	<ul style="list-style-type: none"> • Regionally important routes or transits 	<ul style="list-style-type: none"> • Locally important routes or transits 	<ul style="list-style-type: none"> • Locally important routes or transits.

The general criteria for assessing magnitude of an impact, or degree of change generated by a development is provided in Table 3. 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 3 General criteria for assessing magnitude of an impact.

Magnitude	Typical criteria descriptors
Major	<ul style="list-style-type: none"> 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. Impacts of the project at regional or national scale, or with a large number of people impacted over a long duration. Definite or likely impact.
Moderate	<ul style="list-style-type: none"> Loss of resource, but not adversely affecting the integrity, partial loss of / damage to key characteristic, features or elements. Medium to long term impacts. Large number of people impacted over medium term, or large scale impacts affecting a small number of people. Likely impact.
Minor	<ul style="list-style-type: none"> 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. Impacts a small number of people over a short period. Unlikely impact.
Negligible	<ul style="list-style-type: none"> Very minor loss or detrimental alteration to one or more characteristics of features. Short term. Unlikely to occur.

Assessing overall significance of an impact is based on considering the sensitivity to a receptor against the overall magnitude of a particular impact. A framework for this assessment is provided in Table 4. 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 and 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, and expanded in the individual discussions. Responses from consultations and how they have been addressed in the EIA are provided in the individual assessments:

- Historic Environment Scotland;

- Lochaber District Salmon Fisheries Board;
- Lochaber Fisheries Trust;
- Mallaig and North West Fishermen's Association;
- Marine Scotland Science;
- Ministry of Defence;
- Royal Yachting Association;
- Scottish Environment LINK⁴;
- Scottish Environment Protection Agency;
- Scottish Natural Heritage;
- The Highland Council; and
- Western Ardnamurchan Community Council.

4.3 Environmental Impact Assessment Report

This Environmental Report describes the findings of the Environmental Impact Assessment (EIA), which aims to identify the significant environmental effects of the development, the extent of these effects and identify measures 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 as a primary producer, including fish farming is one of the key priorities for growth⁵. Aspirations published by the sector in 2016 set out plans to double the size of the existing industry already worth £1.8 billion⁶. Similarly, Scotland's National Marine Plan, adopted in 2015, sets out a national plan to ensure sustainable economic growth of marine industries while taking into account environmental protection. It includes specific industry targets, including a target to grow marine finfish sustainably to 210,000 tonnes (whole, wet fish) by 2020⁷. National production during 2016 was 162,817 tonnes⁸, subsequently to meet this target requires substantial effort from current fish farm operators to increase biomass sustainably.

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 cages. Model inputs include flow measurements taken close to the farm, as well as rules describing the release, settling and resuspension of particles. However, there are a number of limitations to this model. NewDepomod was released by the Scottish Association for Marine Science (SAMS) in 2017 and the redeveloped version represents a number of significant improvements to the previous version including a more accurate model for sediment deposition responding to varying bathymetry and an ability to generate more realistic flow patterns⁹.

⁴ Scottish Environment Link coordinates a range of voluntary organisations including Marine Conservation Society, National Trust for Scotland, Salmon and Trout Conservation Scotland and Whale and Dolphin Conservation.

⁵ <http://www.hie.co.uk/growth-sectors/food-and-drink/our-focus.html>

⁶ www.foodanddrink.scot/media/78119/lr-sfd-aquaculture-doc_spread.pdf

⁷ <http://www.gov.scot/Publications/2015/03/6517>

⁸ <http://www.gov.scot/Publications/2017/09/5208>

⁹ SEPA. 2018. Regulatory Modelling Guidance for the Aquaculture Sector. Air and Modelling Unit, SEPA

In line with the Government's targets, and recent changes in SEPA's regulatory regime, MHS proposes to increase biomass through both modifying selected sites and identifying new sites for development. The proposed modifications at Maclean's Nose comprise one of the initial sites to undergo a biomass expansion under the new model greater than 2500 tonnes. Originally Maclean's Nose was progressed as one of three sites within the Loch Sunart complex to be taken forward as a combined application however, following feedback from consultees, where a number of concerns were expressed at the scale of the cumulative proposals, an incremental approach will be taken to future site expansion in the area. This approach was taken to enable stakeholders to review the performance of the site, via the Environmental Management Plan (EMP) and the suite of new management measures recently implemented to enhance environmental performance, including sea lice management and Acoustic Deterrent Device (ADD) policy.

The rationale for extending this site is based on its open water location, legacy of good performance and compliance with SEPA EQS and physical site characteristics, including good dispersive qualities. The site also hosts a demonstration project to trial an innovative renewable energy system involving the generation of wave energy to supply aquaculture applications¹⁰. There are several environmental sensitivities associated with the site, in summary these comprise interactions with the wild Atlantic salmon and sea trout populations, and the use of Acoustic Deterrent Devices (ADDs) in the context of the Candidate Special Area of Conservation (cSAC) for Harbour porpoises.

A series of measures recently introduced by MHS to improve sea lice management early in 2017 have demonstrated tangible improvements. These measures are supported by substantial investment focused primarily on sea lice management, but also covering the development of refined management and use of Acoustic Deterrents, the establishment of Environmental Management Plans, and support for condition monitoring of sites designated under the Habitats Regulations. These measures coupled with the physical characteristics of the location and verified by higher accuracy modelling provided an indication that the site at Maclean's Nose would be suitable for further development.

Project Description

6 Introduction

6.1 Location

The site is located north west of the Maclean's Nose headland, within Mingarry Bay on the southern boundary of the Ardnamurchan peninsula and west of Rubha Ruadh (Figure 1, full size figures, charts and coordinates are provided in Appendix 1). The surrounding area is predominately rural, with settlements at Kilchoan, and to a lesser extent Mingary to the northwest of the site. The development is located within The Highland Council region. Separate reports detailing the methodology and hydrographic reports for both north and south sensors have been collated as part of the regulatory process, with results summarised as part of the Modelling Report provided in Appendix 2.

¹⁰ <http://renews.biz/104646/albatern-deploys-scottish-wave/>



Figure 1 General site location and context.

6.2 Bathymetry

Bathymetry data for the study area was obtained by combining regional bathymetry with a local depth survey. Regional scale bathymetry was extracted from numerical models of the Scottish shelf, which utilised a variety of sources (e.g. digital bathymetry datasets, Admiralty charts and multibeam surveys). The regional scale bathymetry was supplemented by a local depth survey conducted by Anderson Marine Surveys Ltd in March 2017 Figure 2.

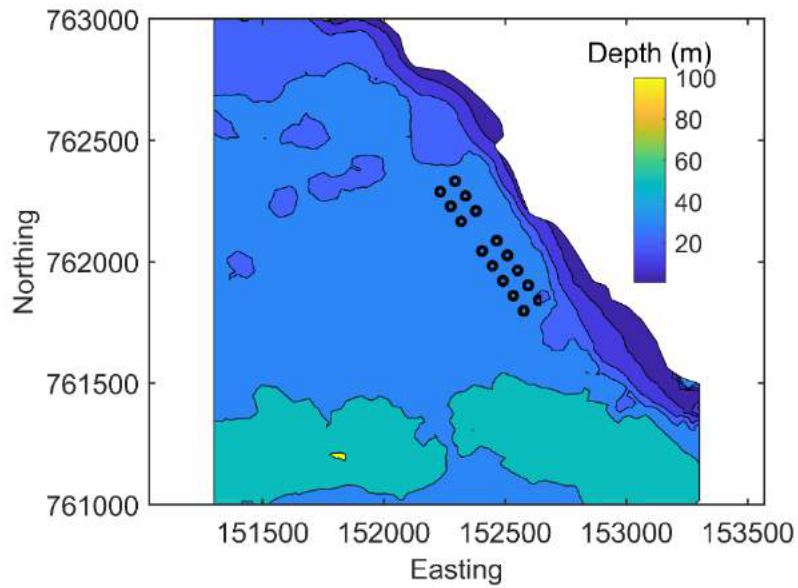


Figure 2 Model bathymetry in the region of the Maclean's Nose site.

6.3 Hydrography

A hydrographic survey was initially undertaken in 2006 based on data gathered from a Recording Doppler Current Meter (RDCP), during the period no pens were present on site. Meteorological data was also gathered to record wind speed and direction. In 2017 two Acoustic Doppler Current Profilers (ADCPs) were deployed on the following dates:

- 22 March 2017 - 4 May 2017; and
- May 2017 – 3 July 2017.

In total, the recent data collection period extends over 102 days, and the data has been used for the calibration / validation of the NewDepomod model. A summary of the mean and residual speeds recorded at the site are provided in Table 5.

Table 5 A summary of the mean and residual currents recorded at the two deployment locations at Maclean's Nose

<u>SURFACE</u>		
	North	South
Mean Speed (m/s)	0.058	0.066
Residual Speed (m/s)	0.032	0.037
<u>MIDDLE</u>		
Mean Speed (m/s)	0.043	0.052
Residual Speed (m/s)	0.020	0.025
<u>BOTTOM</u>		
Mean Speed m/s	0.046	0.050
Residual Speed m/s	0.005	0.004

6.4 Sediments

Admiralty charts define the area as mud and shingle. Video surveys and recent sediment analysis indicated that the seabed substrate comprises of soft brown / grey clay-like fine mud, although sediments further away from the existing pen groups show a higher density of pebbles and shell fragments (Appendix 3: Maclean's Nose Video Survey, and Marine Harvest 2017).

7 Site Equipment

7.1 Summary

In summary the proposals comprise an increase standing maximum biomass from 2,500 tonnes to 3,500 tonnes¹¹, and an increase from 12 to 16 circular pens (120m circumference) held in a 75m mooring matrix and configured in one group of six, and one group of ten pens. The additional four pens will be appended to the southeast group. Figure 3 illustrates the proposed site infrastructure layout with the modifications. The proposed development will comprise of the following infrastructure, discussed in detail in the remainder of Section 4.

- **Circular pens:** Sixteen 120m circumference pens, arranged in a 75m matrix formation. Each pen will be attached to and held in position by a 75m² submerged mooring grid. Pens will be configured in one group of six and one group of ten.
- **Nets:** continued use of the 'Environet' specification at a depth of 16m;
- **Moorings:** a sub-surface moorings matrix ensures pens are maintained in a grid configuration. The matrix 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 diving birds;
- **Feed barge:** a larger specification of feed barge will be located on site, as a storage and distribution facility for feed;
- **Rafts:** two rafts (2m x 3m) are currently consented for storage purposes and will remain on site. A slightly larger raft specification is proposed under the modification (2m x 5m);
- **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.

A summary of the modifications proposed with reference to existing infrastructure is provided in Table 6.

Table 6 Summary of key changes to existing site infrastructure and operation.

Project Component	Current	Proposed
Maximum biomass	2,500 T	3,500 T
Maximum production biomass / cycle	4,250 T	5,950 T
Surface area	1.4 ha	1.9 ha
Moorings area	36.4 ha	53.5 ha
Number of Pens	12	16
Feed Barge	C-Cap 200T	GaelForce 400T
Rafts	2 X (2m x3m)	1 x(2m x 3m) and 1 x (2m x 5m)

¹¹ NewDepomod modelling software provides developers with the option to expand beyond a historical 2,500T maximum biomass limit.

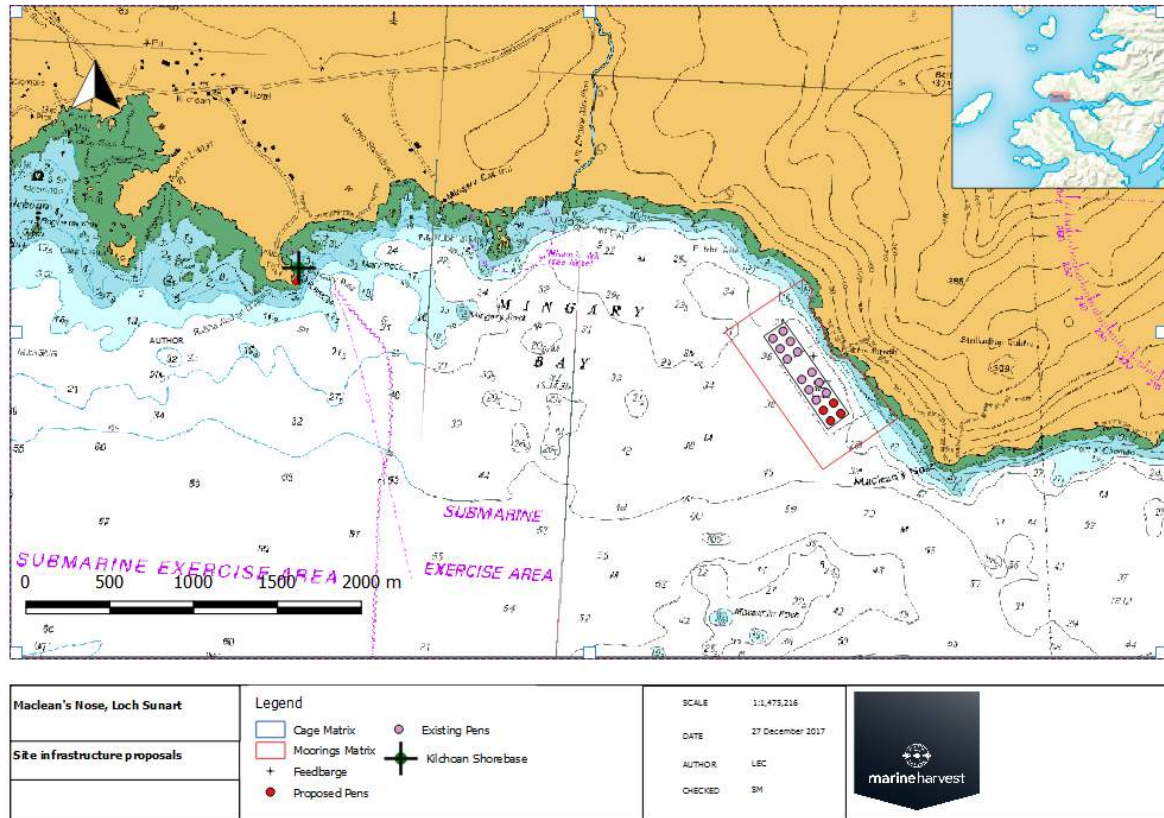


Figure 3 Existing site layout and new pen layout proposals.

7.2 Circular Pens

Fish at the site are held in circular pens which measure 120m in circumference (38.2m in diameter). At the surface, each pen consists of a buoyant walkway which sits on two pipes that float on the surface around the perimeter of the pen. A low handrail is located above the floating walkways at a height of approximately 1.35m. Nets are attached to the ring at the surface and extend below the water towards the seabed. A weighted tube is installed at the base of the net in order to hold the net in position under tension. Appendix 4 provides general assembly diagrams of typical pen designs measuring 120m in circumference. Surface area of the pens will increase from 1.38ha to 1.85ha following the modifications.

7.3 Subsea Nets

The nets will be of the Environet construction, at a depth of 16m. 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 and move to 25mm 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. A summary of mesh sizes and netting specification is provided in Appendix 4.

7.4 Moorings

The moorings matrix will comprise a 75m gap between the two groups to facilitate dispersion of nutrients. A layout of the proposed infrastructure is provided in the Appendix 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 particular location. Four single point moorings are currently consented at the site to support personnel craft, which will be maintained under the proposed modifications.

The moorings comprise of a mixture of ground chain, rope and embedment anchors. The moorings spread will occupy a maximum of 53.5ha an increase from 36.4ha under the current infrastructure. Moorings are designed in accordance with Section 5 of the Technical Standard for Scottish Finfish Aquaculture: Net Design and Construction¹².

An Equipment Attestation Letter is provided in Appendix 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: 50-year storm. To support infrastructure design and load calculations, MHS has gathered 102 days of current data using Doppler Current Profiler meters at the development site to record real time measurements to inform the design of the equipment. As verified in the Equipment Attestation letter, equipment purchased for installation at the new site will meet the Technical Standard for Scottish Finfish Aquaculture¹³.

7.5 Top Netting

Netting is installed over stocked pens to mitigate against predation by wild animals, primarily diving birds. The existing netting support is installed on a circular structure in the centre of the pen and is often referred to as a “hamster wheel”; however, an alternative support which suspends the top nets from poles attached to the perimeter of the pen walkway is proposed for both the new pens and to alter the existing pens. These nets are secured at the pen ring with poles and tensioned to prevent entanglement. This structure will be 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 4. A general assembly diagram of the pen and net support structure is provided in Appendix 4. Figure 5 illustrates the top net mesh to illustrate relative mesh sizing; the side panels consist of a 4-6-inch mesh, whereas the top panel will have a mesh size of 6 inches. Nets will be black in colour.

¹² Marine Scotland 2015

¹³ <http://www.gov.scot/Resource/0047/00479005.pdf>



Figure 4 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 5 Image showing the mesh size of typical top-nets

7.6 Feed Barge

The site is currently served by a 200-tonne capacity C-Cap feed barge. The barge to be installed is likely to be the Seamate™ 400 tonne barge manufactured by Gael Force Marine. Photographs of the indicative feed barge models are provided in Figure 6 and general assembly diagrams of the barge are provided in Appendix 4. The barge will allow semi-

automated feeding using video-controlled feeding systems to reduce feed wastage. The barge is semi-submersible and its height above the water surface is dependent on the volume of feed within it at any given period. Heights range from 8.3m (light level) to 7.2m when loaded to capacity. The barge has an ancillary power source within a compartment.

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 barges have the capacity to store 400-450 tonnes of feed and will have a grey colour scheme.

The diameter of the feed pipes will be 90mm; these will be bundled and will be arranged in an efficient way to minimise the length of the pipes. Historically, black feed pipes have been utilised, however these are heated by the sun and can lead to the breakdown of the feed pellets. White feed pipes have recently been trialled and may be adopted at the site.



Figure 6 Photo of feed barge options, including Gael Force Seamate 450 Feed Storage Barge and Akva 450 panorama Feed Storage Barge Feed.

7.7 Rafts

Rafts are used to provide additional storage at the site and are generally installed on single point moorings within the moorings matrix. Up to two 'Wavemaster' rafts are proposed, with a maximum area of 12 x 8m, will be held in place by 4 mooring lines each, within the mooring footprint of the farm. There are a range of mooring configurations available for installation of rafts, generally these comprise concrete block anchor, chain mooring and surface marker buoy.

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 7). A dedicated navigation light installed on the feed barge, with a range of 2 nm and defined flashing configuration. Although 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, in order 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 8). Each pen of 120m circumference typically require 4 lights.



Figure 7 Typical navigational markings including the buoy specification used to mark the corners of the pen matrix, and yellow pole markers for either side of the pen group¹⁴



Figure 8 Photo showing the use of underwater lighting at a fish farm pen

7.9 Navigational Markers

Navigational lighting and buoy configuration is defined by the Northern Lighthouse Board (NLB) however marker buoys comprise grey marker buoys ranging from 1000l to 3000l in volume. Currently there are 28 X 1000l grey buoys present on the side. It is expected an additional 11 x 2200l and 1 x 3000l grey buoys will be required.

¹⁴ http://hydrosphere.co.uk/datasheets/applications/hydrosphere_aquaculture_v_2_01_sep_14_web.pdf

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 where it is required to work longer hours, but this is kept to a minimum wherever possible.

8.2 Stocking and Grading

The company plans to stock MacLean's Nose in Q1 of 2019, to coordinate production with the neighbouring sites within Loch Sunart. MHS 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 MHS 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, allows for consistent removal of maturing fish and enables 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 RSPCA Freedom Foods¹⁵ criteria. Densities are monitored on a weekly basis in order 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 is provided in Figure 9. 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 5,900 tonnes and associated food conversion ratio (FCR) is 1:07.

¹⁵ 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>

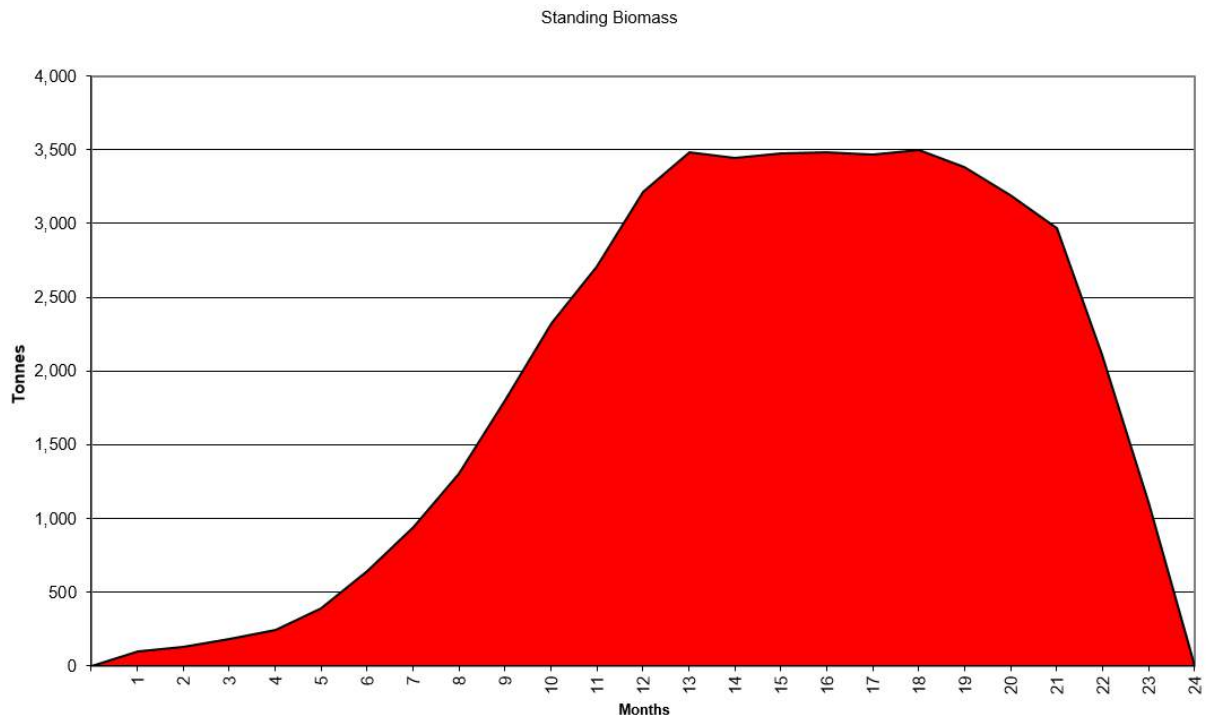


Figure 9 Typical production plan based on a maximum biomass of 3,500t

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 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 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 wastage and improve the feed conversion ratio at the site.

8.6 Stocking and Coordination

Stocking and coordination will be undertaken in conjunction with neighbouring Sunart sites. Appendix 6: Farm Management Statement provides details on how the proposed site configuration will be stocked and coordinated.

8.7 Removal of Fish Mortalities

Mortalities collect in a cone located at the bottom of each pen and are retrieved using an integrated lift up system. Site staff aim to remove mortalities from the base of the pen on a daily basis and 3 times a week as a minimum. 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. The current end point for disposal via anaerobic digester is Energen Biogas and Caledonian Proteins. Should a mass mortality event occur, internal protocol is as follows:

- Notifications to Marine Scotland, senior management, and the health veterinarian at MHS;
- Staff should ensure all nets are above the water-line to contain moribund fish;

- Divers 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 MHS 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, MHS is committed to following the Code of Good Practice for Scottish Finfish Aquaculture (CoGP)¹⁶. The CoGP sets out the standards that farmers must demonstrate compliance when independently audited by 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

Maclean's Nose will be serviced from the existing shore base at Kilchoan (Figure 3). Feed will be supplied directly to the feed barge via boat, no ancillary shore-based facilities will be required for the development. There are currently two rafts authorised on the site which can provide additional storage facilities and will be maintained under the proposed modifications.

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. Maclean's Nose currently holds a CAR licence for the following medicinal treatments described in Table 7 (CAR/L/1002965/V6). Medicinal treatments are administered both as an in-feed treatment and as bath treatments.

Table 7 Existing treatments authorised by the current CAR licence.

Treatment	Administration	Current Discharge Limit	Proposed
Enamectin benzoate	Maximum quantity in 7-day treatment (g)	875	770.8g
Azamethiphos	Total quantity discharged in a 24 hr period (g)	237.2g	641.8g
Cypermethrin	Total quantity discharged in a 3 hr period (g)	43g	46.8g
Deltamethrin	Total quantity discharged in a 3 hr period (g)	16.1g	17.5g

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

¹⁶ Scottish Salmon Producers Organisation. 2015. Scottish Salmon Farming; Code of Good Practice http://scottishsalmon.co.uk/wp-content/uploads/2012/04/sspo_cogp_proof_v5.pdf

lumpsuckers - as an ongoing measure to control sea lice within pens. A number of 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 Maclean's Nose. Freshwater treatments are administered by specialised well boats using locally sourced licensed freshwater abstraction points. Further details and on these treatments are provided in Section 13: Interaction with Wild Salmonids.

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. These activities are not anticipated to change significantly following site modifications.

8.12 Personnel

The site previously employed approximately 9 members of staff, including a site manager and technicians. Additional biomass and infrastructure is likely to require the need for up to 4 additional members of staff.

8.13 Construction and Decommissioning

Construction at the site will take up to 30 days and involve the standard site vessel / workboat. Vessels will return to site shortly after to inspect infrastructure and undertake net tensioning and repositioning if necessary. Decommissioning will 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. In light of 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 2020¹⁷.

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 principals 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)¹⁸. There is overall support for the aquaculture sector, and objectives in the NMP for aquaculture 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 210,000 t (159,269 t 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 Highland Council area has not been prepared.

¹⁷ <http://www.gov.scot/Publications/2015/03/6517>

¹⁸ <http://www.gov.scot/Publications/2015/03/6517/8>

9.3 Highland Wide Local Development Plan¹⁹

No dedicated Regional Marine Plan has been published by the Highland Council, however provisions for guiding aquaculture developments have been published in the Highland Wide Local Development Plan (HwLDP) published in 2012.

Policy 50 in the HwLDP sets out the development management approach to aquaculture, affirming that the “*Council supports the development of fin-fish farming subject to there being no significant adverse effect, directly, indirectly or cumulatively on*”:

The natural, built and cultural heritage taking into consideration:

- *Landscape character scenic and visual amenity with reference to SNH commissioned report; landscape / seascape carrying capacity for aquaculture;*
- *The classification and objectives set out in the river basin management plan for the Scotland river basin district and supplementary area management plans*
- *Wild fish populations;*
- *Biological carrying capacity;*
- *Cumulative and benthic water column impacts for finfish.....consistent with Marine Scotland’s Locational Guidelines; and*
- *Habitats and species including designated sites and protected species.*

Proposals also need to demonstrate:

- *“appropriate operational and site restoration arrangements (including management of noise and lighting impacts, public health and safety, and the effective control of pollution, fish farm escapes, predator interaction and disease.*
- *Good design of pens, lines and associated facilities; and*
- *Opportunities for shared use of jetties, piers and ancillary facilities are promoted where possible”*

Regional level guidance has been developed by some local authorities. West Highlands and Islands Local Development Plan (WestPlan) does not reference aquaculture development and the area is not covered under any Integrated Coastal Zone Management Plans.

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 potential to bind to sediments. This assessment considers the impacts of the proposed extension to Maclean’s Nose arising from organic (carbon) deposition and in-feed treatment residues. Impacts from bath or topical treatments are considered in Section 11: Water Column.

10.2 Consultation

A Screening and Scoping Request was issued to The Highland Council on 29 September 2017. Scoping responses were also received from a range of non-statutory consultees.

¹⁹https://www.highland.gov.uk/info/178/local_and_statutory_development_plans/199/highland-wide_local_development_plan

Table 8 below outlines the responses received and how they have been addressed throughout the EIA for this topic.

Table 8: Consultation Responses - Benthic Environment

Consultee	Date	Comment	Response
SEPA	30-Oct-17	A biomass of 3500T may be accepted if supported by detailed modelling. Modelling to be submitted and approved by SEPA modellers.	NewDepomod modelling undertaken and presented in Section 10.3 based on new biomass thresholds.
SEPA	30-Oct-17	Bath treatment modelling, to predict the maximum usable treatments to stay within SEPA's Environmental Quality Standards.	Outputs of bath treatment modelling provided in Section 11.3.5.
SNH	06-Nov-17	Existing baseline survey indicates uniform burrowed mud habitat including <i>Funiculina quadrangularis</i> within the AZE. The use of two different Depomod models indicate that SEPA's thresholds for comparing visual survey unlikely relevant. SNH to advise on requirement for additional visual survey work based on overlay of NewDepomod on AutoDepomod with existing equipment layout and visual transect surveys to define requirement for additional visual surveys.	Proposal for visual surveys submitted 27 November to SNH, HC and SEPA. Agreement from all stakeholders that visual transect surveys not required for Maclean's Nose, as the areas impacted likely to be less than 50,000m ² (SEPA response 29/11/2017, SNH and HC response 12/12/2017)
HC	Scoping	Seabed video survey required to support assessment of protected habitats and features. Survey to incorporate transects that covering extended site area and be agreed with HC, SEPA and SNH.	
HC	Scoping	Due to proximity to Sunart SAC, an appropriate assessment is required.	See Section 14: Impacts on Species and Habitats of Conservation Importance
HC	Scoping	Impacts on species of habitats of conservation importance to be assessed and mitigation measures proposed.	Impact assessment and mitigation proposals detailed.
HC	Scoping	Video and stills captured to be georeferenced and of sufficient quality to allow species and habitats to be identified, DVD should accompany planning submission.	Video transect surveys not required (see above).
SEPA	Scoping	Highlight the presence of burrowed mud including tall sea pens but feature widespread in coastal waters.	Noted
SEPA	Scoping	Highlight satisfactory levels of benthic sampling with EQS and compliance with residue sampling.	Noted
SEPA	29/11/17	Response to the adequacy of existing video survey transects to inform the impact assessment due to predicted area impacted >50,000m ² and recent benthic sample collection. However, indicated that if submission was post peak 2016-18 production cycle, report required as the most recent self-monitoring seabed survey	Baseline survey in Section 10.4.1
HC (and SNH)	12/12/17	In response to confirmation of adequacy of 2013 visual surveys, no specific comments related to Maclean's Nose.	Baseline survey in Section 10.4.1

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:

- Maclean's Nose Video Survey, 2013, Marine Harvest Scotland (Appendix 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;
- Marine Scotland Feature Activity Sensitivity Tool (FEAST)
<http://www.marine.scotland.gov.uk/FEAST/Index.aspx> ;
- Marine Harvest Scotland Ltd. Maclean's Nose Hydrographic Report, 2018
- Marine Harvest Scotland Ltd. Maclean's Nose Modelling Report, 2017 (Appendix 2);
- SEPA. Interim Compliance Assessment Report. 10 August 2017; and

- SEPA. Fish Farm Monitoring Report: 4 July 2016; and
- SEPA (Air and Modelling Unit). 2018. Regulatory Modelling Guidance for the Aquaculture Sector.

10.3.2 Modelling Methodology

A hydrodynamic model coupled with a new version of the particle-tracking model, NewDepomod, developed by the Scottish Association for Marine Science (SAMS), was used to simulate discharge, dispersion and fate of waste feed, faeces, and residues of the in-feed sea lice therapeutant, Slice®. The purpose of the modelling was to represent the coastal processes involved in particle transport in the near field and far field. A short summary of each of the models is provided below, with a full description of the methodology provided in Appendix 7: Macleans Nose Modelling Method Statment.

Hydrodynamic Model - a localised, high resolution hydrodynamic model was nested in a larger model of the Scottish continental shelf. The local area model covered the Loch Sunart and western Sound of Mull (wSoM) region of the Inner Hebrides and had a spatial resolution of 1 km at the outer boundaries, increasing to 20 m along the shoreline of Maclean's Nose. The model was calibrated against current data and seabed pressure data available from locally gathered Acoustic Doppler Current Profiler (ADCP) data extracted over 102 days between March to July 2017. The model also integrated wind data to simulate wind forcing impacts on current velocity. Outputs from the hydrodynamic model informed aspects the particle tracking model (NewDepomod). This model was run to produce outputs of carbon deposition and in-feed sea lice treatment concentrations.

NewDepomod: the model was calibrated against seabed survey data from both 2016 and 2017 and included consideration of non-tidal (wind) driven currents. Solids deposition outputs from NewDepomod were calibrated against observed Infaunal Trophic Index (ITI) / Infaunal Quality Index (IQI) values obtained from benthic surveys of the site and the model was run in a hindcasting mode over the same time period as the meter data was collected to validate model performance.

10.3.3 EIA Assessment

The degree of deposition of both carbon and in-feed residues is predicted based on modelled outputs derived from detailed hydrodynamic models coupled with a particle tracking model to generate an overall footprint of deposition. The level of significance of the impact is determined by the degree of the depositional footprint on the benthic environment. The criteria for evaluating the impacts on the benthic environment is provided in Section 4.

10.4 Baseline Environment

10.4.1 Priority Marine Features

A baseline survey of benthos (epi-fauna and in-fauna) at Maclean's Nose was undertaken in 2013, both video and sediment surveys were undertaken and reported (Appendix 3). Consultation indicated that these transects are considered to be suitable to assess the proposed extension to the site (SEPA, 29/11/17). The biology of the seabed was described to consist of sparsely burrowed circalittoral fine mud with frequent observations of the tall seapen (*Funiculina quadrangularis*), the phosphorescent seapen (*Pennatula phosphorea*) and the auger shell (*Turritella communis*). Infrequently the following were observed: tube anemone (*Cerianthus lloydii*), the Norwegian lobster (*Nephrops norvegicus*), a burrowing mud shrimp (*Callinassa subterranea*), a fireworks anemone (*Pachycerianthus multiplicatus*) and the hermit crab (*Pagurus bernhardus*). Overall, the habitat is classified as circalittoral fine mud with sea pens (SS.SMu.CfiMu.SpMg). There were no species identified that were PMFs in their own right however some species identified are component species of the broad burrowed mud habitat. These include:

- Seapens and burrowing megafauna in circalittoral fine mud;
- Tall sea pens; and
- Fireworks anemone.

The quality of the habitat is evaluated as low to medium; under ideal conditions the tall seapen can be numerous²⁰. At Maclean's Nose the population is small and although appearance is frequent there is not a thick coverage of this feature, indicative of higher quality habitats. This PMF feature is also widely distributed around west coasts of Scotland (SNH, 2015). There is only one occurrence of a firework anemone and of one Norwegian lobster in the three transects. Species observed in the transects and of conservation importance are summarised in Table 9, with corresponding value classification based on the methodology outlined in Section 4.

Table 9 Species of conservation importance observed in video transects from 2013 survey.

Scientific Name	Common Name	Abundance	Importance	Value
<i>Funiculina quadrangularis</i>	Tall Sea Pen	Frequent	Biodiversity Action Plan (BAP) Species Component PMF species	Medium: represents features of conservation interest present, that do not qualify for national designation
<i>Pennatula phosphorea</i>	Phosphorescent Sea Pen	Occasional	Component PMF species	Medium: represents features of conservation interest present, that do not qualify for national designation
<i>Pachycerianthus multiplicatus</i>	Fireworks anemone	Rare	BAP Species Component PMF species	Medium: represents features of conservation interest present, that do not qualify for national designation

10.4.2 Protected Sites

Impacts on protected species and habitats are covered in Section 14. The site is located within Loch Sunart to the Sound of Jura MPA, designated for common skate (*Dipturus batis*), and deep glaciated channels. Maclean's Nose is also a short distance (approximately 1km) from Sunart MPA, which is designated on the basis of three PMFs.

10.4.3 Previous Compliance Results

The 2017 environmental performance of the site has been assessed by SEPA as "Excellent" in accordance with SEPA's Compliance Assessment Scheme. The most recent Fish Farm Monitoring Report (SEPA, 2016) relating to environmental monitoring carried out on 11th February 2016 was classified as "Satisfactory". SEPA's assessment confirmed that the pen edge station passed the benthic faunal criteria for within the AZE, with sufficient abundances of polychaetes to rework the sediments. Other stations (AZE -10m, AZE, and AZE+10m) all passed benthic criteria overall.

²⁰ Wright EP, Kemp K, Rogers A & Yesson C. 2014. Genetic Structure of the tall sea pen *Funiculina quadrangularis* in NW Scottish sea lochs. Marine Ecology 36 pp 659-667. <http://onlinelibrary.wiley.com/doi/10.1111/maec.12174/full>

10.5 Mitigation

Reducing organic load to the benthic environment is achieved by primarily operational measures that are described in further detail in the following sections:

- 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 feed conversion ratios (FCR). The lowering of FCRs has led to reduced waste inputs to the environment per unit production. The feed conversion ratio (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 and 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 undertakes a high standard of training to reduce feed waste and 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 organic matter to decompose and allow seabed recovery. Faunal community alterations arising from accumulation of carbon deposition 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 Chemotherapeutants

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. The interim near field sediment maximum allowable concentration is reduced from 7.63µg/Kg (wet weight) to 0.12µg/Kg (dry weight)²¹. Application of the interim standards are subject to specific site circumstances and proximity to relevant priority marine features.

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 likely changes to the regulation around Slice® treatments are likely to generate significantly lower thresholds for Slice® use, requiring review of the use 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 available option should sites not meet required criteria.

10.6 Impact Assessment

10.6.1 Carbon Deposition

The principle source of organic material (often referred to as carbon) from the farm comes from the release of uneaten feed and faecal matter. The majority 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.

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, 'opportunistic' species such as *Capitella sp.* and *Malacoceros 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 assimilation of the material to the sediment.

Compliance with Regulatory Requirements

Impacted sediments are now quantitatively defined in terms of the Infaunal Quality Index (IQI) metric. 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 to zero indicate a high level of pollution or disturbance. SEPA guidance specifies that IQI values of greater than 0.75 indicate an approximately non-impacted seabed community, whereas values below this represent impacted sediments. The proposed requirement for seabed

²¹ <https://www.sepa.org.uk/media/299675/wrc-uc12191-03-review-of-environmental-quality-standard-for-emamectin-benzoate.pdf>

impacts for aquaculture is that the areas impacted to a level below 0.75 IQI by any farm are limited to a maximum size of 0.5km².

The outputs of NewDepomod modelling for Maclean's Nose are provided in Figure 10. For the purposes of the EIA, the calibrated model illustrating the full modelled flow (tidal and wind forcing) has been evaluated to provide the most realistic indication of the potential impacts. The full hydrographic report is provided in Appendix 2 and provides details of further model runs, including tide only modelled flow required by SEPA to inform the CAR licensing process.

Current data recorded at the site indicated a weak near-bed average residual current of about 0.01m/s to the south, with the tidal ellipse orientated from northwest – southeast. Consequently, the predicted deposition footprints (Figure 11) indicate dispersal of waste material predominantly along a northwest and southeast orientation, with a discrete area of deposition to the north of the site, possibly generated by localised eddy within the bay.

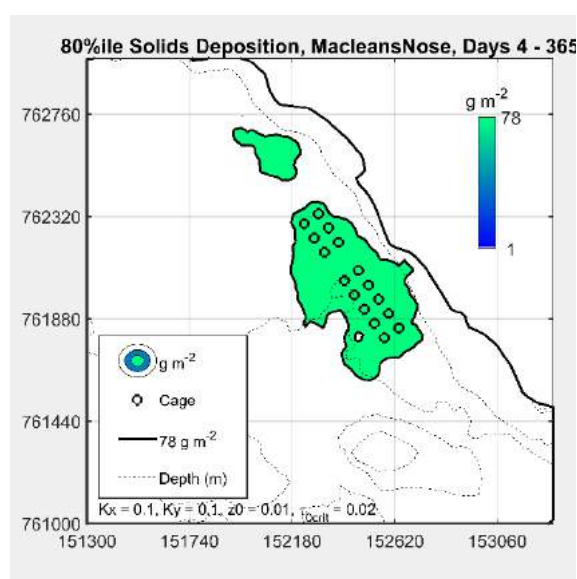


Figure 10 Predicted calibrated deposition with full flow from Run 2 ("Calibrated"), using the 80th percentile deposition value of 78 g m⁻² to delineate the benthic footprint (IQI 0.75).

The total mass of solids released was estimated to be 1,429,136kg per year. Using full modelled flow, with a maximum biomass of 3500 tonnes, the model predicts the impacted area (0.75 IQI) to be less than 280,625m² (Table 10)²². This means that the area where the IQI may fall below 0.75 is less than 0.5 km or 500,000m² and complies with SEPA requirements. In addition, the accompanying validation exercise indicated that the model predictions were conservative i.e. the measured IQI values were higher than the modelled IQI suggesting the impacted area is less than the modelled output.

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 30ITI – Infaunal Trophic Index - which corresponded to an Allowable Zone of Effect (192g cm²/yr). This value was another

²² The calibration exercise demonstrated that, at Maclean's Nose, an IQI greater than 0.75 was achieved where deposition exceeded 78 g m⁻² no more than 20% of the time (i.e. where deposition was less than 78g m⁻² for at least 80% of the time).

metric defining the intensity of benthic impacts. The area corresponding to ITI30 was modelled at a maximum 147,500m² (Table 10).

Table 10 NewDepomod simulation results for tide-only flow after 365 days at maximum biomass for Run 2 ("Calibrated").

Total mass of solids released (kg yr ⁻¹)	1,429,136
Mass of solids within footprint (kg) ²³	1,045,752
Area > 78 g/m ² (m ²)	280,625
Maximum Area > ITI30 or 192g/m ² (m ²)	147,500

The results of the modelling indicate that the proposed variation of the maximum biomass to the limit of 3,500 tonnes is sustainable and within the benthic Environmental Quality Standards limits set by SEPA.

Comparison of Current and Proposed Site Configurations

The proposals to extend the site will result in a number of changes to the mass of carbon deposited and the area impacted. Both the existing and the proposed pen configuration have been modelled under NewDepomod. Figure 11 illustrates both carbon deposition footprints based on the 80% contour (0.75 IQI).

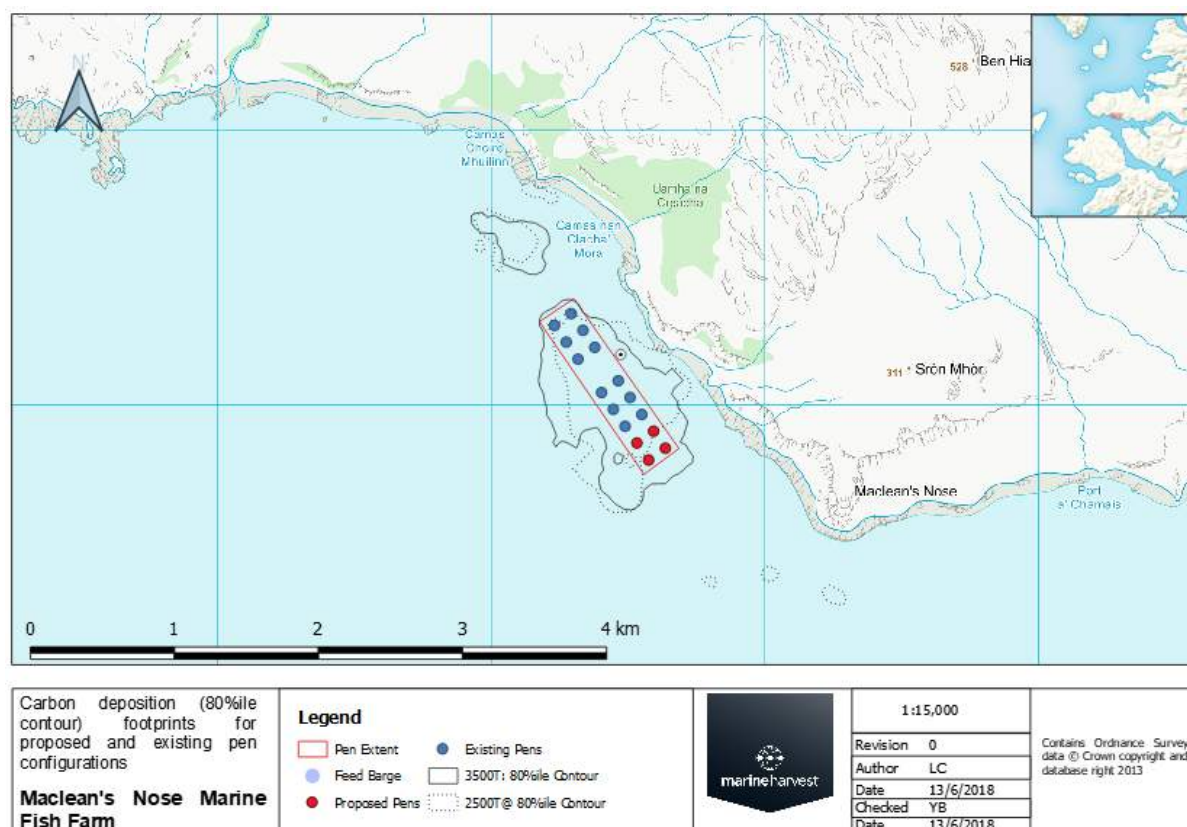


Figure 11 Carbon deposition footprints (80%ile contour) for existing and proposed pen configurations modelled under NewDepomod.

NewDepomod modelling outputs indicate a 10% increase of the area impacted compared to the existing configuration (also modelled under NewDepomod). The area output for the existing configuration was output at 255,192m². The introduction of more accurate modelling

²³ Equivalent to the 78g/m² contour and ITI 0.75 threshold.

techniques based on calibrated models (NewDepomod) also output an overall decrease of the benthic sampling area (ITI 30) from 155,543m² to 147,500m² for the existing pen configuration.

Organic deposition will occur at the extended area with the greatest impact being in and around the immediate pen area. The duration of this impact will extend to the 22-month production cycle, followed by a recovery 6-week fallow period. Highest levels of impact are anticipated when the site is at or approaching maximum biomass. The main impacts arising from carbon deposition are deoxygenation of the sediments resulting from smothering by solids deposition and consequent alteration to benthic communities.

Impacts on Benthos

The baseline survey identified a low to medium value habitat featuring three species of conservation importance, although only one of these was recorded at reasonable frequency (*Funiculina quadrangularis*, tall sea pen). Occasional sightings of (*Pennatula phosphorea*) Phosphorescent Sea Pen and an occurrence of (*Pachycerianthus multiplicatus*), fireworks anemone.

The layout of the site is provided in Figure 3. Section 10.6.1 sets out the likely area to be impacted by the proposals (IQI < 0.75) corresponding to carbon deposition of 17g/m², the impacted area is predicted to increase by 23% mainly to the south of the existing development mainly in line with additional proposed cages. The physical footprint of the modifications is confined to relatively small areas associated with embedment anchors and mooring points.

The increased area of deposition of organic material may lead to the temporary modification of benthic communities directly beneath the pen group. Burrowed mud type habitats are considered to have low sensitivity to deoxygenation and are considered to tolerate sediments relatively high in organic content²⁴. Impacts are considered temporary. The magnitude of the impact arising from the additional site infrastructure on the benthic community is assessed as minor, due to the reversible impact on the existing benthic species assemblage, within an area that complies with SEPA requirements (0.5km²), although the community may be altered for the duration of the development and partially changed on this basis. The receptor sensitivity (benthic community) is classified as low to medium based on the classification of receptor sensitivity outlined in Table 2. The higher sensitivity value is attributed to the slightly higher frequencies of *Funiculina quadrangularis* i.e. the site contains one or more PMFs but would not ordinarily qualify for designation. The overall significance of the impact is classified as minor to moderate.

10.6.2 In-feed Residues

The in-feed treatment, Slice® (active ingredient: emamectin benzoate), is administered by coating feed with medicine. A proportion of the active ingredient, emamectin benzoate, is discharged from the fish and is deposited on the sea floor contained initially in faecal pellets. Emamectin benzoate is readily bound onto organic material and tends to remain in marine sediments with little or no mobility into the water column. The compound is relatively persistent within sediments with a half-life up to approximately 250 days, and complete removal after 4.5 years (SEPA, 2018). SEPA indicates that the maximum theoretical amount of EmBZ in the environment at any given point in time occurs approximately 118 days after treatment and represents around 72% of the initial treatment quantity, subsequently modelling is focused on the likely peak accumulation points.

²⁴ Marine Scotland: FEAST (Burrowed Mud Habitat) Available online <http://www.marine.scotland.gov.uk/feast/FeatureReport.aspx#0>

Data for the toxicity of emamectin benzoate to marine benthic organisms is limited, with data in terms of acute toxicity dataset only available for annelids and crustaceans. The current sediment EQS for emamectin benzoate is derived from toxicology work based on *Arenicola marina*, a sensitive polychaete species, with an additional safety factor to protect all species²⁵.

Receptors most likely to be affected following treatments of Slice® are those located in the benthos. SEPA apply a limit on the size of area that can be affected by a concentration (Environmental Quality Standard: EQS). The EQS is equal to $0.763 \mu\text{g kg}^{-1}$ or 763ng kg^{-1} of wet sediment depending on the sensitivity of the receiving environment and application of SEPAs interim Position Statement²⁶. The size of the area within which concentrations exceeding the EQS are permitted is termed the Allowable Zone of Effects (AZE) and is defined by the area of the farm cages expanded by 100 m in all directions.

NewDepomod was run initially for a Total Allowable Quantity sufficient to treat 5.0 times the proposed maximum biomass. Model simulations were then iterated, until levels did not breach the required limits. For the purposes of the EIA, the calibrated model illustrating the full modelled flow (tidal and wind forcing) has been evaluated to provide the most realistic indication of the potential impacts. The full hydrographic report is provided in Appendix 2 and provides details of further model runs, including tide only modelled flow required by SEPA to inform the CAR licensing process.

A successful pass was achieved with an Over Treatment Factor of 0.7, i.e. approximately 70% of the full biomass of 3500 tonnes can be treated and continue to comply with SEPA EQS. Figure 12 illustrates the dispersal of emamectin benzoate for the maximum treatment biomass of 3500 tonnes. This is equivalent to a released mass of emamectin benzoate of 770.8g. After 118 days, the peak concentration of EmBZ in the near-field did exceed the EQS trigger value of $7.63 \mu\text{g kg}^{-1}$ by $94.9 \mu\text{g kg}^{-1}$. Enhanced monitoring will be required at the site if Slice® is used.

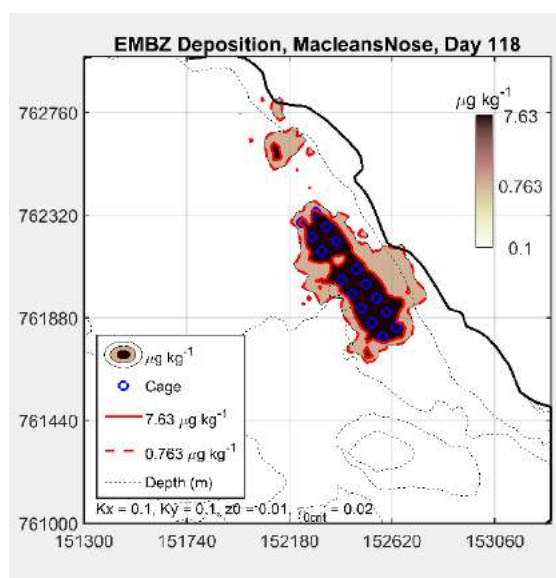


Figure 12 Predicted EmBZ concentrations after 118 days with full flow from Run 2 ("Calibrated") for maximum treatment biomasses, 30 tonnes and 3500 tonnes respectively.

²⁵ <https://www.sepa.org.uk/media/299675/wrc-uc12191-03-review-of-environmental-quality-standard-for-emamectin-benzoate.pdf>

²⁶ <https://www.sepa.org.uk/media/299677/wat-ps-17-03-finish-farm-final.pdf>

Impacts on Benthos

A recent review by SAMS highlighted that the key receptors most sensitive to emamectin benzoate were scavengers, particularly crustaceans. However, little impact has been identified in relation to impacts on the benthic environment, although it is also acknowledged that assessments of impacts of priority habitats to potential pressures are limited²⁷. Burrowed mud habitats containing sea pen and burrowing megafauna are also identified as a PMF likely to be impacted, however the review emphasises the precautionary nature of SEPA's EQS and indicates that the threats to the PMF features should be minimal so long as standards and procedures are adhered to. Although the sensitivity of the receptor is classified as low to medium, none of the species recorded represent the most 'at-risk' species (crustaceans). The highly precautionary nature of SEPA EQSs have also independently been evaluated to generate no more than minimal impacts on the benthos. The magnitude of impacts is subsequently assessed to be negligible for this particular species assemblage, subject to compliant application of in feed treatments. The overall assessment of significance is negligible to minor.

10.7 Monitoring

Suitable transects and sampling stations to monitor benthic and in feed compliance monitoring have been suggested in the Hydrographic Report sampling and will be determined by SEPA based upon the model outputs. In addition, routine monitoring will involve a site-specific monitoring program comprising of seabed samples which are collected and analysed for indicators of nutrient enrichment. As a result of this survey regime, a site can be assessed for its assimilative capacity, and consented biomass tonnages can be adjusted accordingly.

10.8 Summary

The existing site at Maclean's Nose has been operational since 2015 and has achieved passes for all compliance monitoring, since operations commenced. Impacts to the benthic environment were determined based on full flow hydrodynamic model simulations, calibrated with actual site data, based on the recently released NewDepomod software platform. In terms of carbon deposition, the total mass of solids released was estimated to be 1,429,136kg per year and the model predicted the impacted area (0.75 IQI) to be 280,625m². This complies with SEPA requirements to restrict the area where IQI may fall below 0.75 to less than 0.5 km or 500,000m². An accompanying validation exercise indicated that measured IQI values were higher than the modelled IQI suggesting the impacted area is less than the modelled output.

NewDepomod modelling was carried out for both the existing and new site configuration to characterise the degree of change arising from the proposed site extension. NewDepomod modelling shows an increase of the area impacted of around 10% based on the current configuration of 2500 tonnes. The introduction of more accurate modelling techniques using calibrated models has resulted in an overall decrease of the benthic sampling area (one of the key historic metrics used to characterise impacts; ITI30) from 155,543m² to 147,500m².

The increased area of deposition of organic material may lead to the temporary modification of benthic communities directly beneath the pen group. Burrowed mud type habitats are considered to have low sensitivity to deoxygenation and are considered to tolerate sediments

²⁷ SAMS. 2018. Review of the Environmental Impacts of Salmon Farming in Scotland. Executive Summary and Main Report.

relatively high in organic content²⁸. The magnitude of the impact arising from the additional site infrastructure on the benthic community is assessed as minor, due to the reversible impact on the existing benthic species assemblage, within an area that complies with SEPA requirements (0.5km²). The receptor sensitivity (benthic community) is classified as low to medium based on the classification of receptor sensitivity outlined in Table 2. The higher sensitivity value is attributed to the slightly higher frequencies of *Funiculina quadrangularis* i.e. the site contains one or more PMFs but would not ordinarily qualify for designation. The overall significance of the impact is classified as minor to moderate.

To determine an appropriate consent mass for in feed treatments (emamectin benzoate), NewDepomod was run through a number of iterations until infeed residues did not breach the required limits. A successful pass was achieved with an Over Treatment Factor of 0.7, i.e. approximately 70% of the full biomass of 3500 tonnes can be treated and continue to comply with SEPA EQS. This is equivalent to a released mass of emamectin benzoate of 770.8g. After 118 days, the peak concentration of EmBZ in the near-field did exceed the EQS trigger value of 7.63 µg kg⁻¹ by 94.9 µg kg⁻¹. Subsequently enhanced monitoring will be required at the site if Slice® is used.

A recent review by SAMS highlighted that the key receptors most sensitive to emamectin benzoate were scavengers, particularly crustaceans. However, little impact has been identified in relation to impacts on the benthic environment. The review emphasises the precautionary nature of SEPAs EQS and indicates that the threats to the PMF features should be minimal so long as standards and procedures are adhered to. Subsequently although the sensitivity of the receptor is classified as low to medium, none of the species recorded represent the most at-risk species (crustaceans) and the highly precautionary nature of SEPA EQSs have also independently been evaluated to generate no more than minimal impacts on the benthos. The magnitude of impacts is subsequently assessed to be negligible for this particular species assemblage, subject to compliant application of in feed treatments. The overall assessment of significance is negligible to minor.

11 Water Column

11.1 Introduction

Whilst the majority of 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 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 modifications proposed at Maclean's Nose.

11.2 Consultation

Responses received during the Scoping process, relevant to the assessment on Water Column are summarised in Table 11 below.

²⁸ Marine Scotland: FEAST (Burrowed Mud Habitat) Available online <http://www.marine.scotland.gov.uk/feast/FeatureReport.aspx#0>

Table 11 Consultation responses relating to impacts on the water column

Consultee	Date	Advice / Information	Response
SEPA	30-Oct-17	Nutrient enhancement calculations including cumulative impacts with other fish farms	Nutrient enhancement calculations provided with approach on cumulative
HC	Scoping	Assessment of water column to be provided in laymans terms.	Explanation, parameter derivations provide
SEPA	Scoping	Nutrient enhancement calculations required.	Provided in Section 11.3.
MSS	Scoping	Appropriate ECE modelling should be undertaken to show the degree of nutrient enhancement likely to result from the site and form cumulative effects from all licenced biomass.	Calculations based on open water model.
MSS	Scoping	Require information on stocking density, annual production and FCR figures.	Provided in Table 13

11.2.1 Baseline Environment

Locational Guidelines published by Marine Scotland Science designate delineated waterbodies such as lochs and voes on the basis of calculated indices to estimate nutrient enhancement and benthic impacts. Maclean's Nose is located approximately 1km from the closest Locational Guidelines boundary at Loch Sunart in an open water location, and as such is not categorised under the Locational Guidelines (Figure 13). However, for the purposes of the assessment, which considers sites and water bodies in close proximity, Locational Guidelines published by the Scottish Government in June 2017²⁹ categorise Loch Sunart as a Category 3 loch with a maximum biomass of 5,180 tonnes.

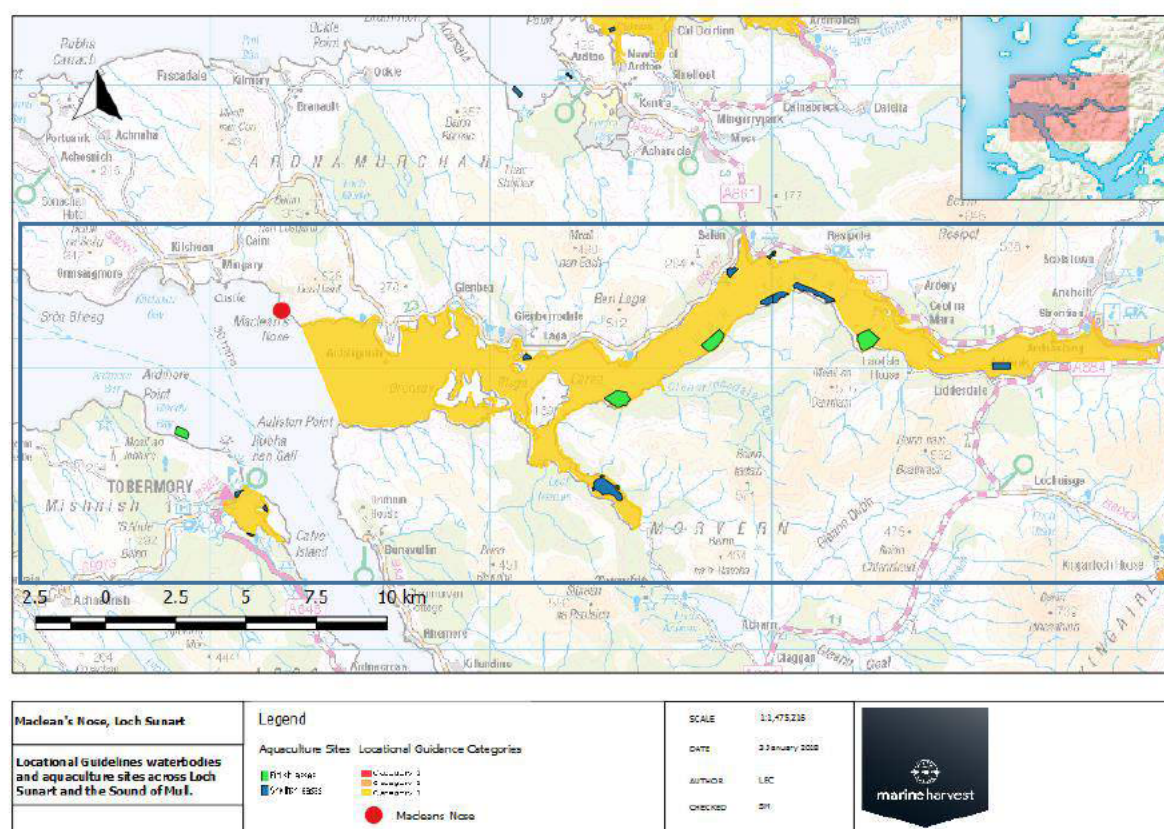


Figure 13 Locational guidelines waterbodies and aquaculture sites. The box indicates the area over which the cumulative ECE was calculated.

²⁹ <http://www.gov.scot/Resource/0052/00522432.pdf>

Maclean's Nose also falls within the Sound of Mull water classification area, the overall status of the water body is considered 'good' under SEPA's classification criteria³⁰ with number of the physico-chemical parameters classified as 'high' status (Figure 14).

1-3-2-3-4: Benthic invertebrates
 1-3-2-7: Macroalgae
 1-3-2-7-1: Macroalgae (FSL)
 1-3-2-7-2: Macroalgae (RSL)
 1-3-2-9-1: Phytoplankton
 1-3-3: Specific pollutants
 1-3-3-15: Unionised ammonia
 1-3-4: Hydromorphology
 1-3-4-1: Morphology

Figure 14 Loch Sunart Water Classification.

There are several other fin fish farms in the vicinity of Maclean's Nose illustrated in Figure 13. Details of the relevant fin fish farms are provided in Table 12. In summary, four of the fin fish farms located in the Sound of Mull / Sunart complex are operated by Marine Harvest, with a total consented biomass of 8678 tonnes, of which 1500 tonnes is associated with Glencripesdale (currently fallow). The site in Bloody Bay, to the south of Maclean's Nose, is operated by Scottish Sea Farms Ltd. with a biomass of 998 tonnes.

Table 12 Active / inactive sites within waterbody selected for cumulative ECE modelling

Site Name	Owner/Operator	Consented MSB (tonnes)	Active (Y/N)	Locational Guidance Water Body
Invasion Bay	MHS	1680	Y	Sunart
Glencripesdale	MHS	1500	Y (fallow)	Sunart
Camus Glas	MHS	2000	Y	Sunart
McLean's Nose	MHS	2500	Y	None
Bloody Bay	Scottish Sea Farms Ltd.	998	Y	None
Total		8678		

The receptor, for the purposes of the assessment, is the water column and associated chemical characteristics. In line with the criteria specified in Table 2, 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 both Maclean's Nose and cumulatively from other farms in the area, 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 new maximum biomass of 3,500 tonnes;

³⁰ <https://www.sepa.org.uk/data-visualisation/water-classification-hub/>

- Equilibrium Concentration Enhancement (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 – a standard box model approach is employed over the Loch Sunart/northern Sound of Mull region to calculate the ECE.
- 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 Manual³¹. 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 13.

Table 13 Nutrient enhancement budget summary

Parameter	Definition / Source	Value
Maximum Standing Biomass (T)	Proposed project biomass	3,500
Stocking Density	Proposed project stocking density	11.92
Annual Production (T/yr)	Production calculation based on in house modelling	3444
Feed Conversion Ratio (FCR)	Current figures relating to feed efficiency	1.07
Total N Input (T/Yr)	Calculated at 6.4% based on food manufacturer, Skretting.	236
Total N in Fish (T)	Calculated at 3.4% of fish mass	119
N Lost to the Environment (T/Yr)	Calculated as 42.3% of nitrogen in feed	99.8

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. Maclean's Nose is not

³¹ https://www.sepa.org.uk/media/114787/ffm_anx_h.pdf.

located in a locational guidance water, subsequently an alternative 'open water' model for Equilibrium Concentration Enhancement 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 background levels due to farming activity. Data inputs to the open water ECE model are provided in Table 14. The velocity data are derived from a deployment of a Teledyne ADCP adjacent to the site from May – July 2017. Details of the deployment and data processing are provided in the hydrographic report in the Modelling Method Statement, Appendix 7.

Table 14 Data inputs to the Open Water ECE model for the proposed biomass at Mclean's Nose.

Parameter	Value
Depth of water at the site (m)	37.1
Diffusion Coefficient ($\text{m}^2 \text{s}^{-1}$)	0.1
Along shore residual velocity (m s^{-1})	0.025
Normal residual velocity (m s^{-1})	0.011
Along shore tidal current amplitude (m s^{-1})	0.086
Normal tidal current amplitude (m s^{-1})	0.038
Tidal current phase (degrees)	0
Number of pens	16
Maximum biomass (tonnes)	3500
Total pen area (m^2)	18,337
Distance from head of grid (km)	2
Distance of pens from shore (km)	0.2

The methodology to assess level of change follows the UK Technical Advisory Group (UKTAG)³² procedure to assess coastal waters using the winter mean of dissolved organic nitrogen³³. 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 $168\mu\text{g/l}$ or $12\mu\text{M/l}$.

11.3.4 Cumulative Impacts

The combined Loch Sunart and northern Sound of Mull (nSoM) area were identified as suitable for the cumulative assessment, the body of water and relevant sites are illustrated in Figure 13. 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 and reported in Table 12.

For the purpose of the cumulative ECE assessment, Glencripesdale, although fallow, has been included as an active site, in line with the licence status. Therefore, the cumulative consented maximum standing biomass for present active fish farm sites and the total MSB for all fish farm sites irrespective of present operational status is 8678 tonnes, with 5180 of this biomass within the Loch Sunart locational guidance water body. Bloody Bay is not located in a locational guidance water body.

³² 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.

³³ http://wfd.uk.org/sites/default/files/Media/Environmental%20standards/Environmental%20standards%20phase%202_Final_110309.pdf

To calculate the cumulative ECE from all farms in the Sunart/nSoM water body only, the standard ECE model outlined by Gillibrand *et al* (2002) for semi-enclosed bodies of water was used. The ECE is calculated by $ECE = S.M / Q^{34}$, where:

- M is the total consented biomass of all the finfish farms in the sea loch (tonnes),
- Q is the flushing rate ($Mm^3 yr^{-1}$)
- S = $48.2 kgN tonne^{-1} yr^{-1}$ is the source rate (total discharge of nutrient nitrogen in kg per tonne of production).

The flushing rate is calculated from the tidal exchange by $Q = 365 * 0.52 * A * (0.7 * R)$ where:

- A is the surface area of the water body (km^2)
- R is the spring tidal range (m)
- 0.7 is a factor used to estimate the mean tidal range from the spring value

For the Sunart/nSoM water body shown in Figure 13, $A = 120.1 km^2$ and $R = 4m$, giving $Q = 236043 Mm^3 yr^{-1}$ (Table 15).

Table 15 Data inputs to the cumulative ECE calculation.

Name	MSB (tonnes)	Area (km ²)	Spring Tidal Range (m)	Q (Mm ³ /yr)	ECE (ug/L)	ECE (umol/L)
Sunart/nSoM	8678	120.1	4.0	236043	1.8	0.13
	9678	120.1	4.0	236043	2.0	0.14

11.3.5 Bath Treatments

Modelling has been undertaken in line with the methodology described above on a whole site (16 pens) basis and stocking density of $11.9 kg/m^3$. 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 consentable medicinal quantities at the proposed site. The results of the bath modelling are summarised in Table 16.

Table 16 Proposed bath treatments

Treatment	3 hour proposed treatment value	24 hour proposed treatment value	Number of Pens Treatable in 3 Hours	Number of Pens Treatable in 24 Hours
Azamethiphos	417.9g	641.8g	1.6	4.0
Cypermethrin	46.8g	N/A	5.8	N/A
Deltamethrin	17.5g	N/A	5.5	N/A

The cage treatment depth used for the bath treatments was 1.4 m. Using the results from the analysis of the surface current meter data in the short-term bath treatment model EQS compliance for both Deltamethrin and Cypermethrin at this cage depth was predicted. EQS compliance for Azamethiphos was predicted at a cage depth of 1.4 m. The permissible quantities mean that full treatment of the 16 pens at the site, would take approximately 2 to 4 days to complete.

³⁴ The ECE units are converted from $kg m^{-3}$ to $\mu mol l^{-1}$, since measurements of dissolved nutrients are traditionally presented in these units

11.4 Potential Impacts

Elevated nutrients are a key factor in eutrophication where nutrient enrichment can cause accelerated growth of plants. Nitrogen can be a limiting factor to primary phytoplankton production in the water column. Degradation of the organic waste generated by dying plant material by bacteria and other organisms can theoretically lead to a reduction in dissolved oxygen levels, although this is rare.

The ECE value for the modified operations at Maclean's Nose based on a maximum standing biomass (MSB) of 3,500 tonnes was calculated as 0.68 μM or 9.5 $\mu\text{g/l}$ and Index 2³⁵. The background level for dissolved available inorganic nitrogen is 12 μM or 168 $\mu\text{g/l}$. The calculated value represents 5.6% of the background and does not exceed the 150% value trigger specific in UKTAG procedures. The nutrient contributions from Maclean's Nose 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 2.0 $\mu\text{g/l}$, or 0.14 μM , representing less than 1% of the background value. Based on methodology above for sites within Loch Sunart, the ECE is 1.9 $\mu\text{g/L}$ or 0.14 μM . The mitigation measures to control nutrient release to the marine environment are specified in Section 10.5. 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.

11.4.2 Bath Treatments

The site has been modelled 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 16 ng l⁻¹ is required to be attained 6 hours following treatment. In the case of deltamethrin a mean concentration of 6 ng l⁻¹ is required at the same point in time³⁶. 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 days³⁷. Therefore, this medicine is subject to additional constraints over a longer time frame and a short term EQS, long-term EQS and a maximum concentration limit is in place. The modelled output complies with these EQS.

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.

³⁵ Derived from Locational Guidelines Nutrient Enhancement Index which specifies a scale from 1 – 5 depending on predicted ECE for nitrogenous nutrient arising from fish farming: <http://www.gov.scot/Uploads/Documents/Report63.pdf>

³⁶ SEPA. 2018. Regulatory Modelling Guidance for the Aquaculture Sector. Air and Modelling Unit, SEPA

³⁷ SEPA. 2018. Regulatory Modelling Guidance for the Aquaculture Sector. Air and Modelling Unit, SEPA

11.5 Summary

Maclean's Nose is located in an area of open water, outside of any Locational Guidance waterbody. Nutrient inputs arising from the proposed modifications to Maclean's Nose were calculated on the basis of both the individual site, and cumulatively to include four other sites present across Loch Sunart and north of the Sound of Mull. The open water status of the location was assessed to have relatively low sensitivity to changes in nutrient enrichment. Nutrient contributions from Maclean's Nose represent 5.6% of background value, below the UK Technical Advice Group (UKTAG) trigger of change, subsequently the magnitude of this impact is considered minor in terms of EIA. Similarly, the cumulative nitrogen contribution is assessed to contribute less than 1% of the background value and 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 potential to attract a number of potential predators. 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 modifications at Maclean's Nose in terms of predator interactions. This assessment should be read in conjunction with Section 14: Impacts upon Species or Habitats of Conservation Importance.

12.2 Consultation

Consultation was undertaken primarily through the Screening / Scoping process. Advice provided regarding the scope of this assessment is provided in Table 17.

Table 17 Consultee responses relevant to the assessment of predator interactions.

Consultee	Date	Advice / Information	Response
HC	Scoping	Appropriate assessment required due to proximity of Inner Hebrides and Minches cSAC.	See Appendix 8: Information to support an Appropriate Assessment
HC	Scoping	Site specific predator control plan required.	Outlined in Section 12.6. Also refer to Appendix 9: ADD Use policy and 10: ADD Deployment Guidance
HC	09/11/17	Details on colour, height, design of the top nets to be provided regarding the equipment to deter predators.	Details on design of top nets provided in Section 7.5.
HC	Scoping	Type manufacture, mode of operation and operating frequency of ADDs.	Details on proposed specification, mode of operation and frequency of ADD provided in Section 12
SNH	Scoping	Requirement to clarify confirmation to technical standard and strategies to minimise risk of damage to predators.	Clarification of the Technical Standard in Section 7 and equipment attestation provided in Appendix 5

In addition to statutory consultees, strategic level discussions are ongoing with SNH regarding the appropriate use of ADDs. Due to the location of the site within the Inner Hebrides and Minches cSAC, relevant information has been cross referenced between the Appendix 8: Information to Support an Appropriate Assessment, where necessary to avoid duplication.

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/>;
- National Biodiversity Atlas <https://nbnatlas.org/about-nbn-atlas/>;
- SNH Sitelink <https://gateway.snh.gov.uk/sitelink/>;
- Marine Scotland Science, The Scottish Government, SNH & JNCC. 2017. Inner Hebrides and Minches Proposed SAC: Advice to Support Management. <https://www.nature.scot/sites/default/files/2017-10/Consultation%20-%20Harbour%20Porpoise%20%20Inner%20Hebrides%20and%20the%20Minches%20pSAC%20-%20Combined%20Req%2033%20%20MOP%20-%20A1918723.pdf>

An impact assessment on the features outlined in the baseline assessment is provided in Section 14: Impacts on Species or Habitats of Conservation Importance. Information to Support an Appropriate Assessment is provided in Appendix 8.

12.4 Baseline Environment

12.4.1 Birds

There are no formal designations for birds within 5km of the site. An RSPB Reserve located at Glenborrowdale is located approximately 10km from the site and records species such as golden eagle (*Aquila chrysaetos*) and a range of marine species such as common sandpiper (*Actitis hypoleucos*) and oyster catcher (*Haematopus ostralegus*). A range of breeding coastal birds are highlighted at Sligneach Mor at the mouth of Loch Sunart 3.2km south west of Maclean's Nose and the National Biodiversity Network holds records of white-tailed sea eagle (*Haliaeetus albicilla*) sightings in the vicinity.

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. Seals are likely to be present in the area, and the National Biodiversity Database highlights numerous sighting of both the Common seal (*Phocoena phocoena*), 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*)

Maclean's Nose is located 1km from Sunart SAC and adjacent to the Sunart SSSI. The Sunart SAC, includes otters as a qualifying feature of the designation, similarly Sunart SSSI includes otters as one of its conservation features. Otters are also protected under Schedule 2 of the Habitats Regulations (European Protected Species). A search of the National Biodiversity Network indicated 7 records of otters in the vicinity of the site.

12.4.4 Non-Target Species

Maclean's Nose is situated within the Inner Hebrides and Minches cSAC for Harbour porpoise, which supports approximately 31.4% of the harbour porpoise population present within the UK's part of the West Scotland management unit in depths of less than 200m (Marine Scotland *et al.* 2017). The cSAC covers most of the inner coastal waters of the Scottish West coast. Other species recorded in the vicinity of the site include infrequent (< 10 since 2003) sightings

of basking sharks, bottle nose dolphins, and a minke whale. A full description is provided in Section 14.

12.5 Potential Impacts

There are a number of potential impacts associated with the presence and operation of a fish farm unit, summarised below behaviour:

- Predator (bird, seal, otter) entanglement in nets leading to harm or fatality;
- Breach or damage to stock nets, compromising net security and fish containment;
- Seal presence around fish pens can generate a stress response in pen fish subsequently impacting feeding behaviours; and
- Disturbance from important habitats and physical harm for both seals and other cetaceans from the use of ADDs.

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

12.6 Management and Mitigation

A range of general mitigation measures currently implemented to reduce interactions with potential predators are outlined below. The principal mitigation for reducing all predator interactions, and subsequent impacts is based on removing incentives for predators to visit the farm and remove opportunities of potential habituation to the development as a food source. The following continually implemented management measures to prevent seal attacks are summarised in the list below. These are divided into the following categories:

- Standard Mitigation Measures; and
- Responsive Mitigation Measures.

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

Responsive measures are adopted in occasional cases of challenging or aggressive seal behaviours despite the standard mitigation measures. As indicated above, ongoing attacks by seals can impact the integrity of containment infrastructure, in addition to generate stressed responses to contained fish with subsequent impacts on feeding, health and welfare.

Standard Mitigation Measures

- *Net Tension:* the principal method of preventing seals attacking farmed fish at the site is the continuous use of well-tensioned netting. The higher the net tension, the more difficult it is for any seal to approach fish or damage nets. The proposed pens use weighted sinker tube technology, detailed in Section 4 of the EIA Report, to weight the nets. Maintenance schedules include regular checks on net tension on a regular basis to ensure they are maintained in good condition.
- *Surface Netting:* netting is installed over stocked pens to mitigate against predation by wild animals, primarily diving birds. Commonly the netting support structure is installed at the centre of the pen and is often referred to as a “hamster wheel”; however, an alternative support which suspends the top nets from poles attached to the perimeter of the pen walkway is also proposed for this development. These nets are secured at the pen ring with poles and tensioned to prevent entanglement. This structure will be at a height to ensure the nets are kept at a safe distance from the water and the feed rotor. Photographs

of the hamster wheel and top net configuration are provided in Figure 5 and Figure 4. General assembly diagrams of each option are provided in Appendix 4, whilst Figure 5 illustrates the top net mesh to illustrate relative mesh sizing; the side panels consist of a 4-6-inch mesh, whereas the top panel will have a mesh size of 6 inches. Installation top nets on stocked pens throughout the production period in order to remove access to pond fish stock.

- *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 daily collection frequency is in place to collect and dispose of mortalities on a daily basis.

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 enclosed 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 MHS 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 when other control mechanisms have failed. Seal dispatch requires licensing through a separate licensing regime, and the use of licensed and trained contractors.

12.6.1 Acoustic Deterrent Devices (ADDs)

ADDs are capable of emitting a frequency of sound which effectively deters seals from the pens. ADDs emit sounds in the frequency range 10-14 kHz, 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*). A detailed assessment of ADDs and harbour porpoises is provided in Appendix 8: Information to Support an Appropriate Assessment. Impacts on non-target species are considered in Section 14.

At present the licensing consents for Maclean's Nose allow the potential use of ADDs as an option to manage seal interaction. ADDs are currently available for use at Maclean's Nose, however to date, net tensioning and generally husbandry have been sufficient for ADDs not to be used on site. However, MHS wish to maintain the option to use an ADD should the site be subject to any consistent and aggressive challenges by seals, and provision of second Terecos system is proposed to be held on site should this requirement arise. The approximate proposed deployment locations of the systems are provided in Figure 15. Should the modification to the existing site be consented, an additional system would be installed at 'Location 2' as indicated in the Figure, between the existing and proposed pens. As the system has not yet been adopted at the site, no default duty cycle has been established.

MHS has recently reviewed and modified the existing company policy for ADDs 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.

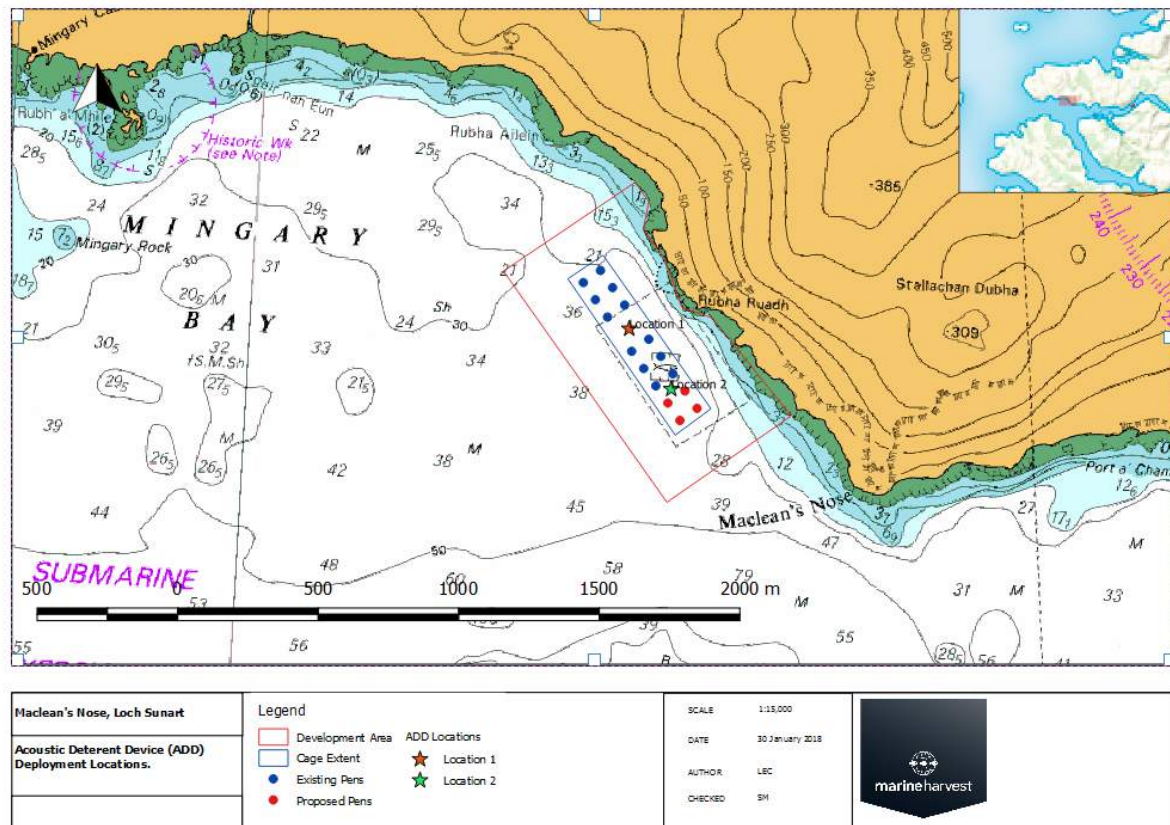


Figure 15 Proposed ADD locations.

Development of the policy is ongoing in conjunction with SNH to revise both the policy and accompanying company ADD guidance before distribution across the company's marine sites. A draft version of the policy and indicative deployment plan is provided in Appendices 9 and 10. This plan forms a framework for further development with SNH. In summary, the company propose to maintain the condition at Maclean's Nose for Use of ADDs when appropriate. Use of ADDs would be according to this 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.

12.7 Impacts

A full impact assessment on the features identified in the baseline assessment is undertaken in Section 14: Impacts upon Species or Habitats of Conservation Importance and also covered in detail in Appendix 8: Information to support an Appropriate Assessment. A discussion of the impact, informing that assessment is provided below.

There are no significant bird species or populations likely to be impacted by the proposals in the vicinity of the Maclean's Nose. Ongoing mitigation and management, principally via tensioned top nets will ensure that should aerial predation by birds will be minimised. The magnitude of the impact is assessed as low, and overall significance of the impact is assessed as low.

Primary predation by otters is primarily through direct entry into pens, which is managed by ensuring the correct fitting of pen and top nets to ensure a continuous barrier against predation. Otters are 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 frequency of occurrence. Overall significance is predicted to be moderate, however with ongoing husbandry methods to reduce attraction to the site and maintenance of net tension the significance of impact is minor.

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.. Although ADDs are available for use at the site, to date existing mitigation measures have been sufficient to minimise predator interactions without the use of ADDs. Should deployment be necessary, an additional Terecos Seal Scarer will be made available. Detailed information on the ADD systems, locations and potential impact on both seals and non-target species is provided in Section 14 and Appendix 8: Information to Support an Appropriate Assessment. To ensure a targeted and appropriate use of the systems, a deployment plan for ADDs is proposed as a framework for further consultation (Appendix 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, resulting in an improvement to the existing practice at Maclean's Nose.

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).

12.8 Summary

A baseline assessment at the site at Maclean's Nose indicates that the site will be exposed to a range of predator interactions. Management of the site will include implementation of a range of standard mitigation measures addressing primary attraction mechanisms, in addition to appropriately maintained barrier systems to remove the potential of physical interaction with the site. A range of standard and responsive measures are also included to address ongoing challenges by predators, mainly seals. These measures include the use of ADDs and humane dispatch under licence. The site is located within the Inner Minch and Hebrides cSAC and the use of ADDs has potential to impact a range of non-target species, including the qualifying feature of the designation; Harbour porpoise. Although ADDs are currently available for use at the existing site at Maclean's Nose, they have not been utilised at any point during its operational history. A draft policy and deployment guidance for ADDs has been developed to provide an outline framework for the managed use of ADDs to address specific challenges from seals and to minimise impacts on non-target species.

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 proposals at Maclean's Nose will result in an increase of biomass of 1000 tonnes. This assessment considers the potential impacts on wild salmonid fishery stocks likely from the proposed increase. This section is supplemented by Appendix 8, which provides information to support an Appropriate Assessment, and includes consideration of the indirect impacts on freshwater pearl mussel populations.

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
Lochaber Fisheries Trust (LFT)	30/10/17	Fragility of salmon and sea trout populations, low trout numbers implicated in poor Freshwater pearl mussel recruitment in Ardnamurchan and Mingarry SACs.	Noted and referenced in Information to Support an Appropriate Assessment (Appendix 8)
LFT	30/10/17	Full assessment of impacts on SACs would require data on lice dispersion, wild salmonid movements the relationship between lice and farmed salmon, the mortality in wild salmon populations attributable to lice and the effect of reduced fish host numbers on FWPM reproduction.	Full suite of this data unavailable for this site. Assessment suggests addressing this data requirement through the Environmental Management Plan (Appendix 12)
LFT	30/10/17	An assessment of the risk to salmon and sea trout populations in Loch Sunart.	See Information to Support an Appropriate Assessment (Appendix 8)
LFT	30/10/17	Request to see sea lice data over last 2 production cycles to understand if targets were met, and to see impact of sea lice data where new control methods have been in place for some time (e.g. Linnhe).	Data for two production cycles unavailable for this site (operational since 2015). Existing site data provided and levelized data across company wide data
LFT	30/10/17	Level of coordination with other sites.	Details provided in Section 13.6.7 and accompanying Appendix 6: Farm Management Statement.
SNH	06-Nov-17	Advise that application presents how treatment techniques will be used and when they will have used to control sea lice on Maclean's nose as part of a site specific and regional EMP. The plan should include: 1) monitoring the status of wild salmonid stocks within the Ardnamurchan Burns and Mingarry Burn SACs; and 2) monitoring lice numbers on wild fish.	Outline treatment plan provided in Appendix 11: Sea Lice Management and Efficacy. Outline EMP included in Appendix 12 including commitments to: <ul style="list-style-type: none"> • Monitoring lice numbers on wild fish in the vicinity of the development. • Commitments to monitor wild salmonid stocks, with consultation from local stakeholders.

			.
SNH	06-Nov-17	Reported information on sea lice levels in local farmed fish (and any other relevant data) should be taken into account as this may provide early warning of risks to the SAC feature and escalate the urgency of monitoring and possible mitigation action. The plan should describe the hierarchy of lice control measures that will be used (e.g. chemicals, wrasse, prolonged fallowing, etc.) and the triggers for that treatment.	Outline EMP (Appendix 12) to provide commitments on data sharing, via meetings and Statement of Operational Practices (SoPs) Indicative treatment plan provided in Appendix 11, includes discussion on treatment hierarchy and rationale for specific treatments.
HC	Scoping	A stand-alone, site-specific, sea lice management strategy should be provided, considering the likely cumulative effects with other fin fish sites in the loch system, including any expansion to those currently being considered to determine the need for an updated Environmental Management Plan could continue.	Management strategy included in Appendix 11.
HC	Scoping	Information and evidence should be provided on the success, or otherwise, of the various new technology proposed and the effectiveness, or otherwise, of existing chemical treatments and all other methods used. In addition, the data collected for the existing EMP, along with a discussion of which methods of sea lice control were required and their effectiveness or otherwise shall be provided.	Treatment efficacies provided in Section 11.
MSS	Scoping	Highlight 2 other sites within 15 km of the site.	Noted.
MSS	Scoping	Recommend that control of sea lice undertaken throughout the year to protect sea trout who are present in inshore waters throughout the year.	Indicative Treatment Plan outlines type of treatment responses implemented throughout the year (Appendix 11).
MSS	Scoping	Rivers Strontian, Pollach and Carnoch have fisheries for salmon and sea trout, data provided by MSS on catch statistics. MSS highlight data published by the SSPO on average lice counts.	Data integrated into baseline assessment (Section 13.4).
MSS	Scoping	Evidence of ability to control lice on site of the current ability to control lice, an attestation required setting out compliance with COGP, internal targets and success of treatment on site. Failures to control sea lice on site should be provided.	Sea lice attestation provided in Appendix 13.
MSS	Scoping	Revised sea lice efficacy statement to be provided taking into account modifications and biomass increase. Details should include maximum biomass that can be treated with in-feeds likely to be permitted and the estimated time take to practically administer and complete bath treatments to all pens at maximum biomass without breaching EQS	Sea Lice Management and Efficacy Statement provided in Appendix 11.
DSFB	Scoping	Highlight uncertainty over status of increased biomass limit.	Discussion of increased biomass limit in Section 5.
DSFB	Scoping	Consider potential for significant environmental impact, lice numbers anticipated to increase as biomass rises.	Impact assessment based on mitigation provided in Section 13.7
DSFB	Scoping	Require evidence to indicate compliance with 0.1 adult female lice per fish.	Accompanying Appendix 8: Information to Support an Appropriate Assessment

			provides site specific data on lice compliance.
DSFB	Scoping	Highlight the depressed populations of salmon and sea trout returns and recommend expansion at sites further away from inshore lochs.	Discussion of rationale behind site selection provided in Section 5.

Marine Harvest (Scotland) Ltd has held a number of discussions with the wild fish stakeholders on the issues that must be addressed to develop best practise in gathering meaningful data that will inform farm operators and wild-fish managers as to 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 such that it would be accountable, transparent and enforceable. Following discussions with the Lochaber District Salmon Fishery Board and Lochaber Fisheries Trust, a Regional Environmental Management Plan is proposed (appendix 12) focussed on the Loch Sunart geographical area, covering the three Marine Harvest operational sites. The Regional EMP will provide the framework for monitoring, communication channels, sharing of data, meetings, and the desired outcomes of the increased knowledge and partnership working that will ultimately result in improved management practises.

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 Maclean's Nose were collated from internal sources. The following information sources were also accessed:

- National Marine Plan Interactive (Disease Management Areas) <https://marinescotland.atkinsgeospatial.com/nmpi/> ;
- Lochaber Fisheries Trust <http://www.lochaberfish.org.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 .

Appendix 8: Information to Support an Appropriate Assessment provides a detailed assessment of the specific features relevant to the SACs designated for freshwater pearl mussel features.

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 on Appendix III of the Bern Convention and Annex II of the EC Habitats Directive. The species is also listed in the UK Biodiversity Action Plan 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.

Maclean's Nose is located approximately 1km from the mouth of Loch Sunart in the open waters of the northern Sound of Mull. Data from Marine Scotland Science indicated that the Rivers Strontian and Carnoch are known to have runs for both salmon and sea trout. Catch statistics were also provided by Marine Scotland and are illustrated in Figure 16. The figures collate data from 1952 to 2016 within the Sunart Statistical District, which includes the Polloch (Loch Shiel catchment). MSS highlight that these figures provide a representation of catch trends in the area. Whilst catches demonstrate significant variation, a clear trend for significant

reduction in salmon stocks is evident from the early nineties from salmon and grilse catches, with sea trout catches reducing slightly early in the eighties.

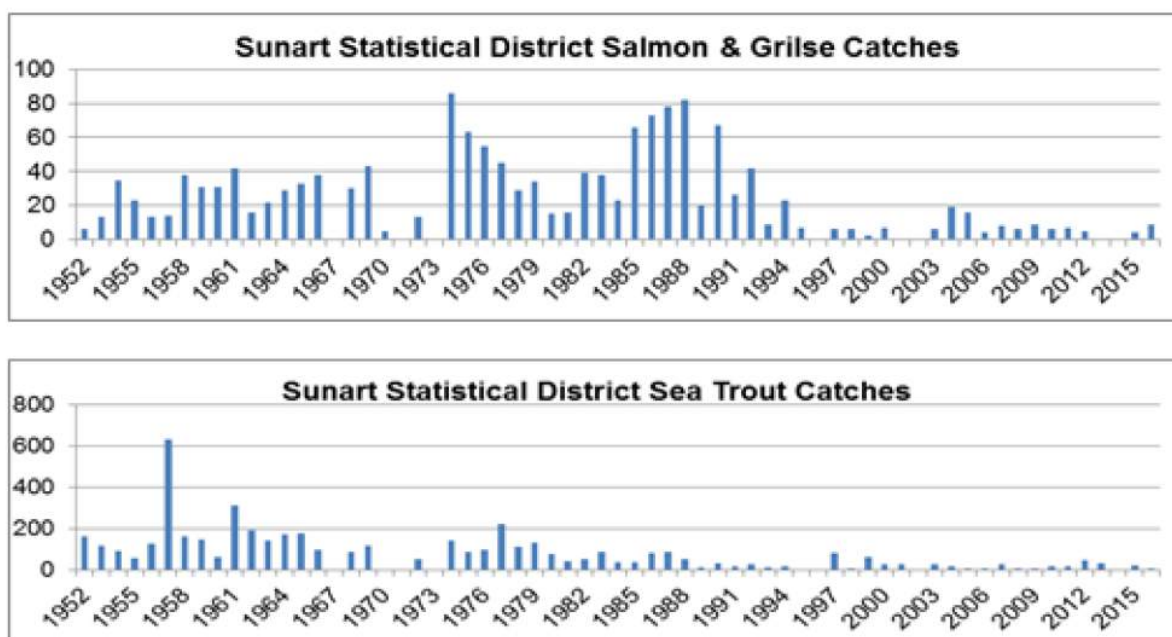


Figure 16 Sunart statistical district sea trout catches, data provided by Marine Scotland Science.

Similarly, Lochaber Fisheries Trust report that in the Strontian River, adult salmon returns have declined in the last few decades. The Strontian Community Company bought the fishing rights to the river in 2006 and has worked with Lochaber Fisheries Trust on a restoration Plan for the river (Lochaber Fisheries Trust. Accessed 2017) resulting in 3-year stocking plan. The Carnoch runs along Glen Tarbet, between Loch Linnhe and Loch Sunart. The river has a small salmon and sea trout run. The vulnerability of the salmon and sea trout populations in the Sunart catchment classify this receptor as high sensitivity.

13.4.2 Disease Management Area

Maclean's Nose is situated within the Marine Scotland Disease Management Area 15b (Linnhe, Firth of Lorne, Sound of Mull and Loch Sunart). 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 15b covers the Scottish Salmon Producers Organisation (SSPO) Code of Good Practice Farm Management Areas (FMA's) M-33, M-34, M35 and M-36. Farm Management Areas describe areas where farmers undertake to coordinate many of their activities and synchronise production in order 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. Farm Management Area 34 (Figure 17) covers Loch Sunart. FMA 34 also includes the fish farm location at Bloody Bay on the North coast of the Isle of Mull; this farm is operated by Scottish Sea Farms limited.

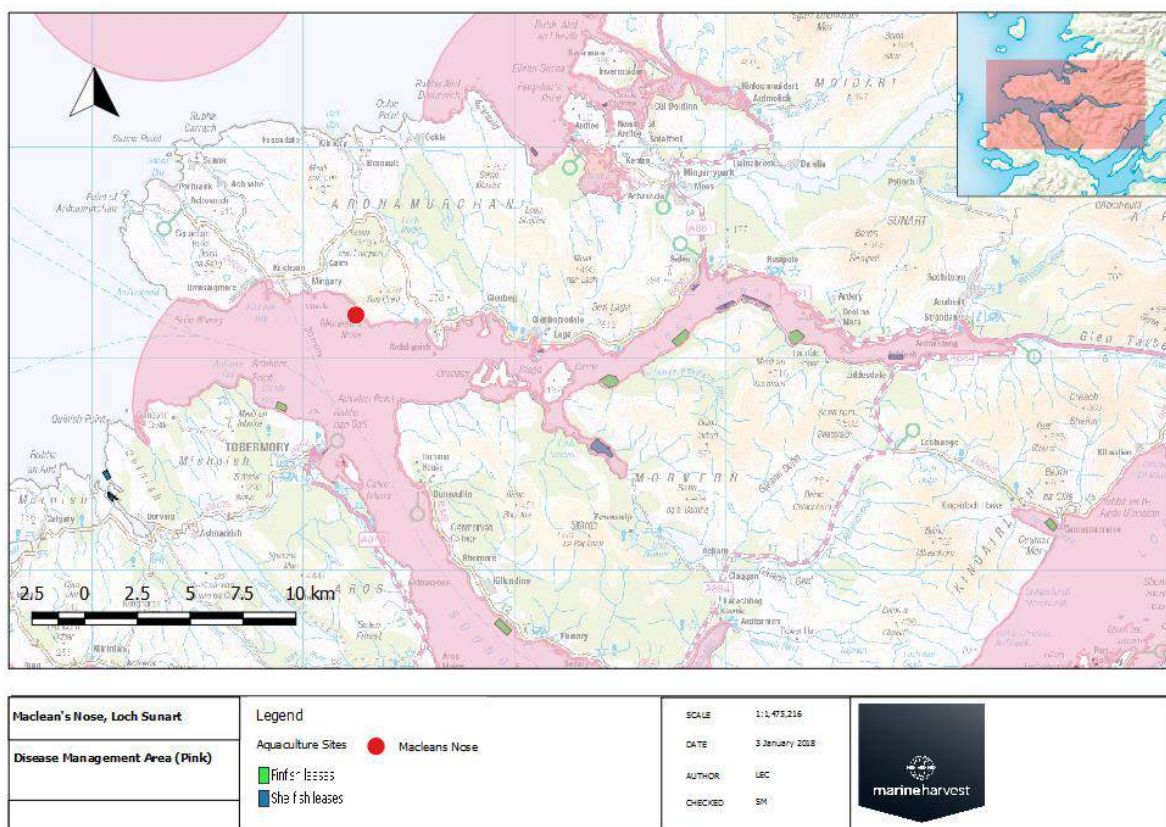


Figure 17 Farm Management Area 34.

Details on measures to coordinate activities are provided in Section 13.6.7 and Appendix 6: Farm Management Statement.

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 the subsequent growth phases, they are able to move around the host and to swim unanchored from the host. It is during these later stages that acute infection can occur. Two species in particular require control in seawater salmon farms, namely *Lepeophtheirus salmonis* - a salmonid specific species - and to a lesser extent, *Caligus elongates*, 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. Smolts may suffer more serious damage than harvest size fish with the same intensity of infestation.

Although sea lice are 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 correlative evidence suggests lice levels are higher around fish farms and that lice burdens on sea trout 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 potential to act as reservoirs for other disease and parasites. These include diseases such as Amoebic Gill Disease (AGD), a parasitic condition which can sporadically affect salmonids, and other notifiable diseases under UK legislation (The Diseases of Fish (Control) Regulations 1994) amongst others.

13.5.3 Genetic Mixing and Competition with of Escaped Farmed Stock

Escaped farmed stock are thought to impact wild populations namely by inter-breeding with native wild populations with corresponding decreases in 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

In order to reduce potential interactions, a range of mitigation measures have been developed to remove or reduce the range of impacts associated with developing the site. Whilst a number of these measures incorporate traditional management measures, a detailed discussion of measures implemented since 2015 provide further details on substantial new investment in sea lice management and outcomes of these. A Sea Lice Management Plan is provided in Appendix 11 and outlines the detailed strategy, and substantial policy changes / infrastructure improvements implemented since 2016 to control sea lice. Mitigation measures are summarised below in the following sections:

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

13.6.1 Good Practice Compliance

MHS currently complies with the Code of Good Practice (CoGP)³⁸: the CoGP First launched in 2006, as the production standard for the farming of all finfish species in Scottish waters, 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

³⁸ <http://thecodeofgoodpractice.co.uk/chapters/>

disease, instead prescribed by veterinarians in response to a clinical bacterial infection.

- *Viral Infection* - Viral Infections are uncommon in Atlantic salmon, largely because vaccines are used to prevent the historically more prevalent conditions, namely Infectious Pancreatic Necrosis and Pancreas Disease. In the past Infectious Salmon Anaemia (ISA) 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 ISA 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 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 code of practice proposed by the Joint Working Group Report on ISA. In most cases, best practice methods of good husbandry techniques restrict the spread of disease. Other good practice commitments relevant to disease control and implications for not complying with these.

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.

13.6.6 Sea Lice Attestation

Maclean' Nose has been consented since 2015 but has been subject to date to only one production cycle. A Sea Lice Attestation, for the period up to January 2018 has been provided in Appendix 13.

13.6.7 Farm Management Area and Coordination

Maclean's Nose is situated within the Marine Scotland Disease Management Area 15b (Linnhe, Firth of Lorne, Sound of Mull and Loch Sunart). 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 15b covers the Scottish Salmon Producers Organisation (SSPO) Code of Good Practice Farm Management Areas (FMA's) M-33, M-34, M35 and M-36. Farm Management Areas describe areas where farmers undertake to coordinate many of their activities and synchronise production in order 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. In some cases, FMAs will focus mainly on sea lice

management, while in others, they will relate to other issues which have a potential to affect fish health.

FMA 34 also includes the fish farm location at Bloody bay on the North coast of the Isle of Mull; this farm is operated by Scottish Sea Farms limited. In accordance with the principles of the SSPO FMA approach, Scottish Sea farms and Marine Harvest Scotland liaise with each other and share information, such as farm management statements, to ensure that the control of sea lice and fish health is facilitated by adopting similar and joined up farming practices.

A Farm Management Statement (FMS) has been developed for Maclean's Nose and the other operational Marine Harvest (Scotland) Ltd sites in the loch system facilitating coordination of activities and synchronisation of production (Appendix 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 if 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 can't 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:* areas are defined which include neighbouring sites that are within close proximity and share the same water 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. At present there aren't any other farms within the Disease Management Area.
- *Regular lice counts on farms:* The Code of Good Practice (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. MHS has adopted a new strategy to increase sea lice counts at its farms above the CoGP requirements to 25 fish at every pen. This approach has been developed in order 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.

- *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 Code of Good Practice 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 cleanerfish, 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 cleanerfish in marine salmon farms: having been proven effective in reducing sea lice numbers, and significantly reducing the need for medicinal treatments. Historically, cleaner fish deployment was restricted by available capacity, however a series of recent internal investments have resulted in greater availability for cleanerfish stocking resulting in firm commitments to stock at the densities set out in the sea lice treatment plan (Appendix 11) and a commitment to stock sites at optimum densities.

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 the Scottish Environment Protection Agency (SEPA) under Controlled Activities Regulations (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 emamectin benzoate (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.

The modelling report for this proposal has been included in Appendix 2 and provides details of the maximum biomass that can be treated with in-feed treatments in section 10. A consent mass of 771 g of emamectin benzoate is proposed as appropriate for 70% of the maximum standing biomass. Details on bath treatments are also provided in Section 10, with results summarised as follows:

Cypermethrin & Deltamethrin Results:

Cage Treatment Depth = 1.4

Permissible Quantity of Cypermethrin = 46.8 g; 5.8 cages/3 hours

Permissible Quantity of Deltamethrin = 17.5 g; 5.5 cages/3 hours

Azamethiphos Results:

Cage treatment depth = 1.4m

Permissible Quantity of Azamethiphos = 258.4 g; 1.6 cages/3 hours

Permissible Quantity of Azamethiphos = 641.8 g; 4.0 cages/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

MHS 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. loch 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 >0.1 Adult Females post treatment) should be retreated immediately, ideally with a different and higher efficacy method. Indicative treatment efficacies are provided in Appendix 11, Sea Lice Management and Efficacy Statement.

13.6.14 Containment

The site-specific containment plan and plan for the recovery of escapes has been included as Appendix 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 Code of Good Practice for Scottish Finfish Aquaculture and a copy of the plan is displayed on site.

An equipment attestation for the proposed equipment is provided in Appendix 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 new site will meet the Technical Standard for Scottish Finfish Aquaculture and has been selected to meet the conditions likely to be experienced at Maclean's Nose.

13.6.15 *Monitoring / Environmental Management Plan*

As part of a suite of measures to understand impacts on and monitor wild salmon and sea trout populations; a regional Environmental Monitoring Plan (EMP) is proposed designed to cover potential impacts arising from the MHS sites within Loch Sunart. A draft version of the plan is provided in Appendix 12. In brief the EMP includes commitments to:

- Transparent data sharing regarding sea lice compliance at sites via stakeholder meetings and the publication of Statement of Operational Practices (SOP); and
- Monitoring sea lice populations of wild salmonids in the local rivers and coastal waters in the vicinity of the Loch Sunart sites.

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 MHS farms since 2015. Section 13.6 and Appendix 11 outlines 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 for treatment (0.1 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 two complete production cycles is not available for Maclean's Nose, having been in operation over one production cycle only. However, many of the actions outlined above have been implemented over the last year, specifically a treatment intervention target policy. These measures have generated significant improvements in lice levels since implementation of the target intervention policy early in 2017 (Figure 18). The data indicates extended periods of almost zero (<1 lice per fish) rates of infestation over the smolt migration

period in 2017. Similarly, in 2017 only one non-compliance event was recorded in September 2017 which resulted in the eradication of lice within 1 week, demonstrating a rapid and highly effective treatment response.

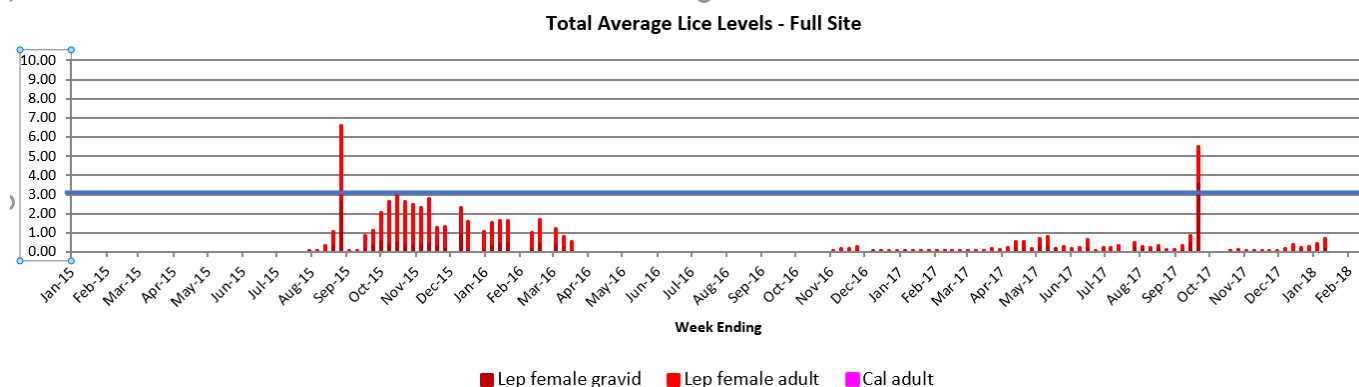


Figure 18 Sea lice data for Maclean's Nose since commencement of operations in 2015. Blue line refers to CoGP targets.

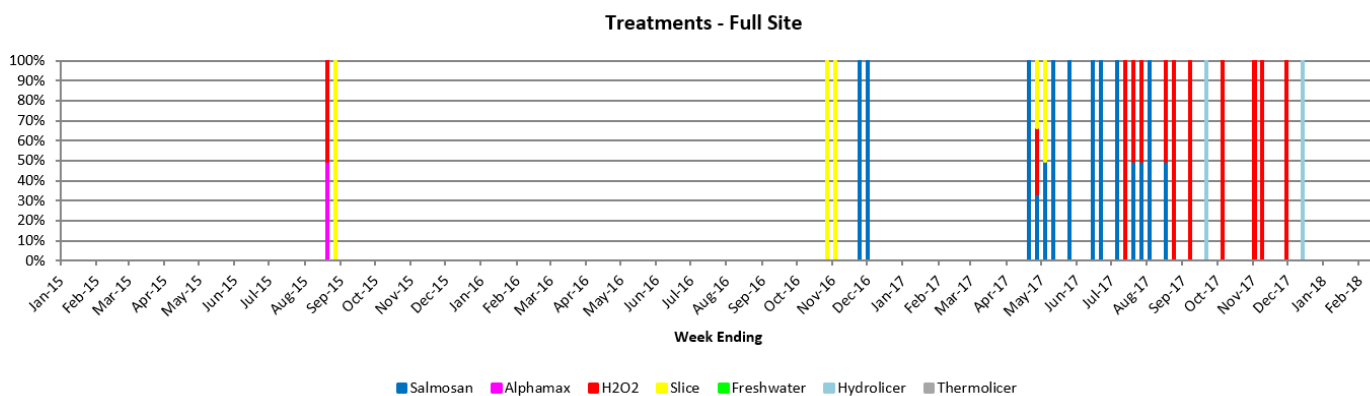


Figure 19 Treatments (medicinal and non-medicinal) administered at Maclean's Nose.

The corresponding treatment plan (Figure 19) illustrates the intensity of treatments implemented in response to the internal change of policy around higher intervention targets of 0.1 / 0.5 lice per fish, and the adoption of individual pen-based interventions as opposed to site based interventions. Two medicinal treatments were administered in 2015, increasing to 4 medicinal treatments in 2016 and 26 treatments in 2017 across both medicinal and non-medicinal treatments. The treatment plan illustrates how new policies, targets and technologies have been adopted in a relatively short space of time, resulting in corresponding outcomes in significantly reduced rates of sea lice infestation, well below CoGP targets and frequently remain at a target rate of around 0 lice per fish.

The data illustrated above represents a short time period which may not be representative of natural fluctuations in sea lice infestation rates. Regional data is available outlining the overall trend of sea lice management, for the Loch Sunart loch complex (Figure 20). The data demonstrates an overall continual improvement in the management of sea lice levels and compliance with CoGP targets from at both the individual site at Maclean's Nose and at a regional level.

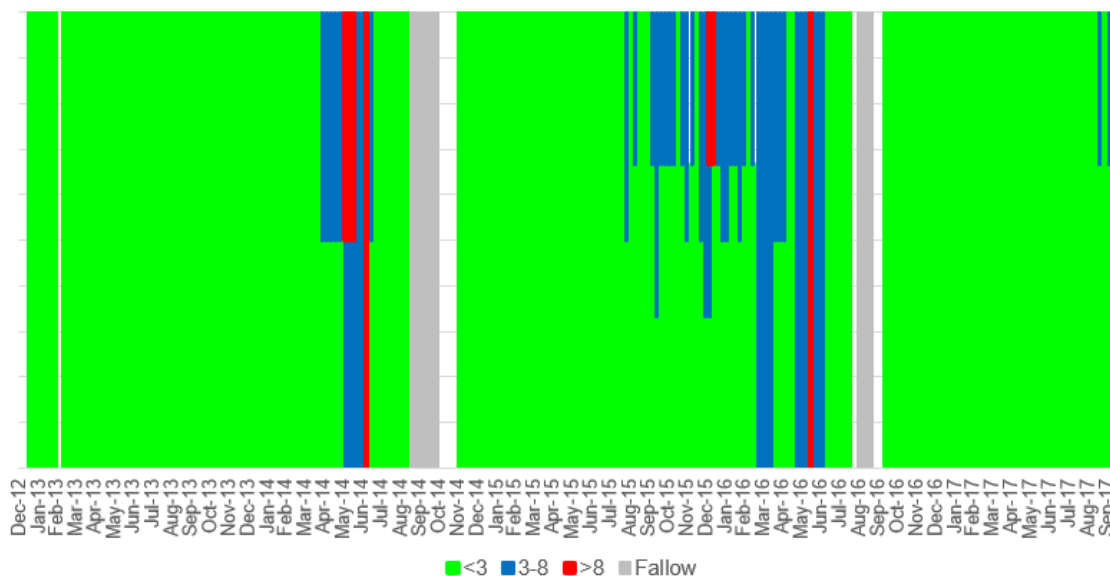


Figure 20 Compliance with Code of Good Practice targets (<3 adult female lice) for Loch Sunart

Similarly, company-wide data is available outlining the overall trend of sea lice management, and levelised 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 21).

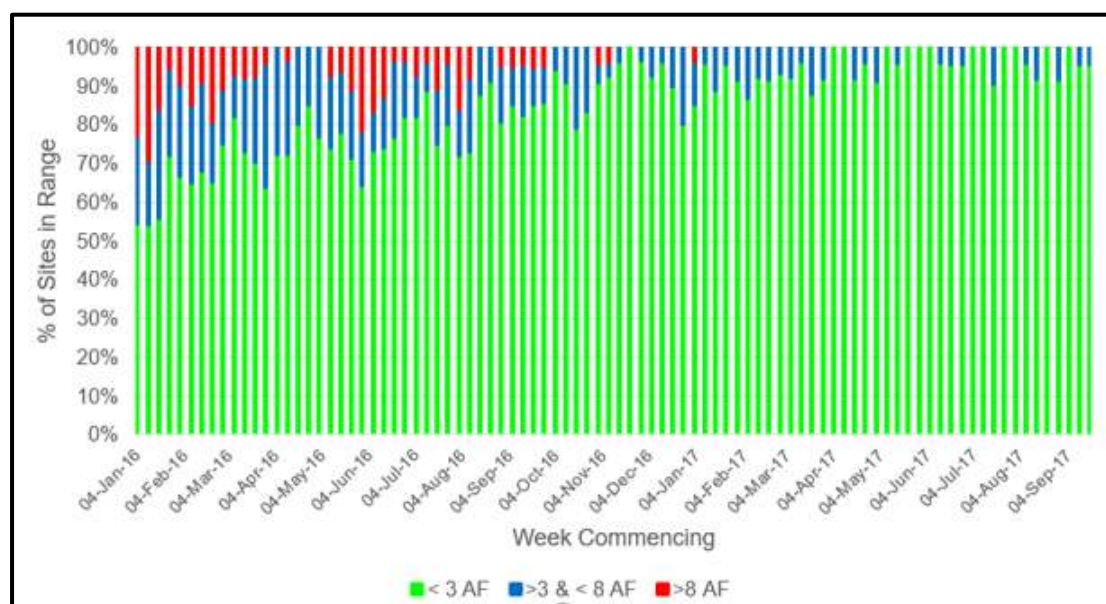


Figure 21 Adult Female Lice Levels vs Marine Scotland Thresholds 2016-2017

13.7.2 Escapes

The likelihood of escape is low; no escapes incidents have occurred at Maclean's Nose since operation commenced in 2015. The following escapes have been recorded across Marine Harvest Sites within Loch Sunart and north Sound of Mull complex (Maclean's Nose, Glencripesdale, Camus Glas and Invasion Bay):

- Invasion Bay: 6 fish, November 2017; and
- Sunart: 2000 fish, May 2000.

No significant escapes have occurred since 2000. Recent commitments to technical standards (see Section 7) have further increased the infrastructural 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 reducing risk. The potential impact of escapes is considered low.

13.8 Summary

Scoping responses highlighted significant concerns around the potential transmission of farm-origin sea lice to wild salmonid populations. The receptor salmonid population is considered high sensitivity due to the conservation value and sensitivity of salmonid populations within Loch Sunart, and potential implications for Sea trout, in particular, as host species for the Freshwater pearl mussel populations in the Mingarry and Ardnamurchan SACs.

Maclean's Nose has been operational since 2015. Site specific sea lice data returns from Maclean's Nose indicate very high levels of compliance and maintenance of sea lice populations well below CoGP, in addition to consistently maintaining target levels of near zero rates of infestation. Compliance rates result from internal policy changes for lice management within the company, in parallel with an internal investment programme in non-medicinal treatments and cleaner fish. On this basis the significance of the potential impacts to wild salmonids is considered low. To ensure that the wild salmonid populations are monitored for population status and lice loadings, a regional Environmental Management Plan 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 will cover the existing sites across the Loch Sunart complex.

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

14.1 Introduction

This assessment considers the range of designated sites and important species that may be affected by the proposed extension to Maclean's Nose. The existing development at Maclean's Nose has been operational since 2015, with no immediate evidence to date of adverse impacts on protected sites and species. This assessment considers the impact on species and habitats of conservation importance and should be read in conjunction with Section 10, Benthic Environment, Section 12, Predator Interactions and Appendix 8, Information to Support an Appropriate Assessment.

14.2 Consultation

Two statutory consultees (The Highland Council and SNH) provided relevant responses to this assessment during the Scoping process. Advice is summarised in Table 19.

Table 19 Summary of advice received during the scoping process.

Consultee	Date	Advice / Guidance	Response
HC		Scope in Sunart SAC with sufficient details to inform an HRA	Information to support an Appropriate Assessment (Appendix 8) addresses potential impacts on SAC.

HC		Potential to impact Mingarry Burns SAC, Ardnamurchan Burns SAC, Glen Beasdale SAC, River Moidart SACs, sufficient information to inform how historic sea lice levels have been managed and impacts on SACs minimised.	Information to support an Appropriate Assessment (Appendix 8) addresses potential impacts on SAC. Glen Beasdale and River Moidart have been scoped out of the assessment (Section 14.4.1).
HC		Likely impacts on qualifying features and cumulative impact with from nearby fish farm expansion proposals.	Wider Loch Sunart plans no longer proposed.
HC		Outline range of sufficient mitigation proposals to ensure no significant effects.	Mitigation provided in Section 14.5.
HC		Details of previous site sea lice history, including cumulative impacts with the other farms in the FM, along with explanation of how sea lice issues managed.	Information to support an Appropriate Assessment (Appendix 8) addresses potential impacts on SACs and Chapter 13, Interactions with Wild Salmonids. Detailed Sea Lice Management strategy in Appendix 11.
HC		Standalone sea lice management strategy that considers both individual and cumulative sea lice impacts on wild salmonids and FWPM.	Sea Lice Management Strategy (Appendix 11) and draft Environmental Management Plan (Appendix 12)
HC		Clear information on how it can be evidenced that the proposed development and cumulative developments will not have significant impact on wild salmonids given the remaining within CoGP can still result in significant levels of sea lice into environment.	Information to support an Appropriate Assessment (Appendix 8) addresses potential impacts on SACs provides evidence of new policy and infrastructure developments impact on sea lice management.
HC		Loch Sunart to Sound of Jura MPA to be scoped in as one of the qualifying features recorded in general area.	Scoped in and assessed in Section 14.4.3.
HC		Sunart SSSI to be scoped into the assessment.	Impact assessment on Sunart SSSI in Section 14.4.8.
SNH		AA to be carried out considering Ardnamurchan Burns and Mingarry Burns SACs for FWPM in combination with MacLeans Nose, Camus Glas, and Muck.	Information to support an Appropriate Assessment provided in Appendix 8.
SNH		1. Information on the treatments for sea lice that have been used at the site in the past and those used in the nearby sites (including Invasion bay) during the last two production cycles. 2. Information on the effectiveness of the sea lice treatments/measures. 3. Whether the current farms operated by MHS use the current CoGP treatment criteria and/or other treatment criteria.	Information to support an Appropriate Assessment provided in Appendix 8.
SNH		Recommend application presents how mitigation techniques will be used and when they will be used to control sea lice as part of a site specific and regional EMP. The plan should include: 1) monitoring the status of wild salmonid stocks within the Ardnamurchan Burns and Mingarry Burn SACs; and 2) monitoring lice numbers on wild fish. Reported information on sea lice levels in local farmed fish (and any other relevant data) should be taken into account as this may provide early warning of risks to the SAC feature and escalate the urgency of monitoring and possible	Summarised in Section 13, Interaction with Wild Salmonids. Draft EMP provided in Appendix 12.

		mitigation action. Ultimately, in the event that monitoring of sea lice levels on wild salmonids identifies particular risks, the plan should describe the hierarchy of lice control measures that will be used (e.g. chemicals, SNH, wrasse, prolonged following, etc.) and the triggers for that treatment.	
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Subsequent correspondence was carried out with a number of consultees regarding the requirement to take forward additional benthic monitoring and sampling. SEPA (29/11/17), the Highland Council and SNH (12/12/17) agreed that the site was unlikely to require further benthic monitoring due to relatively small area of additional impact predicated from preliminary hydrodynamic modelling outputs.

MHS has considered revised advice relating to proposals at Am Maol, Isle of Muck, issued by the Highland Council on 18 May 2018 (Planning Reference CNS/MFF/HI/Lochaber). Revised advice was issued in response to feedback from Lochaber Fisheries Trust regarding position in relation to Habitats Regulations.

14.3 Methodology and Information Sources

14.3.1 Desk Assessment

Desk based assessment to establish baseline environment, ecological importance and potential impacts to species and habitats of conservation importance. 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> ;
- SNH. 2014. Scottish MPA Project Data Confidence Assessment. Loch Sunart Nature Conservation MPA.
- SNH. 2014. Scottish MPA Project Data Confidence Assessment. Loch Sunart to the Sound of Jura Nature Conservation MPA.
- SNH. 2013. Scottish MPA Project. Management Options. Loch Sunart to the Sound of Jura Possible MPA.

14.3.2 Surveys

MHS submitted details of previous survey tracks to SEPA, The Highland Council and SNH in addition to preliminary hydrodynamic modelling. There was agreement that no further benthic surveys or sampling would be required (See Section 10.2). Marine Harvest seabed surveys³⁹ undertaken in 2013 have been evaluated to inform the assessment.

14.3.3 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.

³⁹ Available on the Highland Council Planning Portal
<http://wam.highland.gov.uk/wam/search.do?action=simple> by searching 14/02568/FUL

14.4 Baseline Environment

14.4.1 Surveys

A baseline survey of benthos at Maclean's Nose was undertaken in 2013 where both video and sediment surveys were undertaken and reported. The biology of the seabed was described to consist of sparsely burrowed circalittoral fine mud with frequent observations of the tall seapen (*Funiculina quadrangularis*), the Phosphorescent seapen (*Pennatula phosphorea*) and an auger shell (*Turritella communis*). Infrequently the following were observed: tube anemone (*Cerianthus lloydii*), the Norwegian lobster (*Nephrops norvegicus*), a burrowing mud shrimp (*Callinassa subterranea*), a fireworks anemone (*Pachycerianthus multiplicatus*) and the hermit crab (*Pagurus bernhardus*). Overall, the habitat is classified as circalittoral fine mud with sea pens (SS.SMu.CfiMu.SpnMeg), the habitat quality of which is likely to be classed as medium to low; sea pen appearance is frequent there is not a thick coverage and there is only one occurrence of a firework anemone and of one Norwegian lobster in the three transects, indicating that this is not an important area for either of these species.

14.4.2 Designated Sites

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

- A 30 km search radius was applied to identify sites designated under the Birds or Habitats Directive; Special Protection Areas (SPAs) and Special Areas of Conservation (SACs);
- Sites adjacent to or within the Loch Sunart complex were included in the assessment; and
- Sites with exclusively terrestrial features were not included within the assessment.

Following scoping and consultation, the following Internationally designated areas have been scoped into the assessment and considered in more detail in Appendix 8: Information to Support an Appropriate Assessment:

- Sunart SAC;
- Ardnamurchan Burns SAC;
- Mingarry Burns SAC; and
- Inner Hebrides and Minches cSAC.

Loch Moidart SAC and Glen Beasdale SAC, including the Glenbeasdale extension were suggested for inclusion in the HRA, but were subsequently scoped out due to actual transit distance from site (See Appendix 8, Information to Support an Appropriate Assessment).

The following national designations have been scoped into the assessment:

- Loch Sunart to the Sound of Jura Nature Conservation MPA;
- Loch Sunart Nature Conservation MPA; and
- Sunart SSSI.

14.4.3 Sunart to Sound of Jura Nature Conservation MPA

The site lies on the northern boundary of the Loch Sunart to Sound of Jura MPA (Figure 22), which is designated on the basis of presence of Common skate (*Dipturus batis*), on the IUCN red list of protected species, and geodiversity features (channels and troughs). The MPA also includes geodiversity interests from the Quaternary of Scotland (as part of the Loch Linnhe and Loch Etive key geodiversity area). Large, reproductively mature common skate reside within the glaciated channels (Marine Scotland Science, 2012). There is also some evidence that the shallow reef areas within the MPA are used by common skate for laying their egg-

cases. There is no evidence suggesting specific parts of the area are used as nursery grounds for this species. Reef habitats are a designated feature of two existing marine Special Areas of Conservation (Sunart and the Firth of Lorn), with which the MPA overlaps (SNH 2014). As a national level designation, the receptor is classified as high sensitivity.

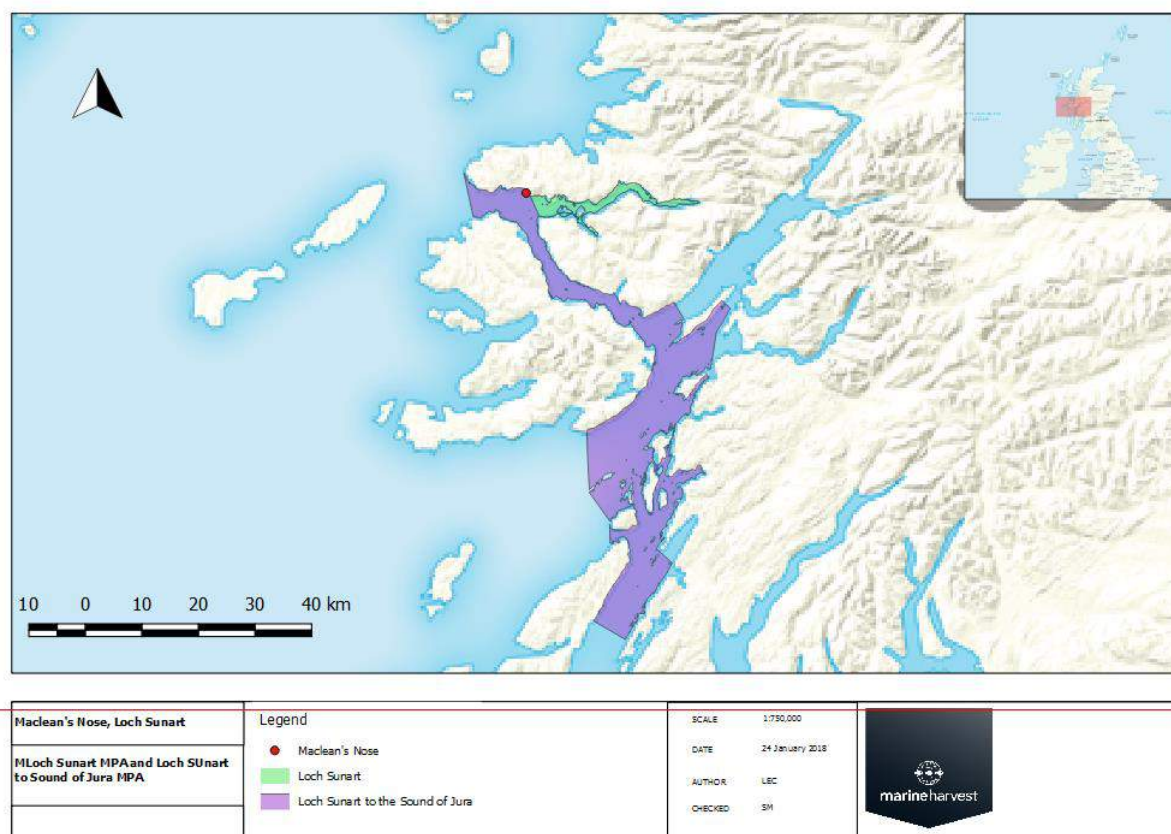


Figure 22 Marine Protected Areas (MPAs) in the vicinity of Maclean's Nose

14.4.4 Loch Sunart MPA

Loch Sunart is a narrow sea loch, towards the north of the Sound of Mull designated on the basis of three priority marine features including flame shell beds, northern feather star aggregations and serpulid aggregations. Aggregations of the rare serpulid or organ-pipe worm are restricted exclusively to the waters of Loch Teacuis, a small arm off Loch Sunart⁴⁰. The Loch supports a significant bed of flame shells primarily through a large bed in the Laudale narrows towards the head of the Loch, and smaller areas (e.g. off Risga and Carna), although smaller populations may be scattered elsewhere in the Loch. As a national level designation, and the presence of PMFs considered to have high sensitivity to pressures associated with fish farming, the MPA is classified as a high sensitivity. Maclean's Nose lies adjacent to the MPA.

14.4.5 Inner Minches and Hebrides Candidate SAC (cSAC)

Maclean's Nose lies within the boundary of the Inner Minches and Hebrides cSAC. The purpose of the cSAC is to contribute towards maintaining the favourable conservation status

⁴⁰<https://www.snh.scot/sites/default/files/A1032173%20-%20G06%20-%20Loch%20Sunart%20MPA%20-%20Data%20confidence%20assessment%20-%20over%202014%20-%20FINAL.pdf>

of its qualifying features: the Harbour porpoise and provide protection for habitats that support the species within the cSAC. If designated, this will become the largest protected area in Europe for Harbour porpoise; it covers 13,800km² and is thought to support over 500 individuals. The cSAC site is located within the West Scotland harbour porpoise Management Unit (MU) and is an area with high predicted and observed densities of this species.

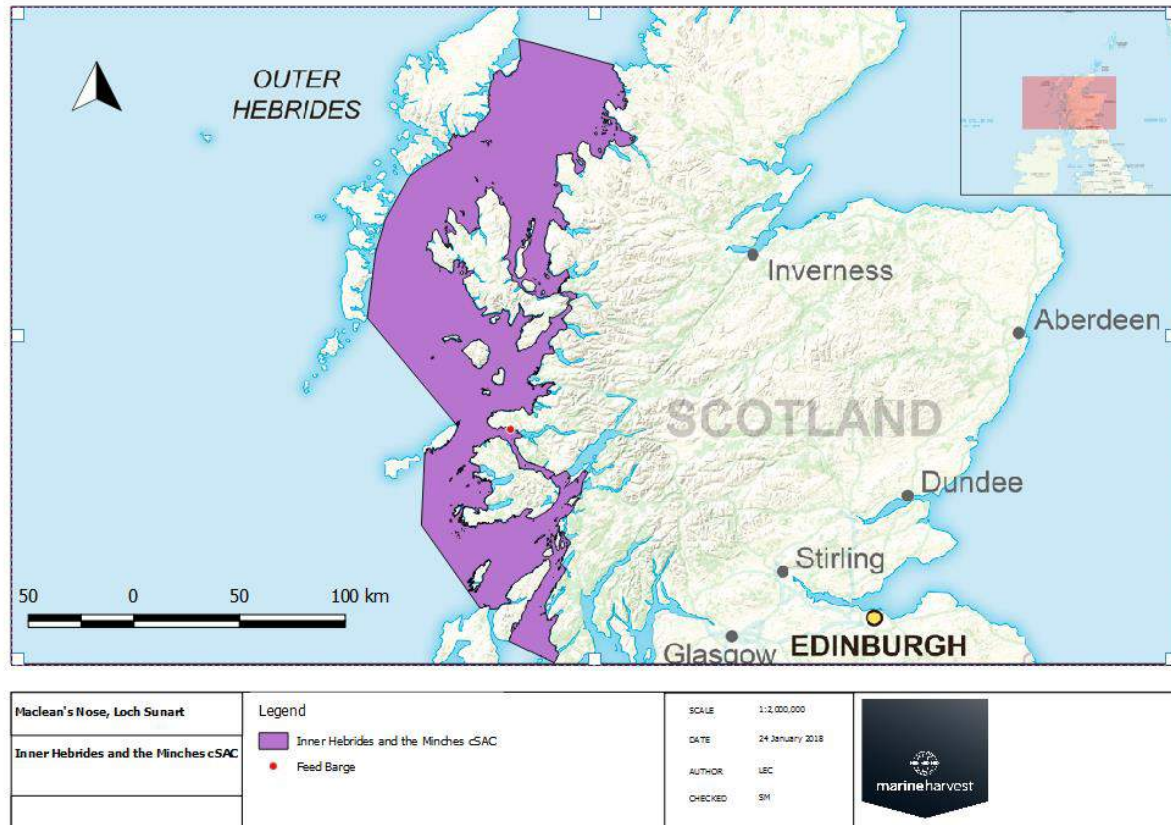


Figure 23 Inner Hebrides and the Minches cSAC

14.4.6 Ardnamurchan Burns SAC

Ardnamurchan Burns SAC designated for the Annex II species, freshwater pearl mussel (*Margaritifera margaritifera*), is located 17 km from the development at Maclean's Nose (Figure 24). Ardnamurchan Burns includes four streams within one area of the extreme west of Scotland. Each stream supports a high-quality functional freshwater pearl mussel population that includes juveniles. The summary condition is assessed as 'Favorable'.

14.4.7 Mingarry SAC

Mingarry SAC is designated for the Annex II species, freshwater pearl mussel (*Margaritifera margaritifera*), and is located approximately 12km from the development at Maclean's Nose (Figure 24). Mingarry Burn on the Isle of Mull is the only site in the Inner Hebrides selected for freshwater pearl mussel. The stream is about 3 km long and contains a functional pearl mussel population along its entire length. This is regarded as one of the most undisturbed Scottish pearl mussel sites⁴¹.

⁴¹ <http://jncc.defra.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0030206>



Figure 24 Freshwater pearl mussel SAC's considered in the Assessment

14.4.8 Sunart SAC

Sunart SAC is designated on the basis of a range of terrestrial⁴² and marine Qualifying Features. The features screened into this assessment includes otters (*Lutra lutra*) and reefs. Figure 25 illustrates the context of the site in relation to Sunart SAC.

⁴² Dry heaths, mixed woodland on base-rich soils associated with rocky slopes, reefs, western acidic oak woodland, wet heathland and cross leaved heath.

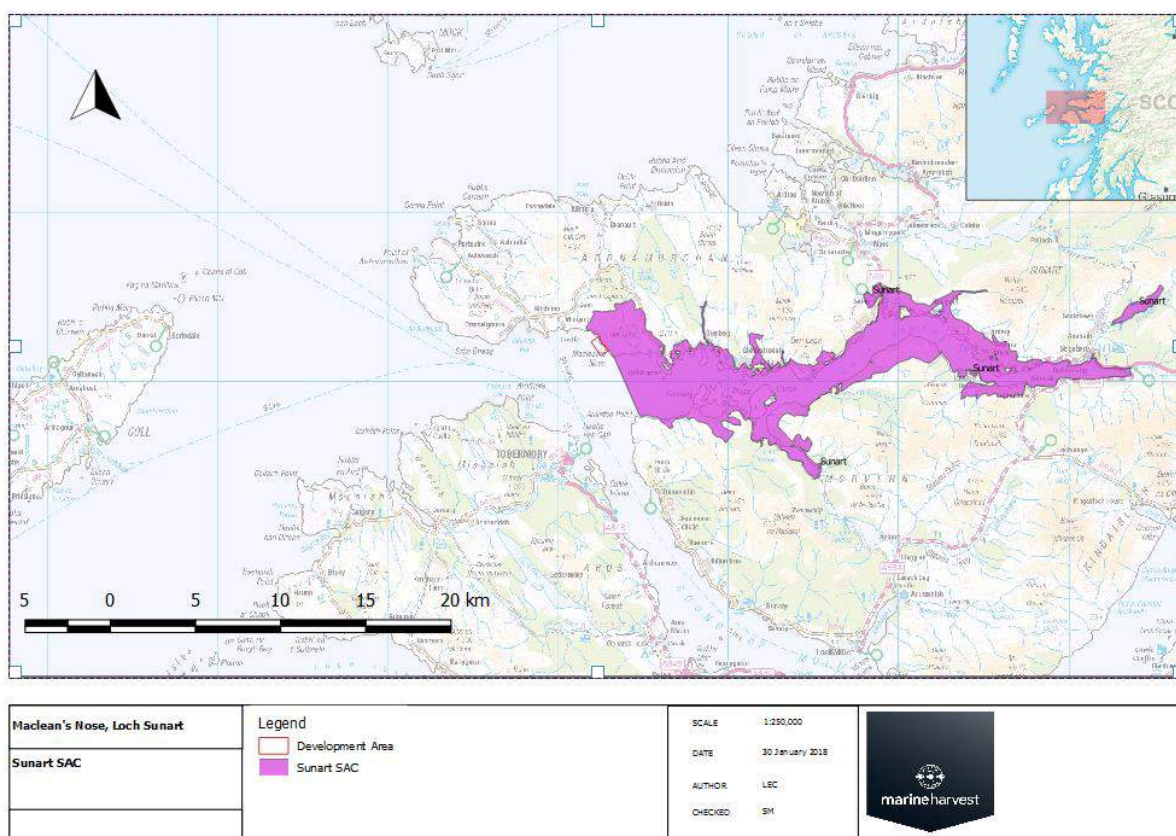


Figure 25 Sunart Special Area of Conservation (SAC)

14.4.9 Sunart SSSI

Sunart Site of Special Scientific Interest (SSSI) is situated adjacent to Maclean's Nose (Figure 26) The SSSI is notified for the species and habitats listed in Table 20. The SSSI extends from mean low water mark:

Table 20 Sunart SSSI notified species and habitats.

Caledonian Igneous	Tertiary Igneous
Moine	Rocky shore
Egg Wrack (<i>Ascophyllum nodosum</i> ecad <i>mackaili</i>)	Eel grass beds
Saltmarsh	Upland oak woodland
Lichen assemblage	Otter (<i>Lutra lutra</i>)
Bryophyte Assemblage	Dragonfly Assemblage
Chequered Skipper	Moths
Upland Assemblage	Vascular plant Assemblage

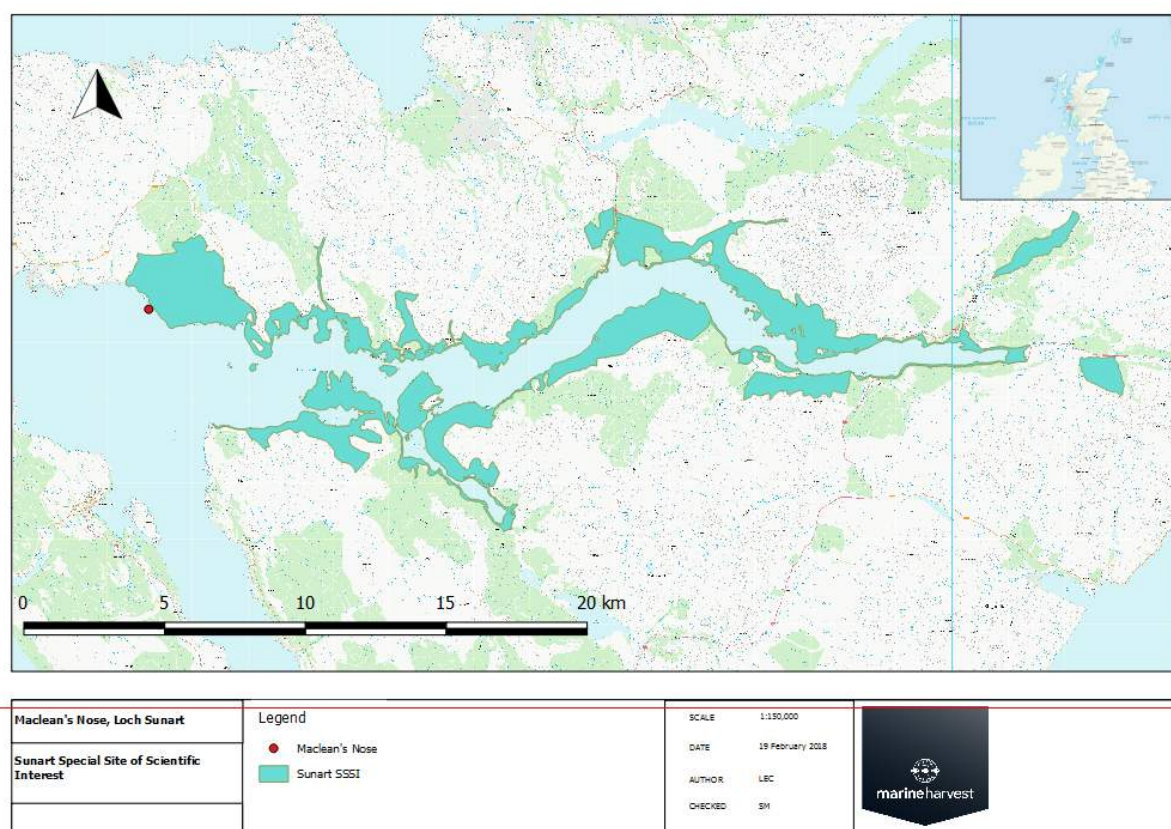


Figure 26 Sunart Sites of Special Scientific Interest

The three coastal features: rocky shore, egg wrack and eel grass were all found to be in favourable condition when surveyed in July 2006. Monitoring also revealed that the vast majority of the reef feature was in good condition, with twenty littoral reef biotopes recorded throughout the SSSI area.

14.4.10 Priority Marine Features

The assessment of Priority Marine Features is provided in Section 10: Benthic Environment.

14.5 Impact Assessment and Mitigation

14.5.1 Loch Sunart to Sound of Jura Nature Conservation MPA

Consultation responses indicated that the proposed development could theoretically result in a reduced availability of prey species, particularly crustaceans, however the modelling outputs (Appendix 2, Section 11.6) indicated that the overall area impacted will comprise 280,625m², which meets SEPA compliance requirements of retaining the IQI 0.75 within a 500,000m² area. Video transects indicated that although some species were present that could be classified as prey species, the area could not be classified as particularly valuable or rich for these species (bristleworms, sand eels, crabs and flat fish)⁴³. Concerns were also raised regarding impacts on egg laying areas. SNH indicated that reductions in prey species or degradation of egg-laying substrate as a result of the discharges, is unlikely to be significant and concluded that the risk of this proposal impacting, other than insignificantly, the protected features of the MPA is low. Similarly, Management Options papers published by SNH to support MPAs, consider mechanisms for achieving conservation objectives of each MPA; for

⁴³www.marlin.ac.uk

this MPA, aquaculture is not considered to be capable of affecting the protected features (SNH, 2013). Whilst the Common skate is considered a very high sensitivity receptor, the magnitude of the impact is assessed to be negligible to low resulting in an overall significance of the impact as minor.

14.5.2 Loch Sunart Nature Conservation MPA (NCMPA)

In assessing likely impacts, carbon deposition, in feed residues and the mooring grid, represent the main footprint associated with finfish farms. The PMF within Loch Sunart NCMPA, represent static features with no likely connectivity between the site infrastructure, or the carbon deposition footprint (Figure 27). In feed residues occupy a similar footprint occupy a similar area as the carbon deposition contour. A negligible magnitude of impact is assigned to this impact. Based on the sensitivity of an MPA as high, overall significance of the impact is assessed as minor.

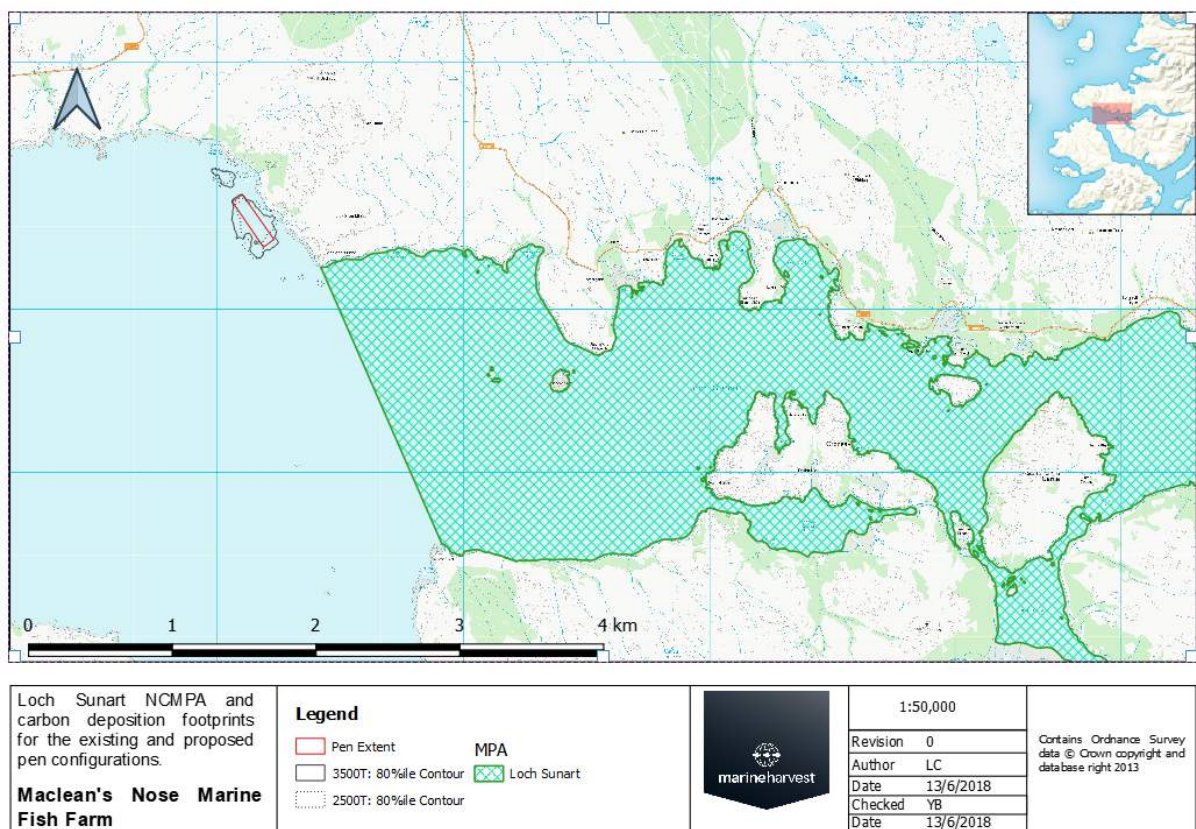


Figure 27 Carbon deposition contour (80%ile) for both existing and proposed pen configurations Loch Sunart NC MPA.

14.5.3 Inner Hebrides and Minches cSAC

Information to support an appropriate assessment is provided in Appendix 8. The key pressure listed for Harbour porpoise conservation⁴⁴ relevant to the proposed modification at Maclean's Nose include:

- Acoustic disturbance arising from acoustic deterrent devices (ADDs);
- Disturbance from vessel noise and movements;
- Eutrophication;
- Collision with vessels; and

⁴⁴ <http://www.gov.scot/Resource/0049/00498260.pdf>

- Chemical pollution.

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. Uncontrolled or unmitigated use of ADDs has potential to undermine the conservation objectives of the site. ADDs are currently available for use on site, and MHS wish to retain this option, however to date ADDs have not been required on this site due to the success of primary mitigation measures. SNH, in the Management Plans for the area recommends the implementation of ADD Deployment plans and Codes of Conduct for existing developments. Section 12.6.1 provides the details of a policy and deployment plan 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 12.6.1, and 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. A full assessment is provided in Appendix or section 8:Information to support an Appropriate assessment.

Entanglement

Removing incentives for wildlife 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 detail in Section 12. Specifically, net mesh specification and tensioning are effective against entanglement events. A number of mobile species including Harbour porpoises may be attracted to the site, creating a higher potential for entanglement risk. Mitigation is outlined in Section 12.6, entanglement risk is managed primarily from good husbandry and maintenance of subsea tensioned nets. SNH considers the risk of entanglement with Harbour porpoises from aquaculture as low⁴⁵. The frequency of such an event is highly 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 surface equipment will equate to an area of approximately 1.9 ha, whereas the moorings will cover approximately 53.5ha. This represents a 27% increase in the existing surface infrastructure and 32% increase in the moorings area. The area is not 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 aquaculture farms include small rapid staff transfer boats and larger fish harvest vessels. The modification to the site represent an extension to an existing site in an area with significant passenger vessel movement, commercial shipping and recreational sea users. In SNH's management guidelines, no further management is required providing best practices are followed. The magnitude of the impact under the context of existing baseline activity is considered negligible and overall significance, minor.

⁴⁵ <https://www.nature.scot/sites/default/files/2017-10/Consultation%20-%20Harbour%20Porpoise%20-%20Inner%20Hebrides%20and%20the%20Minches%20pSAC%20-%20Combined%20Reg%2033%20-%20MOP%20-%20A1918723.pdf>

Collision

The site is located in an area with several ferry routes and marine activity. The fish farm vessel traffic will utilise routine routes. Mortality from vessel strikes are mainly reported in slow swimming species. The overall magnitude is considered low due to the low likelihood of the impact and existing baseline of marine shipping and boating activity in the area.

Eutrophication

The assessment undertaken in Section 11: Water Column indicates that nutrient enrichment will be within the threshold criteria both on the basis of the individual site and cumulatively with other sites. The magnitude of the impact is classified as negligible and the overall significance is assessed as low.

14.5.4 Sunart SAC

Information to support an appropriate assessment is provided in Appendix 8. The key qualifying features of this designation which may be impacted are otters and reefs. Sunart supports a relatively high density of otters and records show that the site has supported consistently strong populations. The incidence and distribution of otters across the Sunart reflects the high quality of the coastal habitat. Otters mainly forage in the extensive algal beds that occur throughout the shallow areas of the loch and which serve as a habitat for important prey species. Similarly, high densities of otter holts have been recorded in many terrestrial areas bordering the edge of the loch and on the main islands, typically in areas of dense vegetation and rock boulder cover. There is also a large influx of freshwater from numerous streams and rivers around the site, which is essential to otters for washing.⁴⁶

The proposed infrastructure will result in an additional four pens to the south of the existing site. The barge and remainder of the infrastructure will remain in place. The development is exclusively in the marine environment, approximately 100m from the shore and SAC designation boundary. The current proposals will continue the established pattern of human activity in the area, and it is anticipated that the ongoing level of activity will be maintained, with exception of some temporary disturbance during construction (maximum 30-day period). There are no proposals for ancillary onshore infrastructure or activities that may directly disturb otter holts, the intertidal area or the qualifying species of the habitat.

The infrastructure proposals and depositional footprint of Maclean's Nose do not overlap or extend to the marine SAC boundaries (Figure 28). The boundary of the marine component of the SAC is located 700m from the development. The predicted footprint in feed residues may overlap with a very small area of the intertidal boundary of the SAC (Figure 12). An impact assessment for benthic features is provided in Section 10.6.2 concluding impacts on benthic features to be negligible. The magnitude of impact on the reef is predicted to be negligible, with an overall significance of minor, based on very high sensitivity of the designation.

⁴⁶ Mercer, T., Howson, C. M., and Moore, J. J. (2007). Site Condition Monitoring: Loch Sunart marine SAC and SSSI. Scottish Natural Heritage Commissioned Report No.286 (ROAME No. R06AC701).

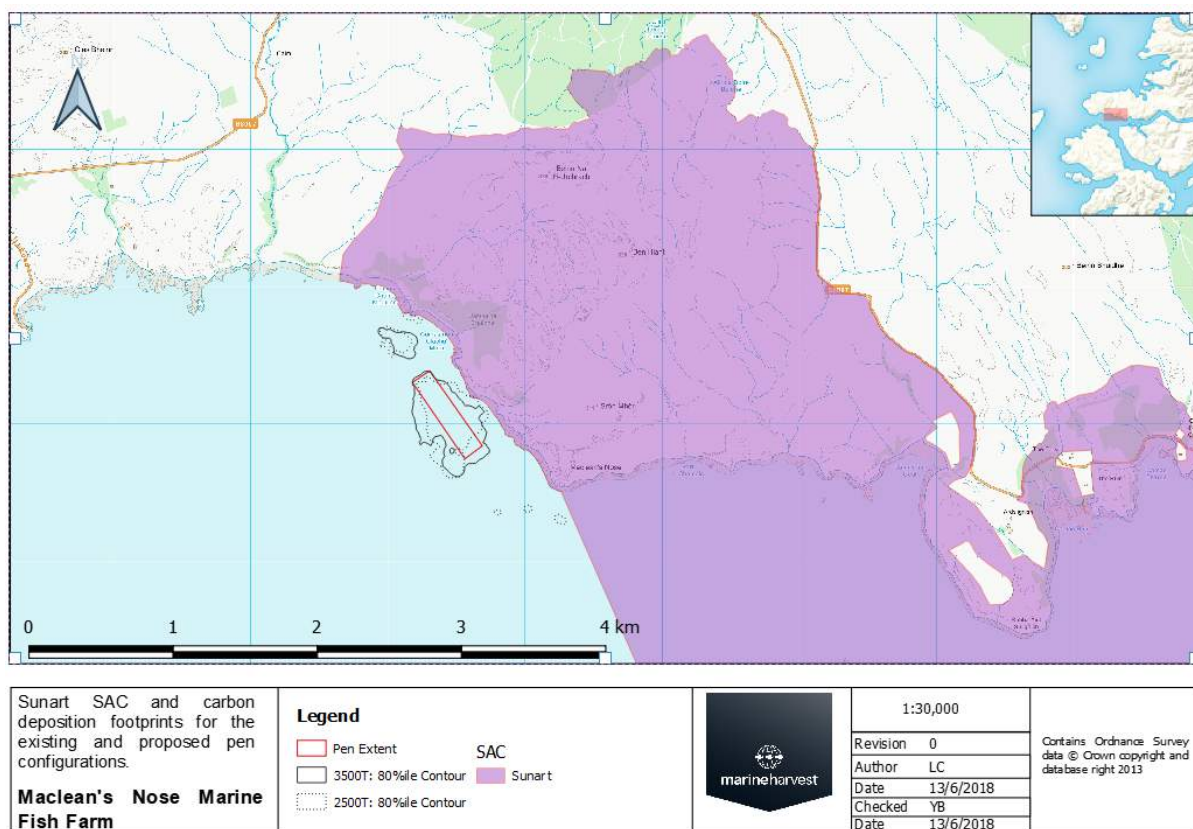


Figure 28 Sunart SAC and carbon deposition footprints (80%ile) for the existing and proposed pen configurations.

14.5.5 Ardnamurchan Burns SAC and Mingarry SAC

Detailed information to support an appropriate assessment is provided in Appendix 8. There is evidence that suggests uncontrolled farm-origin sea lice within constrained waterbodies can have adverse effects in wild Atlantic salmon smolts and sea trout. Marine Scotland has adopted the formal view that salmon aquaculture results in elevated numbers of sea lice in open water and subsequently is more likely to have an adverse impact on Atlantic salmon in some circumstances. Freshwater pearl mussels are dependent on salmonids to complete part of their life cycle and subsequently, have potential to be indirectly impacted by marine fish farming.

Maclean's Nose farm is located approximately 11.2km from the Mingarry Burn SAC and 15.3km from the Ardnamurchan Burns SAC. Recent research based on salmon lice transport modelling in a Scottish system reports that >97.5% of sea lice are transported within 15 km of fish farms, although site specific factors such as prevailing wind and currents, and local topography can have a large impact on the direction and distance of lice dispersal⁴⁷.

A detailed discussion of the mitigation currently in place at the Maclean's Nose and the level of improvements to sea lice management is provided in Appendix 8 and Section 13. The discussion of mitigation includes a review of site specific sea lice data to date, and the impact of new management measures. In summary, evidence at the site suggests that the level of

⁴⁷ Salama N.K.G., Murray, A.G. & Rabe B. (2016) Simulated environmental transport distances of *Lepeophtheirus salmonis* in Loch Linnhe, Scotland for informing aquaculture area management structures. Journal of Fish Diseases DOI: 10.1111/jfd.12375

mitigation in place at the site has maintained populations of near zero rates of sea lice with any exceedances of targets under control within a week. Recently, updated advice on the interaction between marine fish farms site proposals and freshwater pearl mussels was issued by the Highland Council. The response related to a separate site proposal at Am Maol, Isle of Muck. In the response, The Highland Council sets out specific criteria that developers need to demonstrate to ensure that there are sufficient safeguards in place to demonstrate that conservation objectives of the SAC will be met. These are:

- either that MHS can operate Muck fish farm with close to zero sea lice all year round (and therefore not add to the cumulative risk to wild salmonids); or
- that MHS can monitor the effect of sea lice on the SACs and adjust the management of the farm to ensure that the conservation objectives will be met.

Based on site specific sea lice data submitted, MHS have demonstrated that under new mitigation measures, the site can be operated with close to zero sea lice and therefore not compromise the conservation objectives of the SACs. The magnitude of impact associated with the site extension is assessed as negligible and overall impact on the designations, minor.

14.5.6 Sunart SSSI

The site is adjacent to the terrestrial designation of Sunart SSSI, key marine features that have potential to be impacted by the development include:

- Egg wrack;
- Rocky shore; and
- Otters.

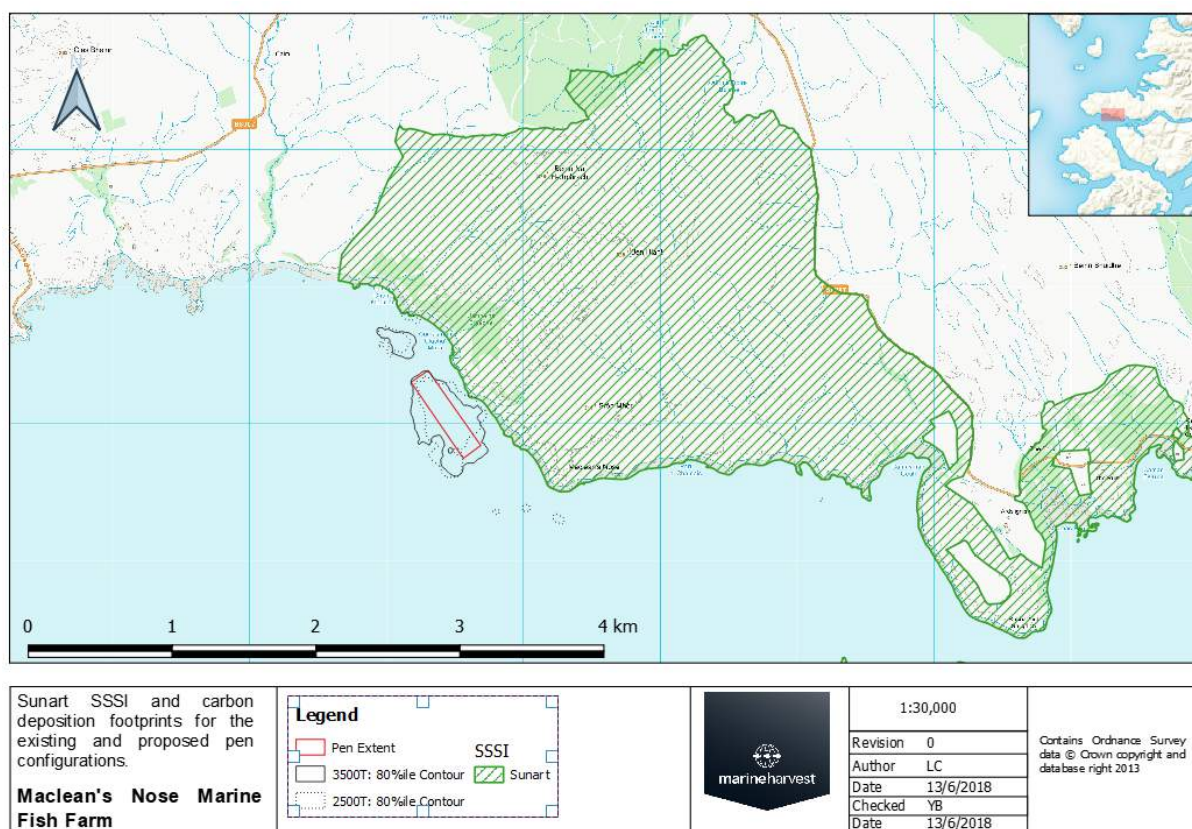


Figure 29 Sunart SSSI and carbon deposition footprints (80%ile) for the existing and proposed pen configurations.

Egg wrack and rocky shore represent intertidal features which will not be impacted by the physical footprint of the site nor carbon or in feed residue deposition (Figure 29). The magnitude of the impact is considered negligible and overall low.

Key management measures for otters at the site include

- Preventing any reduction in the overall number of active holts.
- Preventing any loss of intertidal foraging habitat.
- Avoiding undue disturbance.

There are no terrestrial or intertidal aspects to the development, subsequently no physical impacts are predicted on the number of active holts or loss of intertidal foraging habitats. Nutrient enrichment to the water column could potentially impact seaweed species assemblages, however the assessment in Section 11, Water Column evaluates the overall impact on the water column as minor. In the management statement, SNH indicate that leisure craft do not appear to cause significant disturbance to otters. In the context of existing recreational boating, fishing and commercial shipping activity in the area, the additional disturbance likely to be generated from the modifications at Maclean's Nose are assessed as negligible. The overall impact on otters is predicted to be minor.

14.6 Monitoring

Monitoring measures include implementation of a Regional (Loch Sunart) Environmental Management Plan (EMP), which in addition to commitments on synchronous stocking of farmed salmon, sea lice targets of 0 lice per fish and transparent data sharing, outlines details of how lice are monitored within fish farms. A draft of the EMP is provided in Appendix 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 Practices (SoPs) will be published covering the control of sea lice and other matters in the EMP on the Loch Sunart fish farms. The SOP will encompass the minimum operational fish health standards that MHS 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 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 Acoustic Deterrent Devices (ADDs).

14.7 Summary

The proposals at Maclean's Nose represent an extension to an existing site which has been operational since 2015.

The site lies on the northern boundary of the Loch Sunart to Sound of Jura MPA (Figure 22), which is designated on the basis of presence of Common skate (*Dipturus batis*) and geodiversity features (channels and troughs). SNH indicated that reductions in prey species or degradation of egg-laying substrate as a result of the discharges, is unlikely to be significant and concluded that the risk of this proposal impacting, other than insignificantly, the protected features of the MPA is low. Similarly, Management Options papers published by SNH to support MPAs, consider mechanisms for achieving conservation objectives of each MPA. Whilst the Common skate is considered a very high sensitivity receptor, the magnitude of the impact is assessed to be negligible to low resulting in an overall significance of the impact as minor.

Information to support an Appropriate Assessment was provided separately for sites designated under the Habitat Regulations. Potential impacts arising from the use of Acoustic Deterrent Devices (ADDs) on Harbour porpoise, as the qualifying feature of the Hebrides and Inner Minches cSAC were considered. Although ADDs have not been deployed during the operational history of Maclean's Nose, the optional use of these devices is proposed should standard mitigation not be sufficient for particularly aggressive seal challenges. The implementation of a Predator Management Plan, including a Code of Conduct and Deployment plan for ADDs is proposed as mitigation and as a basis for a future framework for ADD use. The plan commits to targeted, discrete and auditable use of ADDs up to a maximum period of 40% of production cycle. Implementation of the framework in agreement with SNH is anticipated to reduce the magnitude of any impacts on harbour porpoise populations to minor.

The site lies adjacent to Sunart SAC. The key qualifying features of this designation which may be impacted are otters and reefs. The proposed infrastructure represents modifications to the existing infrastructure, of approximately 25% in pen numbers. The barge and remainder of the infrastructure will remain in place. The development is exclusively in the marine environment, approximately 100m from the shore and SAC designation boundary. The current proposals will continue the established pattern of human activity in the area, and it is anticipated that the ongoing level of activity will be maintained, with exception of some temporary disturbance during construction (maximum 30-day period). There are no proposals for ancillary onshore infrastructure or activities that may directly disturb otter holts, the intertidal area or the qualifying species of the habitat. The proposed infrastructure proposals and depositional footprint of Maclean's Nose do not overlap or extend to the SAC boundaries. The boundary of the marine component of the SAC is located 700m from the development. Similarly, the predicted footprint of discharge of medicinal treatments does not overlap with the site boundary and any static reef features that might be present. Magnitude of impact on the reef is predicted to be negligible, with an overall significance, based on very high sensitivity of the designation as minor.

The site was identified to have potential connectivity to SACs designated for freshwater pearl mussel habitats via indirect impacts on resident and migratory salmonid communities. Maclean's Nose farm is located approximately 11.2km from the Mingarry Burn SAC and 15.3km from the Ardnamurchan Burns SAC, both designated for freshwater pearl mussels. A detailed summary of new mitigation measures was set out including a review of site specific sea lice data to date, and the impact of new management measures. In summary, evidence at the site suggests that the level of mitigation in place at the site has maintained populations of near zero rates of sea lice with any exceedances of targets under control within a week. Based on the data, the magnitude of impact associated with the site extension is assessed as negligible and overall impact on the designations, minor. In considering recent advice issued by the Highland Council (18 May 2018), the publication of the data demonstrates that sufficient safeguards are in place to protect freshwater pearl mussels. A Regional Environmental Management Plan is proposed focussed on the Loch Sunart geographical area, covering the three Marine Harvest operational sites. The Regional EMP will provide the framework for monitoring, communication channels, sharing of data, meetings, and the desired outcomes of the increased knowledge and partnership working that will ultimately result in improved farm management practises.

The site is adjacent to the terrestrial designation of Sunart SSSI, key marine features that have potential to be impacted by the development include otters, rocky shore and egg wrack. Egg wrack and rocky shore represent intertidal features which are will not be impacted by the

physical footprint of the site nor carbon or in feed residue deposition. The magnitude of the impact is considered negligible and overall low.

Loch Moidart SAC and Glen Beasdale SAC, including the Glenbeasdale extension were suggested for inclusion in a Habitats Regulations Appraisal (HRA), but were subsequently scoped out due to actual transit distance from site exceeding SNH guidelines. The potential for connectivity was identified in relation to the qualifying features (harbour porpoise) on the Inner Hebrides and Minches candidate Special Area of Conservation (cSAC), Ardnamurchan Burns SAC (freshwater pearl mussel) and Mingary Burns SAC (freshwater pearl mussel).

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 other seabed lease holders, commercial fisheries or military operations. Operational activities at the existing site at Maclean's Nose has not generated any adverse impacts on surrounding navigational traffic to date. This assessment considers the predicted impacts arising from the proposed modifications to Maclean's Nose.

15.2 Consultation Responses

Statutory and non-statutory stakeholders were consulted over the scoping period. A response was received from the Ministry of Defence (Safeguarding) on 30 October 2017, indicating that there would be no issues from the proposals.

In addition, a meeting was held with the North West Mallaig Fishermen's Association on the 27 October 2017. During the meeting informal discussions were held regarding perception of the proposed modifications to Maclean's Nose. Feedback was received indicating that the presence and accompanying restrictions of existing infrastructure in the area and the proposed modifications were perceived not to have an impact on existing fishing activity.

The Crown Estate highlighted the presence of a wave energy development adjacent to the site at the northern periphery of the boundary. Subsequently, consultation with Wavenet Energy Mingary Ltd. - the adjacent wave energy developer - was undertaken to provide additional information on the wave energy demonstration scheme.

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. 2014. Maclean's Nose Environmental Impact Assessment. MHS (Available on Highland Council Planning Portal 14/02568/FUL)

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 within 5km of the Maclean's Nose:

- Loch Sunart is located in a Military Exercise Area which covers the majority of the West Coast of Scotland;
- The nearest anchorage / small craft mooring area located by Kilchoan approximately 4.4km away;
- The development is located approximately 2.5km from the Tobermory to Kilchoan ferry route;
- Approximately 2.9km from a pier at Kilchoan; and
- Fishing effort associated with Norway lobster (*Nephrops norvegicus*) is classified as relatively low within this area, however it is adjacent to suitable nephrops habitat and is classified as a functional nephrops unit.

Previously, concerns regarding commercial fisheries were raised around white sprat and nephrops. As part of the EIA submitted to support the original planning application for Maclean's Nose, MHS commissioned Millport Marine Lab to carry out a nephrops survey of the area (Stephenson 2013). The survey concluded that burrow counts ranged from 0 to 0.21 burrows m⁻² with an overall density of 0.08 burrows m⁻². This level of burrow density is considered low, some isolated areas were identified as having medium burrow density but this was restricted to discrete areas to the south of the pens.

15.4.1 Other Leaseholders

The site is adjacent to an existing lease held by Wavenet Energy Mingary Ltd. for the deployment of a wave energy array and associated electrical cables. An extract of the Notice to Mariners provides the lease boundary and indicates the location of the infrastructure (Figure 30). The project is aimed at demonstrating the application of wave technology to support coastal industries including aquaculture. The wave array has a cable powering the existing feed barge⁴⁸.

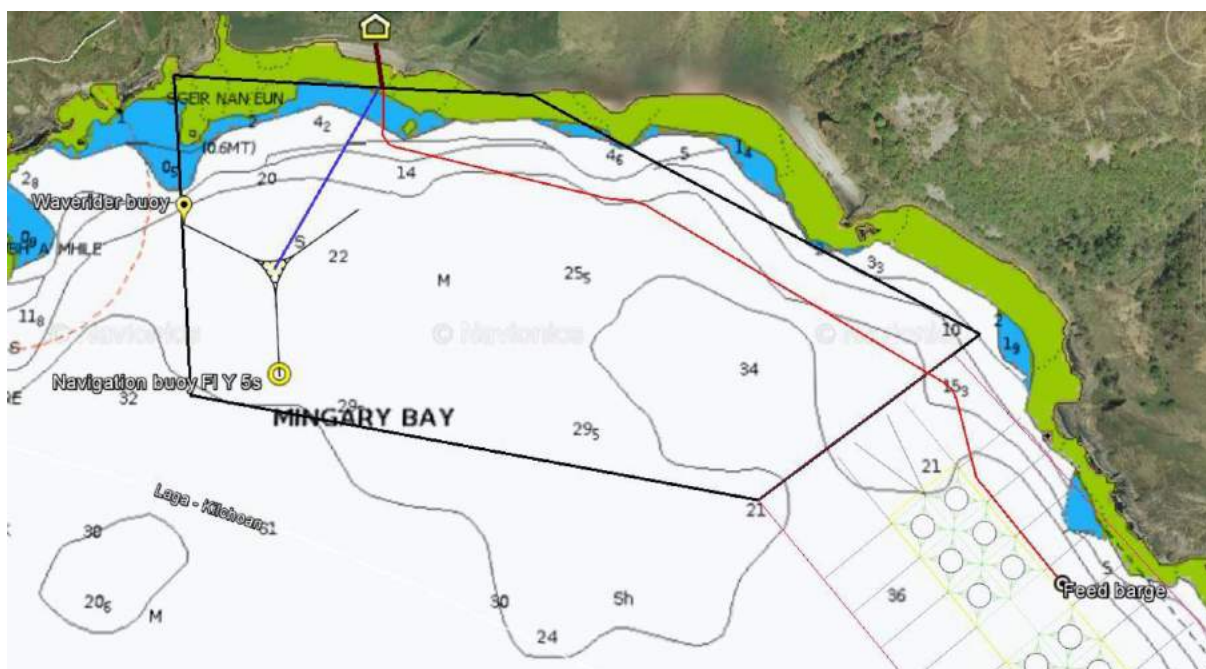


Figure 30 Mingary WaveNET Ltd. wave array. The Western lease boundary abuts the northern lease boundary of the Maclean's Nose lease area.

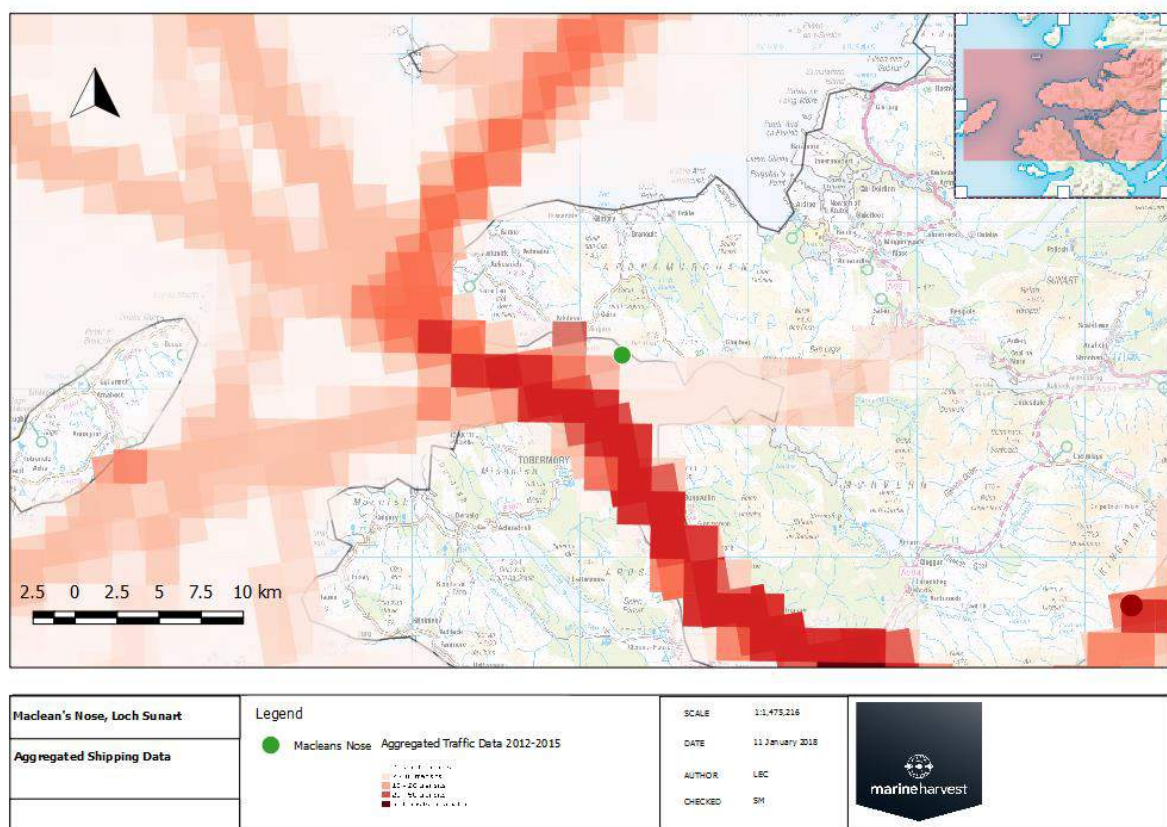
⁴⁸ David Campbell, Director, Albatern Ltd. *Pers Comm.*

15.5 Impact Assessment

15.5.1 Navigation

Additional site infrastructure can comprise an additional navigation risk both to commercial and recreational traffic, mainly though restricting movement and conflicting with shared infrastructure. The site comprises an extension to an existing site; a barge will remain in the same location and the site will continue to be lit and marked in accordance with specifications from the Northern Lighthouse Board (NLB).

Key navigational receptors include the passenger ferry route associated with the transit route though the north of the Sound of Mull. The configuration of additional infrastructure is a continuation of the existing site along the length of the coastline before reaching the Maclean's Nose headland. The configuration is located in an open area of water, maintaining a safe passage for vessel traffic, particularly the main route through the Sound of Mull where frequent passenger ferries and cargo ships transit (Section 21, Traffic and Transport). Figure 31 illustrates the most heavily used shipping transits, concentrated in the Sound of Mull. Maclean's Nose is located inshore, at the periphery of the main route.



- 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.

The main activities identified in the area were creeling and sprat fishing. The original development of Maclean's Nose raised concerns with the Mallaig and Northwest Fisherman's Association. Recent discussions with Mallaig and Northwest Fisherman's Association (MNWFA) regarding the proposed modifications indicated that members of the association no longer utilise the area at Maclean's Nose. The site is considered blocked at one end by the current fish farm and discussions indicated reports of a sub-surface 'tidal' generator (the wave demonstration project: Mingarry WaveNet Array described in Section 15.4.1). In addition, previous baseline surveys of the nephrops populations indicated that burrow count was low, suggesting that the area was not commercially important for these species. A previous assessment of the sprat fishery indicated that the area closed off to the fishery is a very small proportion of the fishing ground of a highly mobile and wide-ranging species. The commercial fisheries populations are classified as a low sensitivity receptor in terms of economic value due to the existing low populations identified, and consultations indicated that the magnitude of physical displacement will be negligible as this zone is currently not utilised by members. The overall significance on commercial fisheries is assessed as minor.

15.5.3 Other Leaseholders

The site shares a seabed lease boundary with the adjacent wave demonstration project at Mingary Energy Ltd. The project is a partnership with Marine Harvest (Scotland) Ltd. designed to trial and demonstrate wave energy applications in aquaculture, with energy generated from the waves aimed at supporting feed barge operations. The magnitude of any impacts is considered negligible as the proposed site extension is at the opposite end of the site at the southern boundary, with no changes to the lease boundary on the northern end. It is possible that the partnership arrangement between the Mingary Energy Ltd and MHS, and proposed extension to the site may generate a slight positive impact on the wave array through increased security of the site.

15.5.4 Military

The site is located in a military exercise area which covers much of the West coast of Scotland. The Ministry of Defence Safeguarding Estates were contacted and expressed no issues with the proposed development.

15.6 Summary

Impacts on navigation, commercial shipping and fisheries were assessed drawing on publicly available data and consultation. Although the Sound of Mull represents a relatively busy shipping route, the location of the Maclean's Nose, within inshore waters, close to the coast, is unlikely to impact normal shipping traffic and activities. Operation of the existing site since 2015 has not generated any issues associated with navigation. As with the existing site, standard mitigation measures, including navigational marking and lighting will be installed at the development. Overall impacts on navigation and shipping were assessed to be minor.

Initially when developing the original Maclean's Nose site in 2015, key concerns were raised by the MNWFA regarding sprat and nephrops fisheries. However, baseline assessments indicated that nephrops burrow density was relatively low and the area represented only a very small part of a large and mobile sprat fishery. Consultations regarding the proposed modifications indicated that MNWFA had no specific concerns regarding the proposed extension to the site. Overall significance of the impacts on fisheries was assessed as minor. Another seabed lease holder operates a wave energy demonstration project adjacent to the

site, this is a partnership between Mingarry Energy WaveNet Ltd and Marine Harvest (Scotland) Ltd to demonstrate wave power in aquaculture operations, subsequently no adverse impacts are associated with the development. Finally, the MOD was consulted to assess conflict with the Military Exercise Area. The MOD responded with no objections to the development and no further assessment was necessary.

16 Seascape and Visual Impact Assessment

16.1 Introduction

ASH design + assessment was commissioned to complete a detailed LVIA with accompanying wireframe and photomontages. This chapter summarises the outputs of the SVIA, the full SVIA and accompanying figures are provided in Appendix 15.

16.2 Consultation

Consultation responses were received during the scoping process and followed up by email. The Highland Council indicated in their scoping response, that photomontages were required to assess the degree of change. SNH indicated in their response of 6 November 2017, that there were no impacts on designations. Three viewpoints were subsequently agreed with the Highland Council to take forward for visualisations and visual assessment (29 January 2018).

16.3 Methodology and Information Sources

16.3.1 Information Sources and Guidance

The following information sources and guidance have informed the assessments and a full description of the detailed methodology is provided in the SVIA (Appendix 15).

- The Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, referred to as GLVIA3 (Landscape Institute and Institute of Environmental Management and Assessment, 2013);
- The Siting and Design of Aquaculture in the Landscape: Visual and Landscape Considerations (Scottish Natural Heritage, 2011);
- Guidance on the Landscape/Seascape Capacity for Aquaculture, referred to as GLSCA (Scottish Natural Heritage, 2008);
- Landscape/seascape carrying capacity for aquaculture (Grant, 2006);
- Coastal Character Assessment (Scottish Natural Heritage, 2017) and draft of Visualisations for Aquaculture (Scottish Natural Heritage, 2016);
- GIS datasets available from SNH, Scottish Government and Historic Environment Scotland;
- Mapping and information from 'The Highland Coastal Development Strategy' (May 2010);
- National seascape character types and descriptions identified in SNH commissioned Report No 103 'An assessment of the Sensitivity and Capacity of the Scottish seascape in Relation to Windfarms' (2005);
- Landscape character types and descriptions identified in 'Lchaber; landscape character assessment' (Environmental Resources Management, 1998, No. 97) from the SNH suite of regional landscape character assessment documents; and
- Ordnance Survey mapping and Aerial Photography from online sources (e.g. Google Earth).

16.3.2 Methodology

The methodology, summarised from the full description in Appendix 16, and based on the guidance above comprises the following:

- Generation of a Zone of Theoretical Visibility (ZTV). For the purposes of this assessment a ZTV has been generated comparing existing and proposed infrastructure;
- Establish baseline conditions; and
- Identification of viewpoints.

The assessment of both potential seascape effects and visual amenity is based on an assessment of sensitivity, combined with a magnitude of change criteria to predict an assessment of significance. Full details of the criteria are provided in Appendix 15.

16.4 Baseline

The study area, selected as a 5km area around the site, is situated in an area of seascape (known as Outer Loch Sunart) off the Ardnamurchan peninsula coast, of which Maclean's Nose together with Auliston Point on the Morvern peninsula, forms the gateway to Loch Sunart to the east. To the south Rubha nan Gall (off Tobermory, on Mull) and Auliston Point form a gateway to the Sound of Mull. To the west is the open Sea of the Hebrides. The nearest settlement of any size on the Ardnamurchan peninsula is Kilchoan, which falls largely outside the ZTV. However, the smaller nearby coastal settlement of Mingary does fall within the ZTV.

16.4.1 Landscape Designations

- There are no nationally designated areas within the study area, although the Moidart and Ardnamurchan National Scenic Area (NSA) is located approximately 7km north of the proposed development.
- The study area is located within a Special Landscape Area (SLA): Outer Loch Sunart and Islands defined in the Highland Wide Local Development Plan (April 2012). The proposed fish farm development falls within this SLA on its north-westernmost periphery.

16.4.2 Landscape Seascape Character

One National Seascape Character; Area 20: Sound of Mull/Firth of Lorn/ Sound of Jura (Sounds, Narrows and Islands) covers the entire 5km study area. This Coastal Character Type (CCT) is described by as having "...complex and distinct forms, ever changing variations in seascape due to interaction with layered headlands, lochs, mountains and islands. However, there is a sense of unity as all forms are highly natural and linked together with water⁴⁹." ASH identified a further three Local Coastal Character Types (LCCTs) for this assessment and are illustrated in Figure 32.

- LCCT 1: Rocky Indented Coastline with Human Interventions: This LCCT is considered to have Some Sensitivity as it has evidence of human intervention.
- LCCT 2: Rocky Coastline with Shingle Beaches Rugged Backdrop and Fish Farm: This LCCT is considered to have Some to High Sensitivity Visual Amenity

The receptors identified within the study area include:

- Mingary Pier, the nearby buildings;

⁴⁹ Scott, K. E., Anderson, C., Dunsford, H., Benson, J. F., & MacFarlane, R. (2005). An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. SNH Commissioned Report No. 103 (ROAME No. F03AA06). Scottish Natural Heritage.

- Mingary Castle and nearby houses; and
- The Tobermory-Kilchoan vehicle/ pedestrian ferry arrives and departs from Mingary Pier.

No formal recreational routes fall within the ZTV; these have not been considered further in the assessment. The B8007 single track road forms the principal vehicular route within the study area running in parallel with the coastal shore between Kilchoan, Mingary and Glenbeg, 7km to the east. However, since this falls largely outwith the ZTV it has not been considered further in the assessment.

16.4.3 Cumulative Impacts

There are no other operational, consented or proposed Finfish farms within the 5km study area so an assessment of cumulative effects has been scoped out of the assessment.

16.5 Assessment

The ZTV generated for both the existing and the proposed infrastructure is provided in Figure 32. Additional visibility generated by the proposed modifications is mostly confined to a strip of sea area south east of the proposal.

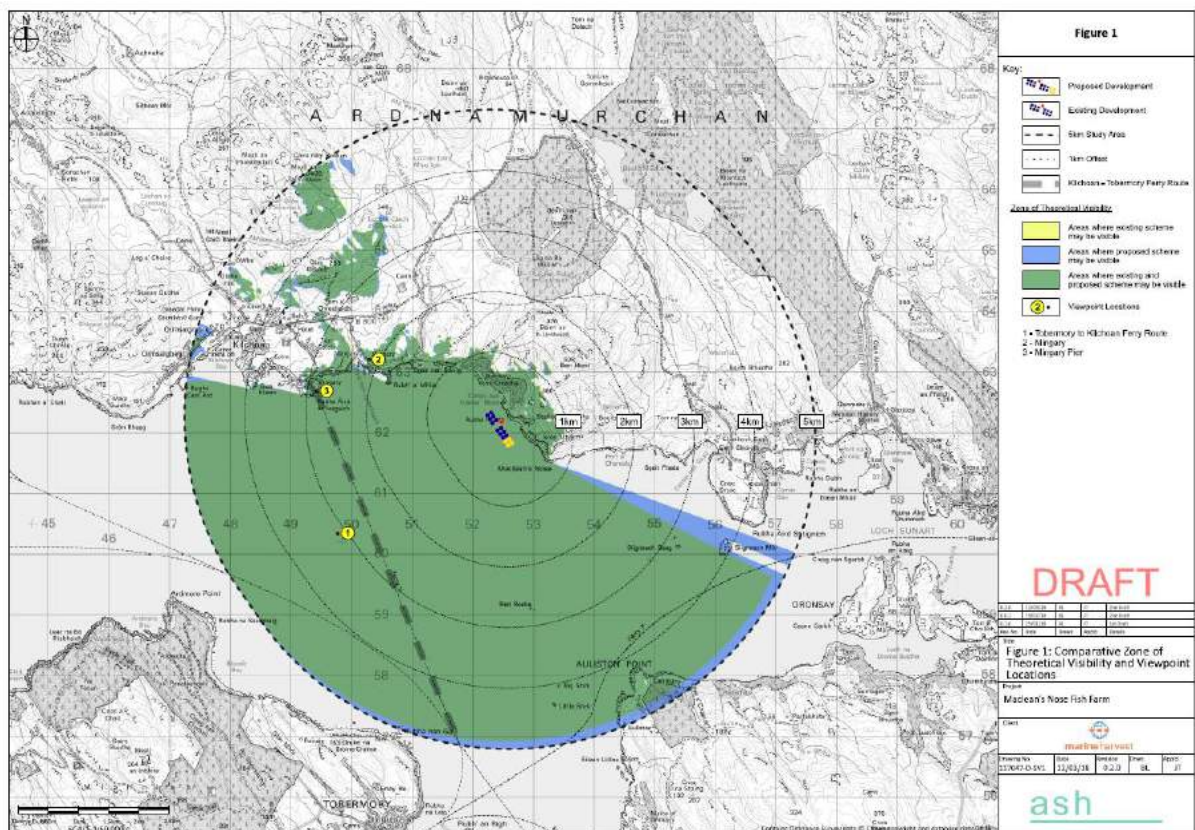


Figure 32 Zone of Theoretical Visibility for both the existing and the proposed infrastructure.

16.5.1 Viewpoints

The viewpoints outlined in Table 21 and illustrated in Figure 32, were selected based on the outputs of the ZTV, baseline assessment and consultation with the Highland Council.

Table 21 Representative viewpoints

No.	Location	OS Reference	Grid	Representative views
VP1	Tobermory – Kilchoan Ferry off Maclean's Nose	NM 49777 60348		Pedestrian views from the ferry upper deck
VP2	Mingary Pier	NN 49430 62680		Views from pier; views from people and cars arriving / alighting from and waiting for ferry; views from car park and minor road to Kilchoan; views from nearby fish farm shore base buildings
VP3	Above Mingary Castle	NM50287 63193		Views from converted Mingary Castle residence and adjacent car parking area; views from nearby detached houses; views from minor road to castle

16.6 Impact Assessment

The impact assessment considered the potential impacts on the seascape character and landscape designations.

16.6.1 Outer Loch Sunart SLA

The proposed extension is located in part of the Outer Loch Sunart SLA. The existing fish farm, barge and also the nearby developed Mingary pier area with accompanying boat and ferry traffic does reduce this sensitivity locally. Landscape sensitivity to the type of development proposed is therefore considered to be generally high but locally medium.

The ZTVs indicate that intervisibility with the proposed development to the landward side would be well contained by topography and limited to the coastline and hills of west of Maclean's Nose and the northern coast of Morvern and Auliston Point and the sea in between, which also forms part of the SLA. However, the proposed development is not visible from the majority of land and sea loch within the SLA so the change would only affect a localised and limited area of this designation. The magnitude of change is therefore considered to be generally negligible but locally low during construction and operation.

Due to the small relative scale of the proposal compared to the whole SLA and the limited intervisibility, effects on landscape character may be notable but within a limited area in the environs of the proposed development. The predicted negligible to low magnitude of change during construction and operation on a landscape of generally high but locally medium sensitivity is considered likely to lead to a locally direct and minor to moderate adverse and generally indirect minor adverse impact/change? therefore not significant landscape effects during construction and operation.

16.6.2 Local Coastal Character Types

LCCT 1: Rocky Indented Coastline with Human Interventions: this LCCT is considered to have some sensitivity (as it has evidence of human intervention and therefore reduced sensitivity to development of the type proposed) and magnitude of change would be low due to distance. The proposed development would result in an indirect, virtually imperceptible to inappreciable change in the existing seascape character in the area and therefore an indirect Negligible to Minor adverse (non-significant) effect.

LCCT 2: Rocky Coastline with Shingle Beaches Rugged Backdrop and Fish Farm: This LCCT is considered to have some to high sensitivity and magnitude of change would be low due to distance and also due to the minor nature of the proposed changes in landscape character terms. The proposed development would therefore have Minor adverse indirect and not significant seascape effects upon this LCCT.

16.6.3 Visual Amenity

Photomontages and wirelines were produced from the three representative viewpoints described in Table 21. The assessment of the impacts on each of these receptors is summarised below.

- Viewpoint 1: Tobermory to Kilchoan Ferry off Maclean's Nose: slightly elevated, relatively distant (3.14km) front or side-on north easterly views of replacement barge and additional pens will blend in well against rocky backdrop. The difference will barely be noticeable; hence a negligible magnitude of change from this distance and orientation. When combined with low sensitivity due to the presence of the existing development and the range of elements of the changing panoramic views available, visual effects would be negligible (not significant).
- Viewpoint 2: Mingary Pier: oblique, relatively distant (2.94km), view of replacement barge and additional pens would be obtained, which will blend in well against rocky backdrop; change will be difficult to perceive; hence negligible magnitude of change from this distance and orientation. When combined with low sensitivity due to the presence of the existing development and the range of elements of the broad panoramic views available, visual effects would be Negligible (not significant).
- Viewpoint 3: Above Mingary Castle: an elevated, closer and more acute view of new barge and extended pen layout would be obtained. The extension will mean that from this height (c.20m AOD) and angle, the pens will appear to project out into sea loch further beyond Maclean's Nose and the new barge will be slightly more noticeable than present barge due to size and design albeit at a distance of 2.27km; hence a low-medium degree of change. When combined with low sensitivity due to the presence of the existing development and the range of elements of the broad panoramic views available, visual effects would be Minor-Moderate (not significant).

16.7 Summary

The assessment considered the potential effects to the seascape character and visual amenity within 5 km of the proposed development including one Special Landscape Area, two local coastal character areas and three viewpoints. The assessment identified that the effects on the seascape and visual amenity of the study area are unlikely to be significant as the proposed development is for a relatively minor pen extension to the existing fish farm and a barge and netting substitution. The fish farm is well-sited parallel to the coastline north west of Maclean's Nose, leading to limited intervisibility with both local coastal character areas and visual receptors in the study area, due to screening from potential receptor locations by foreground topography.

Where there is theoretical intervisibility, distance to potential receptors ensures reduced magnitude of change except in the case of the LCCT seascape immediately adjacent to the proposed development on Maclean's Nose; but even here seascape effects although elevated, will be of a localised nature and not significant. No significant effects are anticipated to the Outer Loch Sunart and Islands SLA and it is therefore concluded that the integrity of this local/ regional designation would remain unaffected.

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 acoustic deterrent devices (ADDs) is considered in Section 14. Impacts of noise on recreational divers is considered in Section 20.

17.2 Consultation

Noise was not identified as a potentially significant impact during the scoping process, however the Highland Council highlighted the proposal for a larger feed barge and requested details on noise levels of the new barge and other equipment as appropriate, with likely degree and duration of change on key receptors.

17.3 Methodology and Information Sources

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

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

17.4 Baseline Assessment

Potential receptors to noise impacts were identified within 1km buffer from the feed barge location (Figure 33). 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 or Ben Hiant, recreational users (boats / kayakers) and fishing boats. No formal coastline walking routes were identified although it is likely that walkers associated with the coastline, ascending or descending Ben Hiant may experience some noise. Other marine recreational users include yachts and power boats.

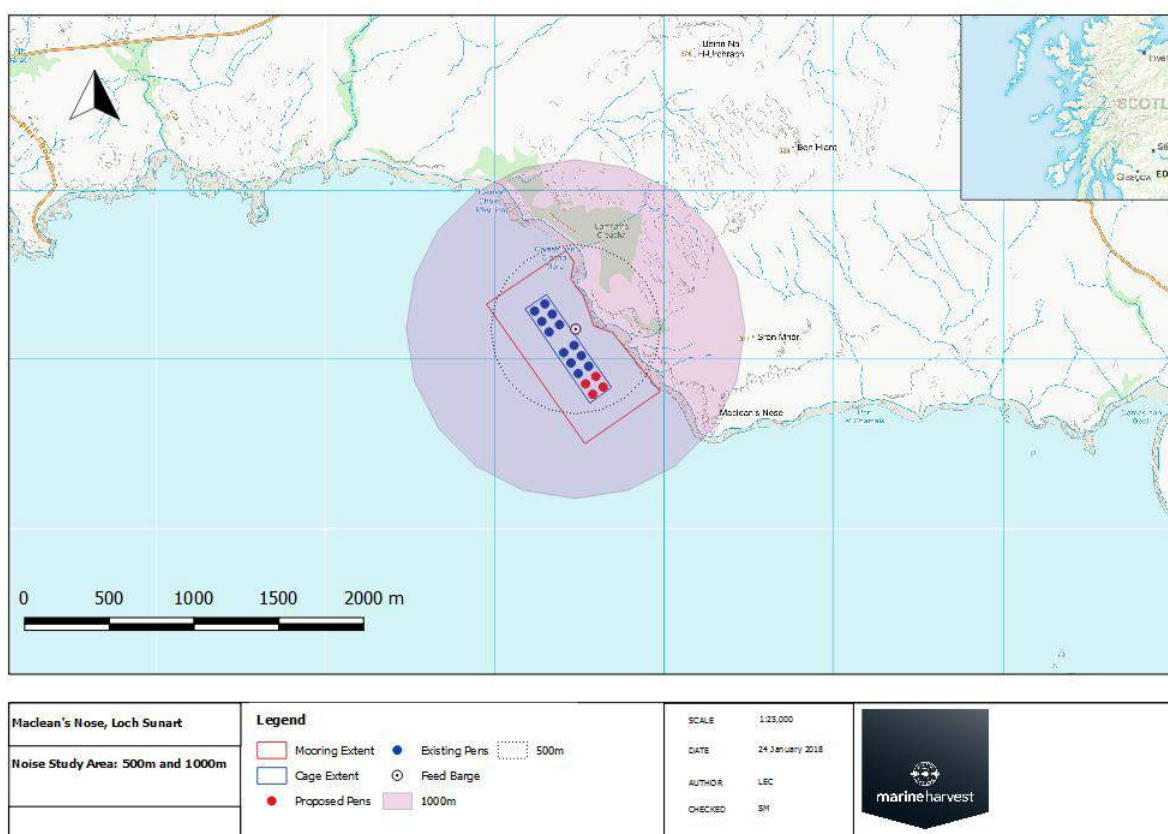


Figure 33 Noise study area; 500m and 1000m zonation around feed barge.

17.5 Predicted Impacts

The key change to the existing proposal is the upgraded specification of the feed barge from a 200T C-Cap to a 450T SeaMate. A decrease in boat traffic is anticipated arising from fewer

number of feed deliveries; this is not expected to materially change the existing noise generation at the site.

In terms of the barge specification proposed the generator is to be housed deep below deck. Noise generated by the generator is minimal, restricted to the exhaust connection and represents an improvement in noise containment. The noise generated by equipment at the farm is unlikely to be noticeable 500m beyond the site. Whilst there may be slight noise heard it is expected to be localised, in direct connection with the visible farm.

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 as reasonable active maritime shipping associated with the transit route through the north Sound of Mull (Section 15). There is a reasonable 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 low level of use near the site (Section 20). Coastal walks adjacent to the site would be challenging due to the steep incline / cliffs along the shoreline. Kayaking is mainly confined to Loch Sunart and no formal or recorded informal walks are associated with the areas adjacent to the proposed farm. 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 are in place, under the responsibility of the Farm Manager to ensure site equipment is running efficiently. Should a noise issue be raised, MHS has in place Environmental and Quality Management System procedures which requires 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 MHS auditing team, and the corrective action is closed once it is resolved.

17.7 Summary

The existing site has been operational since 2015 and no issues relating to noise generation have been identified. The proposed extension is located in a more remote setting, further away from residential and most recreational receptors. 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 in close proximity to the development. Overall the significance of noise in the context of a relatively active area for marine traffic including heavier vessels such as large passenger ferries and cargo ships is assessed as minor significance.

18 Cultural Heritage

18.1 Introduction

Cultural heritage refers to archaeological sites, historic structures, gardens and designed 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 the proposed extension to Maclean's Nose. The setting of a specific asset within the wider landscape can also contribute to a features significance, this aspect is considered in Section 16 (Seascape and Visual).

18.2 Consultation

Responses relating to this assessment were provided exclusively during the scoping period. The Highland Council indicated that the impact on Historic Marine Protected Areas should be detailed in the Environmental Report, including the potential for smothering (30/11/17). Historic Environment Scotland also advised consideration of the impacts of the proposed development on the Mingary HMPA. Potential impacts on the HMPA are covered in the sections below.

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 (<http://portal.historicenvironment.scot/designation/HMPA2>);
- National Marine Plan Interactive; 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 sporting divers are reporting 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 2 km radius:

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

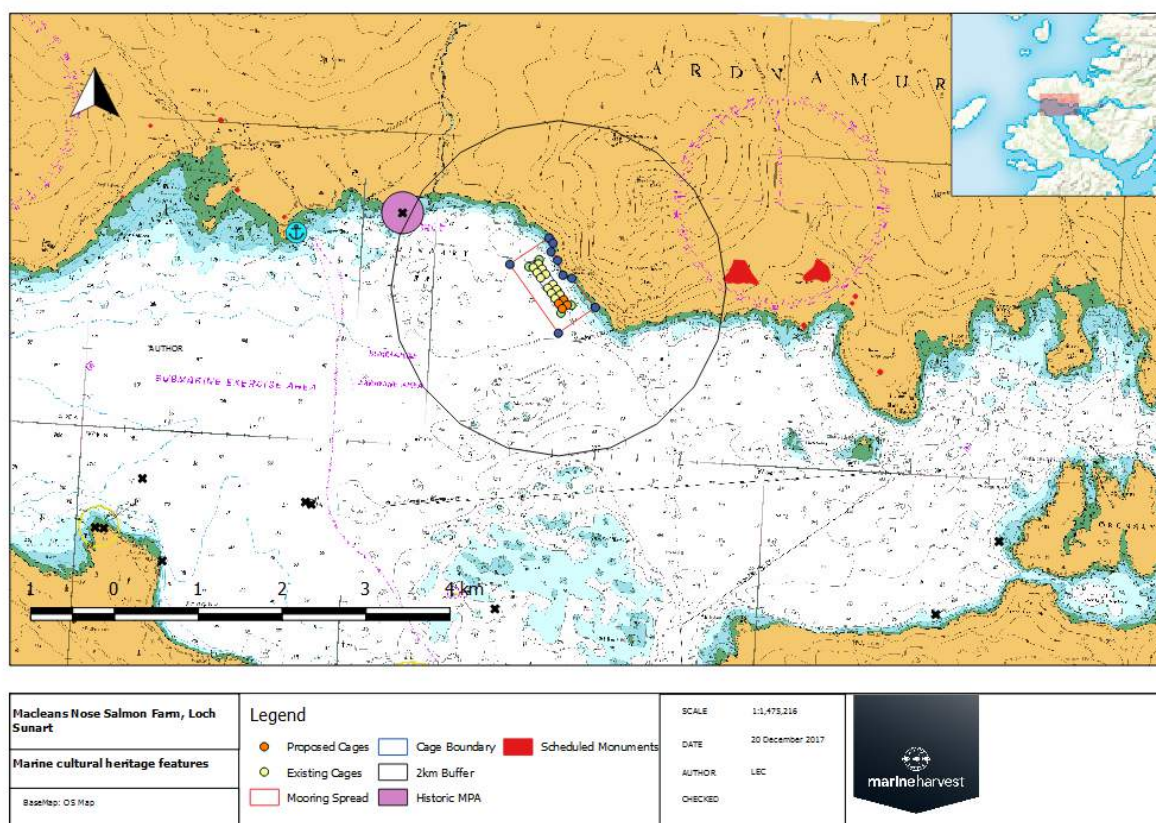


Figure 34 Context of the proposed modifications at Maclean's Nose against the Mingary HMPA.

18.4.2 Mingary Historic MPA

Part of the Mingary Historic MPA falls within the 2km study area (Figure 34). The marine historic asset located within the Mingary Historic MPA is believed to relate to a wrecking incident that is recorded to have occurred during a siege of Mingary Castle by Archibald Campbell, 8th Earl of Argyll, in 1644. The remains of the vessel lie wrecked on or in the seabed at a depth of 8-11m below chart datum illustrates the core of the recorded remains within the Historic MPA boundary. The wreck is located 700m from Mingary Castle, a coastal castle of strategic importance during the 13th-18th centuries. As this site remains undisturbed, it retains an inherent potential to make a significant addition to historic knowledge. In particular, information about the design and use of vessels during the 17th century. The wreck is also in an area that is very popular for recreation and tourism (in particular sport diving).

18.5 Predicted Impacts

The site is considered vulnerable to the following direct and indirect impacts which may be associated with the proposed modifications at Maclean's Nose:

- Physical damage/loss/alteration arising from collision/abrasion by construction and extraction activities;
- Anchoring/mooring of vessels within the protected area; and
- Alteration/loss of the asset arising from any construction at sea or commercial installation operations in the vicinity which might exacerbate erosion of sediments or result in significant changes to seabed biology/water chemistry within the protected area.

The key impact identified during the consultation was the potential for smothering; an increase in biomass has the potential to increase carbon deposition from the site.

Consultation responses and the baseline assessment indicated Mingary HMPA as the key receptor. The sensitivity of the receptor is classified as high due to its designation as a marine historic asset of national importance. The existing site has been operational since 2015, with no known impacts identified on the wreck site. The current proposals to extend the existing development are confined to 4 additional pens to the south east of the existing pen configuration, located at the furthest point of the site approximately 1.8km from the HMPA (Figure 34). No direct impacts associated with the construction of the extension or the moorings spread are anticipated. Whilst vessels will transit past the site to the shore base at Kilchoan, the direct route to the shore base is approximately 400m between the boundary of the HMPA and the transit route. No direct impacts are anticipated to be generated by transiting marine traffic. The magnitude of impacts is assessed to be negligible.

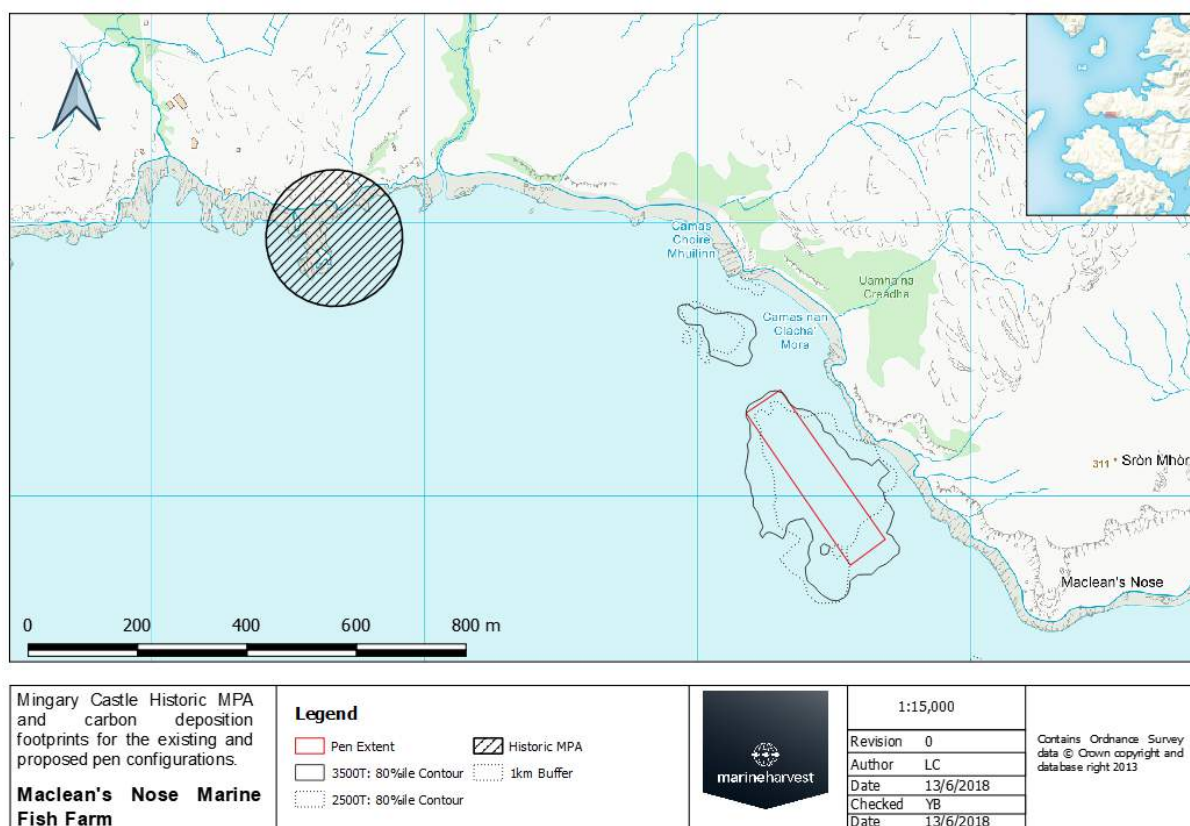


Figure 35 Mingary Castle Historic MPA and carbon deposition footprints (80%ile contour) for the existing and proposed pen configurations.

In the original application submission for Maclean's Nose, MHS carried out modelling using AutoDepomod, which predicts deposition of faecal waste outputs, and reported results in the Environmental Statement accompanying the Planning Application. Historic Scotland were satisfied that, based on the modelled outputs, there would be no impacts on Mingary Castle Wreck. NewDepomod modelling indicates a modelling footprint which demonstrates that the carbon deposition and in-feed residue footprint have not and will continue not to impact the HMPA site (Figure 35). No direct or indirect significant effects are likely from smothering due to significant distance between the boundary of the modelled depositional boundary and the HMPA boundary. The magnitude of impacts associated with carbon deposition is assessed to be negligible.

18.6 Summary

The assessment considered the presence of features of cultural heritage importance within a 2km boundary of the site. The key feature identified was the Mingary HMPA. The HMPA bounds a wrecked vessel believed to have occurred during a siege of Mingary Castle by Archibald Campbell, 8th Earl of Argyll, in 1644. An assessment of the potential impacts arising from construction and physical placement of the new infrastructure was undertaken. The presence and operation of the existing site since 2015 has not generated any identified impacts on the feature, and the proposed extension to the site is located at the SE corner of the development: the furthest point from the HMPA, at a distance of approximately 1.9km from the HMPA boundary. Transiting vessels to the shore base at Kilchoan will not interact with the HMPA boundary. NewDepomod modelling illustrates the predicted footprint of carbon deposition is expected to lie 1km from the boundary of the HMPA. The overall assessment of significance is expected to be negligible on the HMPA based on a negligible magnitude of impact and high sensitivity of receptor.

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

The Highland Council responded through the scoping process requesting a site-specific waste management plan. Details of what the plan should include are provided in Table 22 below.

Table 22 Consultation advice from the Highland Council: Waste

Scoping Advice	Response
Set out the site-specific practices that will be undertaken in order to minimize waste from the site;	Accreditation to ISO 14001 to ensure structured approach to handling waste. Certification includes the Plan – do – Check - Act and demonstration of continual improvement in environmental management.
Detail the position of the persons responsible for the management of waste on the site as well as detailing the various waste disposal pathways;	Farm or production location managers are responsible for the storage and uplift of waste generated at the site during operation, at timely and regular intervals. (Details in Appendix 17: Waste Collection Procedure)
Include proactive measures for the recovery of litter of marine origin from the area around the site;	No formalised procedure in place.
Specifically set out the fate including pen and mooring maintenance, therapeutic treatments and harvesting operations;	Nature, classification and fate of waste provided in Table 23.
Provision should also be made within the plan for the recovery of all litter accidentally released from the site to the wider environment, including storm damage.	No explicit consideration in the waste management plan but considered good practice for recovery.

19.3 Methodology and Information Sources

19.3.1 Information Sources

The following information sources have been referenced:

- Marine Harvest Scotland Waste Management Policy;
- Marine Harvest Scotland Waste Collection Procedure; and

- Marine Harvest Scotland ISO 14001 Certification.

19.3.2 Impact Assessment

The assessment of waste has not been subject to an assessment, instead this section reports on general principals 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 MHS 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. MHS has an internal waste management policy in place provided in Appendix 17.

19.4.2 Nature of Waste

The nature of waste generated at a fish farm, its classification and subsequent management routes is detailed in Table 23. Procedures for managing and collecting waste are provided in Appendix 18: Waste Collection Procedure.

Table 23 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 morts	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.
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19.5 Management and Mitigation

Marine Harvest (Scotland) Limited (MHS) 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'⁵⁰.

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

Aquaculture significantly contributes to the sustainable economic growth in rural and coastal communities, with many communities depending on the employment and revenue it provides (National Marine Plan, 2015). However, small changes in economic activity has potential to impact communities in rural Scotland more significantly than more populated areas. This assessment considers the social and economic impacts of the proposed modifications to Maclean's Nose. Other effects on leisure activities and access to these activities are also included. Recreation is also considered in Section 16: Landscape and Visual Impact Assessment in terms of impacts on visual receptors.

20.1.1 Consultation

Two responses were received relevant to this assessment:

- The Highland Council requested in their scoping response that the assessment consider the potential impacts of acoustic deterrent devices (ADDs) on recreational divers; and
- The Royal Yachting Association responded to issue of the scoping report on 24 November 2017 indicating that there were no issues with the proposed development.

A meeting was held with Kilchoan Community Council on 12 February 2017. Details of the proposed project were presented by MHS Compliance Manager and existing Site Manager. The community council expressed support for the proposed modifications to the development and committed to provide a positive representation to the Highland Council. Consultation was undertaken with David Campbell, Director of Albatern Ltd. who are trialling an innovative wave energy array as a demonstration of how renewable energies may be applied in aquaculture in the future.

20.2 Methodology and Information Sources

The assessment extracted information from the following sources:

⁵⁰ Recycled fish farm material used for the construction of reinforced polytunnels, particularly in exposed island locations.

- Economy and employment data from Highland Council Ward Statistics;
- Land Use Consultants. 2016. Scottish Marine Recreation and Tourism Survey 2015. Marine Scotland, The Scottish Government.
<http://www.gov.scot/Resource/0049/00497904.pdf>
- SEPA. 2017. Supporting Guidance (WAT-SG-67) Assessing the Significance of Impacts: Social Economic and Environmental;⁵¹
- Discover Moidart. <https://www.moidart.com/walking/ardnamurchan>
- National Marine Plan Interactive, Marine Scotland; and
- 1:25,000 Ordnance Survey Mapping to assist in the identification of key tourism and recreational attractions and land uses.

Significance of impacts have been evaluated by considering the likely scale of change as a result of the proposed modifications to Maclean's Nose, together with the value of the resources affected. The classification of value is summarised in Section 4.

The methodology for assessing economic impacts is based on a recent methodology published by SEPA⁵². This methodology is based on the comparative assessment of Gross Value Added (GVA) of the projects against regional or local GVA.

20.3 Baseline Assessment

The area around Maclean's Nose is located within the Kilchoan community council. The site lies within the Fort William and Ardnamurchan Ward, the third largest ward with one of the lowest population densities across the Highlands and Islands with 4.5 people per square km compared to an average across the Highland of 201.9 people / km². Employment is dominated by accommodation and food services, followed by health and retail. Agriculture, forestry and fishing comprised around 3% of the employment sector in 2011. Since census data was gathered in 2011, significant local investment in the aquaculture sector has been developed via an £80 million investment in the Marine Harvest Feed Mill at Kyleakin with direct employment anticipated to be over 55 full time staff.

The existing site of Maclean's Nose, is located on the southern coastline of the Ardnamurchan peninsula, the nearest significant settlement being the village of Kilchoan which has a small number of B&Bs, hotel and nearby campsite. The development is located at the foot of Ben Hiant, and the closest tourism receptor of significance is Mingary Castle. Section 18 provides details of the wave energy array installed adjacent to the site, which is designed to demonstrate wave energy as a source of energy for fish farms.

Following assessment of the Scottish Marine Recreation and Tourism Survey (LUC, 2016) the following key recreational activities were identified:

- Recreational sailing, power boating and cruising centred mainly on the transit route around the North Sound of Mull;
- Recreational SCUBA diving site associated with Mingarry Castle Wreck approximately 1.7km from the site;
- A moderate level of recreational yachting activity, and recreational powerboating in the vicinity of the site;

⁵¹ SEPA. 2017. Supporting Guidance (WAT-SG-67) Assessing the Significance of Impacts: Social Economic and Environmental

⁵² SEPA. 2017. Supporting Guidance (WAT-SG-67) Assessing the Significance of Impacts: Social Economic and Environmental;

- One RYA training centre (Hebridean Sea School) located 4km from the site;
- Coastal walking routes; there is no formally designated walking routes or core paths near the development, however there are routes associated with Ben Hiant and the presence of the Sunart SSSI, encourage coastal walkers. Similarly, the Camas nan Geall coastal walk along the south coast of the Ardnamurchan peninsula is an informal walk valued for the potential of spotting otters and eagles; and
- Kayaking and canoeing has the highest level of intensity within Loch Sunart, with some activity continuing outside of the complex but at a reduced intensity / frequency.

20.4 Impact Assessment

20.4.1 Economic Impacts

Employment: There will be through life economic impacts arising from job creation and local expenditure to support ongoing operation and maintenance activities. The proposed modifications at Maclean's Nose result in the direct employment of up to an additional four permanently employed members of staff (or equivalent) and potentially additional seasonal workers in the busier summer periods in the second year of the 22.5-month production cycle. Based on an average farm technician salary of £22,000 per annum, this represents an additional £88,000 to the local economy. However, the overall scale of economic effects is based on Gross Value Added (GVA)⁵³ contributed by an activity. The GVA for aquaculture is £63,000 per year per unit (employee) resulting in a maximum additional GVA contribution of £252,000. Aquaculture also experiences a high GVA multiplier effect. The GVA multiplier metric combines the direct and indirect (i.e. supply chain) effects of increasing demand of a product. The regional GVA (Lochaber, Skye, Lochalsh, Arran & Cumbrae and Argyll and Bute) in 2015 was approximately £21,718 billion⁵⁴. The magnitude of the impact will represent 0.001 of regional GVA. Impacts will be local in nature and confined to a small number of people, subsequently the overall impact is assessed as minor (positive).

20.4.2 Recreation and Tourism

The proposed modifications will result in an additional visual element to the existing development at Maclean's Nose. Section 16: Landscape and Visual Impact assessment outlines the potential impacts on the surrounding landscape character.

Recreational Users

Impacts arising from terrestrial users are considered in Section 16 (Landscape and Visual Assessment). The site is approximately 1.8km from the Mingary Castle Wreck Historic Marine Protected Area, which in addition to an important cultural designation, is also a dive site. Historic Environment Scotland recommended an impact assessment on this feature which is considered in Section 18: Cultural Heritage. The Highland Council requested that the impact on divers was assessed. Overall the distance from the site (approximately 1.8km).

Recreational sailing: the area experiences high intensity of recreational sailing associated mainly with the transit passage around the north of the sound of Mull. Similarly, power boating and motor cruising have a relatively high intensity of use associated with the area. The sea space adjacent to Maclean's Nose is approximately 3km from this route. Data indicates that it is significantly less intensive than the surrounding area. The RYA did not have any comments

⁵³ GVA is measure of the value of goods and services produced in an area, industry or sector of an economy.

⁵⁴ Office for National Statistics:

<https://www.ons.gov.uk/economy/grossvalueaddedgva/bulletins/regionalgrossvalueaddedincomeapproach/december2016>

to contribute to the Scoping process. The yachting community is considered a moderately sensitivity receptor; based on the number of users, and regional importance. The magnitude of the impact is predicted to be minor given the distance from the most frequency used routes and likelihood of interactions. Overall significance on the recreational yachting community is assessed as minor.

Coastal walking: the proposed extension to the site will extend in a south easterly orientation away from the concentrations of terrestrial receptors at Kilchoan and Mingarry. No core paths or designated walks are associated with the area, although the area is valued for scenery. Coastal walkers are classified as a minor to moderate value receptor based on the local importance of the scenery and coastal resource.

Kayaking and canoeing: there is a high intensity of kayaking and canoeing within Loch Sunart, although the intensity of this decreases within increasing distance from the loch inlet, with Maclean's Nose experiencing a low to medium level of intensity of use. The presence of a farm would not prevent access around the coastline. The proposal would extend an existing feature along the coast; however, this area is outside of the more intensively used zone within Loch Sunart. The value of kayakers and canoeists as a receptor is moderate, based on frequency of use and potential regional importance to tourism, however the magnitude of the impact given the reduced intensity of use in the area and continued access is assessed as minor.

Divers: there are several scuba diving locations in the vicinity of the site. Potential impacts can arise from smothering subsea features, access restrictions and impacts from ADDs on divers. The latter impacts are addressed in Section 18. The existing site has not generated any impacts and hydrodynamic modelling indicated that diving locations will not be impacted by the proposals. The site will not impede any access to the diving areas. The use of ADDs is discussed in Section 12. ADDs although available for use at Maclean's Nose, however to date standard mitigation has been effective in deterring predators and ADDs have not yet been utilised on site. Feedback from commercial divers operating in the Hebrides⁵⁵ suggests that ADDs are audible around 500m from source, sufficient distance not to impact the recreational site. The diving sites are considered low to moderate in value, the corresponding magnitude of the impact is classified as negligible, with no pathway for an impact determined. Overall impact minor.

20.4.3 Other Users

Maclean's Nose is currently being used as a demonstration project to trial a novel application of wave energy technology in providing clean, renewable energy to aquaculture sites. The project represents an innovative concept, which aims to support the emerging wave energy sector develop from a research and development towards a commercial product. Whilst a defined socio-economic value is not possible to attribute to the role of the project in supporting the wave energy sector, the positive economic impact and contribution to the sector is demonstrable.

20.5 Summary

The proposed modifications at Maclean's Nose will result in up to four additional permanent jobs, an important contribution to remote peripheral economy. The existing supply chain, which already serves the operational site is likely to benefit from a minor impact arising from the higher site capacity. The socioeconomic impacts are predicted to be minor (beneficial) in significance. The physical extension of the site was assessed against in terms of a range of

⁵⁵ Ollie Alston, Lochs Diving Services and Commercial Diver (anonymous) *Pers Comm* 16/3/18)

recreational receptors including scuba diving, recreational yachting / boating, coastal walking and kayaking. There were no nationally or internationally important historic sites or recreational sites. All activities demonstrated a reasonably high frequency of use, of resources that can be considered of local to regional importance, subsequently all recreational receptors were assessed as moderate value. Impacts on sailing were assessed as moderate due to distance from the main transit route around the northern Sound of Mull. Impacts on access to scuba diving sites were assessed as negligible, minor impacts were predicted on coastal walkers in terms of landscape amenity, finally minor impacts were predicted on kayakers / canoeists.

21 Traffic and Transport

21.1 Introduction

Traffic generated by the existence of a marine fish farm can comprise of both marine and terrestrial transport. This assessment considers the likely changes to volume and nature of traffic arising from the proposed modifications and evaluated these impacts against existing marine traffic. No additional terrestrial transport is anticipated from the development, the assessment focuses on marine transport.

21.2 Consultation

Traffic and transport has not been identified as a potentially significant issue during the scoping process. The Highland Council requested information on the degree of change anticipated with the proposed modifications. The RYA responded with no comments regarding impacts on recreational users.

21.3 Methodology and Information Sources

Information has been gathered regarding existing boat movements, transit routes and vessels specifications from the current site manager. An estimation of the additional requirements has been undertaken based on calculations on feed requirements for the new barge specification. 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 Maclean's Nose was extracted from National Marine Plan Interactive. A number of commercial and fishing vessels transit through the Sound of Mull, and represent a reasonably active area of shipping, similarly a passenger ferry service runs from Kilchoan to Tobermory and a further two services run through the Sound of Mull (Oban to Lochboisdale, Castlebay, Coll and Tiree). Passenger routes represent the most significant traffic movement in the area. Data extracted from NMPi for aggregated shipping transit data between 2012-2015 is summarised in Table 24, vessel types with less than 2 transits a week are not included.

Table 24 Summary of existing traffic transit density in the vicinity of Maclean's Nose.

Vessel	Average weekly density (2012-2015)
Recreational Vessels	2 -10 transits
Port Service Craft	2 – 10 transits
Passenger Vessels	50 or greater
Non Port Service Craft	2 – 10 transits

Fishing Vessels	2 – 10 transits
Cargo Vessels	20 -50 transits

Maclean's Nose is an operational site, consented at 2,500 tonnes maximum biomass. The site is not currently operating at full biomass capacity and existing site traffic movements are not fully representative of the site at full operational capacity. There are no plans for ancillary onshore infrastructure. The site is currently serviced from the existing shore base at Kilchoan. Marine activities associated with the existing development currently comprise of the following activities:

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

Two examples of typical vessels commonly accessing the site at present are illustrated on Figure 36.



Figure 36 Examples of typical vessels commonly accessing site, a well boat used for freshwater treatments, grading, stocking etc and site-specific workboat.

Current daily traffic movements from the shorebase at Kilchoan are serviced by a dedicated site workboat, as illustrated in Figure 36. Current traffic is mainly confined to daily workboat movements, feed deliveries and treatments/ harvesting via wellboats.

21.5 Impact Assessment

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

The construction of the additional infrastructure is anticipated to require no more than 30 days. The proposed pens and moorings will be delivered by work boat directly to the site for installation and installed during the summer period. Given the existing level of activity on site and relatively standard character of the vessels the magnitude of the impact is predicted to be low. The area is commonly used by passenger vessel and a relatively high density of cargo vessels who are predicted to be high sensitivity receptors.

During operation, workboats will transit between the shorebase between the start and end of the working day. The boat will remain the same or similar specification to the existing workboat. Trips may increase on a daily basis 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 in quantities of approximately 275,000. The proposal to operate at a maximum biomass of 3,500t is predicted to require approximately 4 deliveries.

21.5.2 Feed deliveries

The proposed feed barge has the capacity to store up to 400-450t of feed. 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.

A harvest multiplier and economic Feed Conversion Ratio (e.FCR) has been applied to the maximum biomass to predict the amount of feed likely to be used. A farm will use a maximum of 5,630 tonnes of feed a year. Single deliveries are expected to be sent in quantities of 150 to 200 tonnes. This equates to a maximum of 38 deliveries over the year, approximately 3 per month. This figure represents the maximum modelled figure based on 150 tonne deliveries and maximum biomass maintained at all times. Currently the site is not operating at maximum biomass and receives one feed delivery approximately every 3 weeks.

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 site is fallowed.

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 currently available within the company.

21.6 Summary

The proposed modifications at Maclean's Nose represent a small, incremental increase to existing traffic at the site from increased feed deliveries of up to 3 per month and additional treatments, harvesting and stocking requirements. The shore base at Kilchoan and standard transit routes will continue to be used for movement. The increased capacity of the feed barge is likely to reduce the frequency of feed deliveries. Similarly, the area is relatively active in terms of existing boat traffic particularly from passenger ferry routes and cargo vessels. No significant issues were highlighted by the Highland 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 duration construction period. During operations, activities will largely remain the same, with a small increase in the overall amount of site boat traffic predicted to be minor.

22 Gaps and Uncertainties

The Environmental Report has drawn on field survey work, compliance reports and modelling. Desk based assessments have drawn on significant desk-based material which may be out of date. The key mitigation against the inherent limitations associated with desk based derived data is consultation to ensure desk based information is appropriate and fit for purpose for EIA. Limitations associated with modelling are summarised in detail in the Hydrographic Report Appendix 2 and discussed within the Section 11: Water Column with reference

specifically to the open water (i.e. outwith the Locational Guidelines) nature of the site and cumulative assessments.

Abbreviation	Definition
ADCP	Acoustic Doppler Current Profiler
ADD	Acoustic Deterrent Device
AZE	Allowable Zone of Effect
BAP	Biodiversity Action Plan
CAR	The Water Environment (Controlled Activities Regulations) (Scotland) 2013
CoGP	Code of Good Practice
cSAC	Candidate Special Area of Conservation
ECE	Equilibrium Enhancement Concentration
ELC	Environmental Limit Condition
EQS	Environmental Quality Standard
FCR	Feed Conversion Ratio
GVA	Gross Value Added
HMPA	Historic Marine Protected Area
HwLDP	Highland Wide Local Development Plan
LCCT	Local Coastal Character Types
MHS	Marine Harvest (Scotland) Ltd.
MoD	Ministry of Defence
MPA	Marine Protected Area
MSS	Marine Scotland Science
NLB	Northern Lighthouse Board
NMP	National Marine Plan
RSPCA	Royal Society for the Prevention of Cruelty to Animals
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SAMS	Scottish Association for Marine Science
SEPA	Scottish Environment Protection Agency
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SSPO	Scottish Salmon Producers Organisation
SSSI	Special Site of Scientific Interest
ZTV	Zone of Theoretical Visibility

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