Mowi's response to questions provided by the Loch Hourn community via the Glenelg and Arnisdale Community Council

Introduction

Mowi appreciates the delivery of the list of questions and observations from the local community by the Glenelg and Arnisdale Community Council. The Loch Hourn fish farm has been contributing to the Glenelg and Arnisdale community for 30 years currently employing 11 members of staff.

Engagement at this early stage is important and the issues that have been raised will help guide the development and focus of the Environmental Impact Assessment that will accompany a future planning application. We would also welcome the opportunity to review the letters referred to as being publicly available. In this response we have taken the time to consider and answer all questions that were submitted, and we hope this provides clarity over our current and future fish farming operations in Loch Hourn. We have numbered the list of questions that were submitted for ease of cross referencing as there are a number of common themes.

When we are considering changes to the operation of a fish farm that can and does involve a substantial amount of work that is carried out over the span of a couple of years. As you can appreciate during these long timeframes, proposals can change over the course of the project, as they have with the proposed modifications to the Loch Hourn fish farm. Business planning and operational requirements can influence change but importantly we are also seek to take account of the views of stakeholders and regulators. Specifically, for Loch Hourn, initial plans for the proposed site modifications were first presented in 2018. Since then our proposals have evolved with an increased recognition of the operational and environmental benefits that a move to fewer, larger pens could bring. Progress with environmental modelling and an operational strategy focussed on fish health and welfare have led to the current design proposal of 8 x 160m circumference pens. We have just submitted a revised pre application enquiry to SEPA, and we will share the response when available. An updated plan showing current proposal is attached to this response (Annex 1; Figure 4).

With regards to communicating the proposed modifications with the public, stakeholders, and regulators, Mowi welcomes open communication at all stages of the application process. Given the current situation of the global pandemic, online discussion forums are being recognised by The Highland Council as a suitable alternative to physical consultation meetings, and as indicated we are successfully progressing meetings with other communities and stakeholders using this approach. Our operations and business planning decisions continue despite Covid-19 and I hope we can have further discussions in due course on progressing a meeting with the Community Council or a wider online community event.

1. What research has been carried out to determine the carrying capacity for open net salmon farming in Loch Hourn?

   There has been a long history of fish farming in Loch Hourn with the first farm installed in 1990. Since then there has been a number of changes to the configuration, location, biomass, and equipment used at the fish farm.

   The current configuration of equipment and biomass at Loch Hourn has been in place since 2016. Mowi uses a range of tools and investigative measures to assess the suitability of sites for fish farming, the carrying capacity of the environment, and the potential for increasing the biomass of existing sites. As we will explain later in

this document, we have collected significant and long data sets of tidal information and created a detailed hydrodynamic model of Loch Hourn. The location of the site is near the mouth of Loch Hourn, and experiences good water exchange with the Sound of Sleat. Video surveys, seabed biology and seabed chemistry analysis are used to assess benthic communities and identify any temporal changes in seabed life. Video surveys have been undertaken at Loch Hourn in 2005, 2016, and a new survey is proposed to take place in Spring 2021. Comparing these surveys will inform Mowi of any changes to the benthic communities. Additionally, nutrient modelling is carried out to determine the addition of nutrients above background levels derived from the fish farm, and in this case an increase in biomass at Loch Hourn (further details in the answer question 15). Furthermore, Mowi undertakes compliance monitoring during each production cycle to assess the health of the seabed environment against SEPA's Environmental Quality Standards. The current set up in Loch Hourn has achieved two consecutive "satisfactory" classifications for meeting these Environmental Quality Standards. Results from these compliance surveys are used to validate environmental modelling which demonstrate that the proposed development is sustainable and will not breach Environmental Quality Standards. We will explain in detail further on the environmental modelling that Mowi is undertaking.

Results from these tools and investigative measures allows Mowi to conclude that an increase in biomass at our Loch Hourn site would be within the carrying capacity of the environment.

2. <u>A properly commissioned independent impact study is essential to determine the ecological effects of Mowi's proposal. Will Mowi (or SEPA) undertake an EIA in relation to its plans to expand?</u>
"The main aim of the Environmental Impact Assessment (EIA) Directive is to ensure the authority granting consent for a particular project makes its decision in full knowledge of any likely significant effects on the environment"[1]. The outcome of the screening and scoping process carried out in November 2018 concluded that an EIA was required for the Loch Hourn project. It is the developer's responsibility to compile detailed information for an EIA Report which investigates the likely significant environmental effects of the development [1,2]. Mowi uses both internal and external competent experts to assess the likely significant effects on different factors relevant to fish farming. Once submitted with the planning application, the EIA is publicised, and at that stage consultation bodies and members of the public have the opportunity to comment on the EIA report.

3. <u>What evidence is there for tidal dispersion of nutrients, chemicals and antibiotics used by Mowi and how these interact with farms to the north and south of Loch Hourn? What are the interactions between these separate farms?</u>
Mowi has collected multiple sets of current meter data in the vicinity of the site over the past 10 years. In particular, we have collected over 200 days of current data at the site over the past 3 years. These data are being used to calibrate and validate a hydrodynamic model of Loch Hourn and surrounding waters. The Loch Hourn

[1] https://www.nature.scot/handbook-environmental-impact-assessment-guidance-competent-authorities-consultees-and-others
[2] https://www.gov.scot/publications/planning-circular-1-2017-environmental-impact-assessment-regulations-2017/

model is based on a model developed by Marine Scotland Science, the East Coast of Lewis and Harris (ECLH) sub-model of the Scottish Shelf Model[3]. The basic ECLH model has been refined to provide higher spatial resolution around the Loch Hourn site and has been calibrated against the current data.

The model will be used to assess the potential for the dispersion of medicines used at the site and will also be used to model the dispersion of particulate wastes, both intensity and spatial extent. As part of the process, interactions with sites to the north (Loch Alsh) and south (Loch Nevis) will be assessed. The preliminary screening modelling conducted by SEPA[4] did not identify any interactions between the sites. As part of the SEPA (CAR) environmental permit application, Mowi is required to provide a detailed report of the hydrodynamic and dispersion modelling which will be publicly available. The dispersion of nutrients is assessed by nutrient enhancement modelling using the Equilibrium Concentration Enhancement (ECE) calculation developed by Marine Science Scotland.

4. <u>The regularity of tidal flow will lead to an indefinite build up of pollutants within the loch, which will only be flushed out by the relatively small effect of rainfall in the loch's catchment area. How does NewDepomod account for the dispersal of nutrients so as to comply with SEPA's new regulatory framework?</u>
Water circulation in sea lochs is driven by a combination of tides, river discharges and wind forcing. The interaction between these components of flow, together with the influence of the sea loch topography, can lead to complex patterns of residual (i.e. non-tidal) circulation, which assists in the dispersion and assimilation of wastes. Even though tides are regular, wind forcing often plays a dominant role in driving the water movement in sea lochs. After analysing current meter data from 111 fish farm sites in Scotland, Edwards (2015)[5] concluded that "tidal movements are generally less important than random movements". By "random", Edwards was referring to any non-tidal forcing, which in Scotland's sea lochs is usually wind-driven. Thus, dispersion and assimilation of wastes is generally driven not by tidal currents but wind-driven currents.

As part of the application to SEPA for the Loch Hourn site, Mowi is developing a detailed hydrodynamic model of the water circulation in the loch and adjacent coastal waters. The model will be calibrated against our archive of current meter data from the site (more than 200 days of data). This calibrated model will be used with NewDepomod to simulate the dispersion of particulate wastes. Full details of the waste dispersion modelling will be provided in reports to SEPA which are publicly available.

[3] Marine Scotland, 2018. The East Coast of Lewis and Harris Model. Available at http://marine.gov.scot/information/east-coast-lewis-and-harris-model
[4] SEPA, 2020. Aquaculture Modelling Screening & Risk Identification Report: Loch Hourn (HNW1). Scottish Environment Protection Agency, February 2020, 28pp.
[5] Edwards, A. 2015. A note on dispersion in west Scottish coastal waters. Report for Benchmark Animal Health, 13th September 2015, 55pp.

5. SEPA's Risk Identification Report (Feb 2020) states: "Current meter data [for tidal flow] however suggests these are both over-predicted and thus screening modeling output should be treated with caution." Has Mowi adjusted NewDepomod to reflect this over-prediction of the ability of tides to disperse waste in the benthic sediments below and adjacent to the fish pens? If so, how?

   Yes, Mowi has adjusted NewDepomod to improve the quality of the predictions of seabed impact. SEPA uses an uncalibrated hydrodynamic model for their screening model, combined with uncalibrated predictions of waste dispersion. Mowi has spent many months developing a detailed hydrodynamic model of the water circulation in the loch and adjacent coastal waters. The Mowi Loch Hourn model is based on a model developed by Marine Scotland Science, the East Coast of Lewis and Harris (ECLH) sub-model of the Scottish Shelf Model[6], but the basic ECLH model has been refined to provide higher spatial resolution around the Loch Hourn site, The hydrodynamic model will be calibrated against our archive of current meter data from the site (more than 200 days of data).

   Flow fields from the calibrated hydrodynamic model are then used to simulate dispersion of particulate wastes using NewDepomod. The parameter settings in NewDepomod are adjusted to produce the best comparison between the model predictions and 'real life' benthic data around the site collected by Mowi. The selected parameter settings are tested against benthic data collected over multiple production cycles (back to 2012 – 13) to demonstrate that the parameter set is robust and accurate. Full details of the modelling undertaken using NewDepomod will be provided in a publicly available report to SEPA as part of the CAR application.

6. Will Mowi provide benthic survey data and videos to the community as well as the inputs, assumptions, tuning and outputs from the latest NewDepomod exercise?

   Mowi can make this information available to the community. The majority of this information will be publicly available on The Highland Councils website after the submission of the planning application[7]. Additionally, information relating to the discharges from fish farms into the environment, in which modelling with NewDepomod is involved, will be available on the SEPA website[8].

7. What experimental and sampling evidence is employed to support the predictions of New Depomod?

   Mowi undertakes compliance monitoring during each production cycle. This consists of sediment 'grab' samples taken at multiple locations to assess benthic health in the vicinity of the cages. In recent years, the number of samples taken during each survey has increased significantly. For example, in December 2019, Mowi took sediment samples at 35 locations around the cage groups mirroring the requirements of the new regulatory framework recently introduced by SEPA. This data is then used to calibrate and then validate the performance of NewDepomod.

   For Loch Hourn, NewDepomod has been calibrated using the 35 samples collected during December 2019 towards the end of the 2018 – 2020 fish growth cycle.

[6] Marine Scotland, 2018. The East Coast of Lewis and Harris Model. Available at http://marine.gov.scot/information/east-coast-lewis-and-harris-model
[7] https://wam.highland.gov.uk/wam/
[8] https://www.sepa.org.uk/regulations/water/aquaculture/

Calibration of NewDepomod involves adjusting some of the parameters in the model in order to produce the best agreement between the model predictions of waste deposition and the measured benthic metric, in this case Infaunal Quality Index (IQI).

The parameters obtained during the calibration process are then tested against IQI data obtained during other production cycles. This process ("validation") tests the robustness of the parameter set to be able to repeatedly predict benthic impacts over different production cycles. For Loch Hourn, we have validated the model against data collected in 2013, 2015 and 2017, towards the end of each two-year production cycle.

Full details of the modelling undertaken using NewDepomod is provided in a publicly available report to SEPA as part of the CAR application. The modelling must be accurate and robust enough to demonstrate that proposed developments are sustainable and will not breach Environmental Quality Standards.

8. Fish food amounting to 3,758 tonnes were dispensed during 2019. According to the 2019 emissions report, 190 tonnes of nitrogen (equivalent to 9,500 tonnes of sewage sludge) and 26 tonnes of phosphorus were released into the sea. How were these amounts calculated and how were these nutrients dispersed?

This data is publicly available via The Scottish Pollutant Release Inventory (SPRI) which details officially reported annual releases of specified pollutants to air and water from a wide range of SEPA-regulated sectors. Operators of sites carrying out specific activities above defined capacity thresholds are obliged to report under SPRI on an annual basis. The activities and thresholds are largely determined by national and European emission reporting requirements.

For marine pen fish farms the emissions of Nitrogen and Phosphorus from a fish farm are theoretical and derived from assumptions that are based on feed and its conversion into a pollutant load. The detailed calculations and formulae are available from SEPA but are based upon the Nitrogen (N) and Phosphorus (P) content of feed, % of uneaten feed (assumed as 3%), the conversion of feed by fish and amount of N / P entrained in fish and the % N / P loss via fish excreta.

A recent change in operation has been the introduction of Mowi feed to the fish held at Loch Hourn. By producing feed, ourselves we can determine the raw materials, nutritional requirements and recipes required to produce the healthiest salmon possible and at the same time ensure we minimise the potential release of substances such as N and P.

The dispersion of nutrients for the Loch Hourn fish farm is discussed elsewhere in the is document (questions 3 and 12). We have also addressed how the scale and location of a fish farm is assessed using detailed modelling to ensure that any emissions from a site can be safely assimilated by the environment without compromising environmental standards (questions 1, 3 and 5).

The assumptions used by SEPA for SPRI marine pen fish farm reporting purposes date from 2004. Mowi is presently assessing whether they are still relevant given the advance and evolution for feed diets since 2004.

Fish farms do release nutrients, the majority as dissolved inorganic nutrients through gill excretion by fish, but also particulate organic nutrients through waste excreta and dissolved organic nutrients arising from seabed resuspension of particulates. However, most nutrients in the sea come from the sea, nutrients from fish farming only contribute a relatively small additional loading to the marine environment [9] . Initial modelling by Mowi looking at the proposed nutrient contribution from the Loch Hourn farm supports this. The inputs from aquaculture are assessed against current background levels as established by OSPAR[10]. Initial modelling confirms that the proposed fish farm development would contribute a minimal additional loading, representing less than 1.1% of the Loch Hourn background level. Further information on this will be presented in due course within the EIA.

The question makes an inference between the reported SPRI data for N and P to an equivalent figure for 'sewage sludge'. We don't offer any comment on how this calculation was derived but would simply state that this is a false and misleading comparison. Due to the constituents of human waste it requires significant levels of treatment to make if safe to discharge to marine waters. As highlighted waste from fish farming is very different in nature and content with dissolved nutrients and particulate waste being inherently harmless by-products of fish farming.

9. <u>During this period what was the total biomass harvested from this site. What was the food conversion rate and how was it calculated?</u>
   The harvested biomass from the 2018 input, which was harvested between April 2019 and January 2020, was 4850T live weight. The biological food conversion rate (FCR) for this input was 1.117. The FCR is calculated by dividing the feed fed by the biomass gained. The biomass gained is the sum of the harvested weight plus mortality weight, minus the weight of initial stocking to the site.

10. <u>What proportion of wild fish are used to provide protein in farmed salmon feed? Does this count as a 'sustainable' use of wild resources?</u>
    Over the past few decades, the aquaculture industry has worked to reduce the proportion of raw marine ingredients used in salmon feed. Traditionally, diets included about 50% fish meal and oil, whereas today this has been reduced to 20% - with much fish meal sourced from the trimmings of wild capture fisheries (these trimmings are now diverted back into the food change). In 2019, Mowi used 0.66kg of wild caught fish to produce 1kg of farm-raised-salmon. Comparatively in 2018 we used 0.75kg. We support and are actively involved in the ongoing development and testing of novel raw materials, such as marine oils derived from algae and insect proteins. When comparing the use of raw materials to produce animal proteins, it is accepted that fish/salmon remain one of the most efficient converters

[9] http://www.parliament.scot/S5_Environment/General%20Documents/20180125_SAMS_Review_of_Environmental_Impact_of_Salmon_Farming_-_Report.pdf
[10] https://www.ospar.org/

of feed to meat. More information can be read at https://www.scottishsalmon.co.uk/resource-centre/infographics/salmon-a-healthy-responsible-protein-source.

Mowi feeds only source their fishmeal and fish oils form suppliers compliant with the Marin Trust sourcing standard (originally IFFO RS) or sourced from trimmings meals or oils.

11. What sampling and modelling procedures were employed to determine the time period for dispersal of faecal and waste food contaminants (including N,P and C), and the distances from the cages where this occurs?
The modelling procedures employed by Mowi are explained elsewhere in this response and will be described in full detail in reports submitted to SEPA. The area of impact of particulate wastes is determined using the sampling strategy required by SEPA as part of the new regulatory framework. The most recent survey, in December 2019, consisted of 28 sample stations radiating in all four directions from the cage groups, plus an additional 7 reference and random stations. The survey demonstrated that the benthos exhibited "Good" health status within 75m of the pens in all directions (in the lateral directions, the distance to "Good" status was less). Modelling and continued monitoring is required by SEPA to ensure that waste feed and faeces is adequately dispersed and assimilated by the environment such that sediment health outside an allowable mixing zone remains "Good", and that sediment health within the mixing zone is not harmed to an extent that it cannot recover. The allowable mixing zone is defined as a circle of radius 100m around each cage. Monitoring is carried out every production cycle (roughly every two years) to ensure continued sediment health below and around the cages.

12. There are backwaters and eddies in Loch Hourn where tidal circulation might be insufficient to disperse the large quantities of nutrients, chemicals and antibiotics released from the farm. Has this been taken into account when sampling seawater compositions of N and P? Can Mowi provide a map of the water sampling points?
As answered earlier in this response document Mowi employ advanced hydrodynamic modelling using spatially varying currents from across the Loch Hourn waterbody to assess the intensity and spatial extent of particulate waste deposition on the seabed and to assess the fate and behaviour of medicines that are used on the site. In the last few years there has been significant advances in modelling tools and approaches in Scotland that have been led by Mowi. All modelling methods have to be approved by the Scottish Environment Protection Agency and the outputs are scientifically robust and defendable.

In terms of nutrient modelling as answered previously Mowi undertake modelling studies in relation to the input of nutrients from fish farm developments. The approach taken to the modelling involves a combination of advection, dispersion and settlement which consider tidal currents and dispersion. Importantly the process is also carried out independently by Marine Scotland during consultation on development proposals. The modelling carried out by Mowi demonstrates that the degree of enhancement of nutrient concentrations in the water column above existing background is predicted to be low and not any cause for concern. Full and

transparent details of all environmental modelling carried out by Mowi would be presented in the EIA and applications to SEPA

In relation to antibiotics, Mowi Scotland across all farms used 23 grams of antibiotics per tonne of salmon in 2019 (pg 67 of Mowi's 2019 Annual Report), and the UK government's Veterinary Medicines Directorate (VMD) continues to show salmon farmers are the lowest users of antibiotics in the UK animal protein industry. Medicines are never used prophylactically – only to treat an illness under the prescription and direction of a licensed veterinarian. Our Loch Hourn did not use any antibiotics last cycle.

Mowi is not obliged to undertake water quality monitoring under the SEPA licensing framework, however SEPA undertakes ecological waterbody (including water quality) assessment as part of their River Basin Management Plans. The plans are aligned with the requirements of the Water Framework Directive (WFD) and provide an assessment of the condition of Scotland's water environment and identify where efforts for protection and improvement must be targeted.

Each year the Scottish Environment Protection Agency produce an annual WFD ecological classification for all the water bodies in Scotland, including coastal waters. The assessment of ecological status looks at a range of individual elements such as abundance of aquatic flora and fauna, the availability of nutrients, temperature, and pollution by chemical pollutants. Each individual classification element is assigned a classification with an overarching water body assessment. SEPA operate a water quality monitoring network to inform 'status' assessments and results from 2007 to the latest classification year can be found on SEPA's Water Classification Hub[11]. The latest ecological classification confirms the overall Loch Hourn coastal waterbody to be of Good Ecological Status, with notably the individual water quality element, Dissolved Inorganic Nitrogen considered to meet High classification standards. Additionally, the classification data set confirms no deterioration in the Loch Hourn waterbody status since the classification exercise commenced in 2007.

The waterbody classification assessment for Loch Hourn by SEPA provides regulatory validation that releases from operation of the farm to the water environment are being safely assimilated by the carrying capacity of the marine environment without significant adverse impact on the ecological condition of Loch Hourn.

13. <u>Is the loch being monitored for algal blooms? If so what is the frequency and timing of these events? If not, who should be responsible for this?</u>
Marine algae regulate global climate by producing 50-80% of the planet's oxygen[12] and support entire marine ecosystems. Blooms of algae often become productivity hotspots (e.g. oceanographic conditions at fronts favour algal blooms[13]) where animals, such as zooplankton, fish, birds and marine mammals, congregate to feed

[11] https://www.sepa.org.uk/data-visualisation/water-classification-hub/
[12] https://oceanservice.noaa.gov/facts/ocean-oxygen.html
[13] https://www.sciencedaily.com/releases/2015/05/150501182116.htm

or reproduce. For example, the proposed Sea of the Hebrides Marine Protected Area[14] list fronts as one of its designated features due to high biodiversity attracted by the increased productivity there.

A harmful algal bloom (HAB) is when a "regular" algal bloom has detrimental effects to a receptor, either through excess biomass or toxin production. The term "harmful" can be confusing and anthropocentric in that algal blooms are typically classified as harmful if they have negative effects on human society. For example, humans may come into physical contact with a dense HAB and get skin rashes or breathing difficulties. In Scotland, such dense blooms are uncommon, perhaps due to our cold, turbid and well-flushed waters, and so harmful effects from physical contact are rarely recorded in Scottish coastal seas. Occasionally foam from an offshore *Phaeocystis* bloom can be blown onto the coast causing local disruption, as happened in Aberdeen in September 2012[15], but these events are relatively rare.

However, low density HABs are a problem for shellfish aquaculture operations in Scotland. Shellfish filter-feed on micro-algae, so when toxin microalgae are present, even in small densities, biotoxins can accumulate in the flesh of shellfish. Ingestion of contaminated shellfish by humans can cause severe gastrointestinal upset, neurological disorders and even death. These biotoxin producing algae are naturally present in low cell numbers within the general microalgal community; sometimes a single cell per litre of water can be enough to cause illness.

Naturally occurring microalgae can also be harmful to finfish aquaculture operations. If cells reach too high concentrations then they can irritate fish gills causing lesions and inhibit gas exchange, negatively impacting fish health. Microalgae naturally bloom every spring in temperate seas, when there is more light, the water column begins to warm, and nutrients are naturally high from a winter of wind-induced mixing. Phytoplankton have beautiful and complex forms to decrease sinking rates so they can remain closer to the sun for better photosynthesis. These blooms are important for driving food webs during the spring and summer months and drawing down CO_2 from the atmosphere. However, they can irritate fish and damage their gills; damaged gills then make fish more liable to contract secondary diseases.

Both natural and anthropogenic factors are linked to HAB events. HABs are very diverse and therefore it is difficult to generalise about their causes, which will be unique to species and bloom location. Increased nutrient loadings in coastal areas from an expanding human population, farming practices and industry are cited as the driver of increased global HABs by some authors[16], however see the response to Q15 for an explanation on why this is not straightforward, especially in Scotland.

There is still much to learn about HAB events globally, and the more awareness and sampling is carried out, the more HABs are recorded. It is important to note

[14] https://www.nature.scot/sites/default/files/2019-06/Sea%20of%20the%20Hebrides%20possible%20MPA%20-%20Site%20Summary%20Leaflet.pdf
[15] https://www.theguardian.com/uk/2012/sep/25/foam-weather-aberdeen-fishing-village
[16] https://tos.org/oceanography/assets/docs/18-2_glibert3.pdf

that increasing sampling effort could be behind general observations of global HAB increases.

Plankton monitoring is undertaken on a daily based by trained Mowi farm staff. If harmful algae are identified, they are quantified and reported to a central database as well as notified immediately to the relevant Mowi health manager to discuss mitigation measures. Depending on species identified and abundances, action is taken. During a plankton bloom, depending on the particular species identified, density and water depth of the bloom different actions are taken. Our options are to stop feeding the fish, stop fish handling activity, stop net washing and aeration within the pens – it can be a combination of these measures or all measures depending on the circumstance.

There have been no significant algal blooms recorded in the last couple of growth cycles at our Loch Hourn fish farm.

14. Has Mowi (or SEPA or Marine Scotland) made any efforts to monitor the decimation of mussel and cockle beds and other marine life throughout Loch Hourn and to investigate the cause of the sharp decline in crustaceans and molluscs?
Mowi is not aware of any such reported decline in sea life however the relevant authorities to report such concerns would be Marine Scotland and/or NatureScot. Mowi would be interested to see the evidence which supports these concerns.

In terms of understanding how our site interacts with the marine environment we can state with confidence impacts from fish farming are limited, localised to the site (as demonstrated by monitoring) and are in accordance with the environmental standards set by SEPA.

The sea lice medicines licensed for use at Mowi's Loch Hourn site are all authorised fish medicines having been through a rigorous assessment by the Veterinary Medicine Directorate (VMD) of their general safety (including consumer, environment, and operator safety). SEPA's approach to assessing applications for authorisations is based on eco-toxicological risk assessment using data from laboratory and field studies on sensitive and relevant marine test species in order to derive safe no environmental effect concentrations. Conditions in authorisations are then set using predictive modelling studies to place limits on the quantity of medicine treatment or the rate of release in order to ensure the safe no effect concentrations (Environmental Quality Standards) are met. This detailed and comprehensive process protects the marine environment from harm and in doing so protects species such as crustaceans and shellfish.

15. Can Mowi confidently rule out any adverse effects on marine life resulting from sea lice treatments or algal blooms caused by feed and fish excrement eutrophication and if so, on what evidence? Will they employ the precautionary principle when the science is incomplete?
Yes, we can confidently rule out adverse effects on marine life and this is supported by robust science.

Uneaten food and faeces from salmon farms will sink to the seabed. However, a small component is suspended or dissolved in the water column. Our regulators

require us to model potential nutrient enhancement in the water column and will not grant us permission to operate a farm if modelled values exceed regulation levels. This assessment is frequently cumulative, meaning that it considers nutrient inputs from a group of neighbouring farms in a water body.

Our farms add only a small amount of nutrients to baseline nutrient concentrations in the water bodies where they operate. We model nutrient inputs before we apply for new farms or apply to increase the biomass of existing farms. We first approximate the quantity of nutrients released from the farm based on the consented or applied maximum biomass and then use a box model to derive an indicative level of nutrient enrichment. For example, initial modelling results suggest that nutrient inputs from our farm at Loch Hourn will be less than 1.1% of background concentrations, well below regulation thresholds.

Eutrophication is characterised by an overabundance of plants or algae and can have visible consequences like low oxygen concentrations, foul odours and harm to marine life [17]. While nutrient enrichment of a water body can lead to eutrophication, nutrient enrichment on its own is not eutrophication. Eutrophication conditions are rare in the well-flushed, near-pristine marine waters where fish farming takes place in Scotland; regulation of nutrient inputs from fish farms ensures that the risk of eutrophication is very low.

Harmful algae are algae that can harm aquatic life, land animals or humans that come in contact with them or ingest them. Harmful Algal Blooms (HABs) are events associated with harmful algae. However, despite the word “bloom” in the name, HABs are not always visible or obvious. Moderate concentrations of some algae can irritate or kill fish, low concentrations of others can produce potent biotoxins that temporarily accumulate in shellfish; while an observer on a boat or farm never sees them unless a water sample is observed under a microscope. Also, harmful algae are not a homogenous group of organisms, meaning that their ecophysiology can be very different from one organism to the next. For example, a nutrient that is favoured by one species may be toxic to another and while many photosynthesize, some prefer to eat other organisms.

Perhaps unsurprisingly then, the relationship between anthropogenic drivers and pressures and HABs is complex[18] (

Figure *1*) and it is clear that nutrient enrichment is not the only, or even the main, driver of HABs. Some HABs have been linked to increased nutrient concentrations in regions like Chesapeake Bay (USA) that suffer from regular eutrophication. However, on the west coast of Scotland waters are near-pristine, otherwise we would not choose to farm here.

[17] Chislock, M. F., Doster, E., Zitomer, R. A. & Wilson, A. E. (2013) Eutrophication: Causes, Consequences, and Controls in Aquatic Ecosystems. Nature Education Knowledge

[18] Gowen, R., Tett, P., Bresnan, E., Davidson, K., McKinney, A., Harrison, P., Milligan, S. P., Mills, D. K., Silke, J., & Crooks, A. M. (2012). Anthropogenic nutrient enrichment and blooms of harmful phytoplankton.Oceanography and marine biology

A group of researchers from SAMS, Oban[19] concluded that "an anthropogenic nutrient-HAB link is far from universal, and where it has been demonstrated, it is most frequently associated with high biomass rather than low biomass (biotoxin producing) HABs". On the west coast of Scotland, HABs are mainly low biomass. A report commissioned by the Scottish Government and written by a prominent HAB scientist[20] concludes that a link between these HABs and marine fish farming operations on the west coast of Scotland is unlikely.

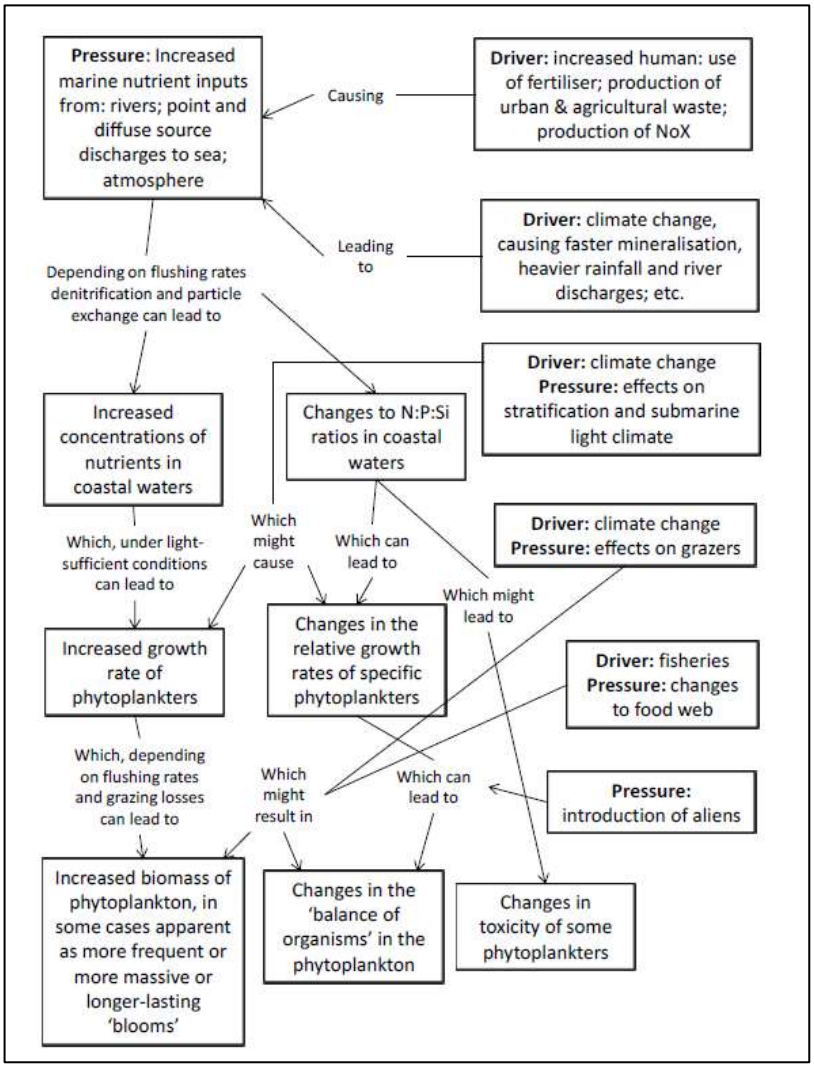

Figure 1. The interaction between drivers, pressures, changes in nutrient concentrations, ratios, forms and occurrence of HABs. NoX is oxidisable N. Redrawn from[18]

Mowi Scotland uses licensed medicines in bath treatments to reduce sea lice pressure on its salmon farms. Bath treatments can take place in tarpaulins within pens, or in wellboats. Mowi now favours the use of non-medicinal treatments where

[19] Davidson, K., Gowen, R., Harrison, P., Fleming, L., Hoagland, P., & Moschonas, G. (2014). Anthropogenic nutrients and harmful algae in coastal waters. Journal of Environmental Management

[20] Smayda, T.J. (2006) Harmful algal bloom communities in Scottish coastal waters: relationship to fish farming and regional comparisons - a review. Report for the Scottish Executive Environment Group

practical, and the company has been particularly successful in utilising cleanerfish as a means of biological control. Bath treatments are considered as a backup solution to cleanerfish and other non-medicinal measures.

The effect of the discharge of medicine residues from salmon farming was scientifically reviewed in 2018, as part of a wider review of the environmental impacts of salmon farming in Scotland, for the Scottish Parliament[21]. The active ingredients within medicines commonly used in baths to treat sea lice are hydrogen peroxide, cypermethrin, deltamethrin and azamethiphos. All four degrade rapidly or are adsorbed onto particles in the water, making them unavailable to marine organisms[22], therefore, they are considered low risk.

The use of these medicines follows veterinary prescription, and their discharge is regulated by SEPA through CAR licencing. Regulation is based on Environmental Quality Standards (EQS). EQS is the residual concentration in the environment of a discharged medicine on an appropriate spatial scale, above which its pressure on the environment is deemed significant. EQS values are typically based on laboratory assays on representative organisms and they are precautionary in nature: a factor of 10, 100 or 1000 is applied to the laboratory values. SEPA regulates rates of use and resulting discharge of chemotherapeutants from bath treatments based on EQS and dispersion modelling: "The model predicts environmental concentrations that can be compared with quality standards to determine the quantity of medicine that can be licensed for a particular site."[22]

On the possible effects of medicines on conservation features, the review[1] stated that: "As SEPA's EQS are precautionary in nature, it should be emphasised that the actual threat to these features should be minimal so long as standard procedures and protocols are adhered to, given the limited range of organisms that have been used in testing."

The focus for many protected areas and features is on benthic habitats and communities, such as burrowed mud, maerl beds and native oyster beds. However, since bath treatment medicines tend to disperse more quickly and are located within the water column, the review concluded that the more likely cause of concern in conservation areas is from organic deposition/enrichment than from medicine use.

As final remarks on this question we rely on farming our fish in locations of high-water quality to ensure we harvest fish of the highest standard. It is in our own interest to ensure there is no deterioration in the condition of the local environment and water bodies where our farms are located and we can confidently say that we have been farming considerately and responsibly in Loch Hourn since 1990.

[21] Tett, P, Benjamins, S, Black, K, Coulson, M, Davidson, K, Fernandes, TF, Fox, C, Hart, M, Hicks, N, Hughes, A, Hunter, DC, Nickell, T, Risch, D, Tocher, D, Vare, L, Verspoor, E, Wilding, T, Wilson, B & Wittich, A (2018). Review of the environmental impacts of salmon farming in Scotland

[22] SEPA (2008). Fish Farm Manual, Annex G: Models for Assessing the use of Medicines in Bath Treatments

16. Can Mowi explain the radical increase in macroalgae within the littoral zone across the entirety of Loch Hourn? Is this not a classic sign of increased nutrients in the marine environment and the possibility of increase algal blooms and their deleterious effects on the marine ecology

Mowi would be interested to see the available evidence on this radical increase in macroalgae within the littoral zone across the entirety of Loch Hourn. Nutrients and algal blooms in relation to fish farming operations are addressed in questions 13 and 15; as concluded in these previous answers, a link between algal blooms and marine fish farming operations on the west coast of Scotland is unlikely.

At a global scale, macroalgal habitats (e.g. seaweed beds and kelp forests) are very important, extensive, and productive coastal ecosystems[23]. In general, for any species to thrive, environmental conditions need to be optimal. Temperature, light availability, nutrients, exposure, and water quality are abiotic factors important for the growth and distribution of macroalgae. A balance of optimal values of all these factors would be needed for a substantial increase in macroalgae. Therefore, an increase in nutrients alone would not be the causal factor in explaining an increase in macroalgae. Temperature has been cited as one of the most important factors in determining the geographic distribution of macroalgae[24].

17. Evidence from divers and diving companies shows that many Priority Marine Features have become either damaged or extinct in Loch Hourn over the last 15 years. Has SEPA or Mowi undertaken extensive surveys in Loch Hourn for sites of seagrass, maerl, sea fans, sponge communities, native oysters etc. and other Priority Marine Features (PMFs)?
As with the previous question 14, Mowi would be interested to see the available evidence on which to base such a statement on alleged PMF damage.

Mowi takes its responsibilities for responsible environmental stewardship seriously and regularly undertakes monitoring of the seabed under and in the vicinity of the Loch Hourn harm to assess the general health of the seabed. As will be known, fish farming has existed in Loch Hourn since the early 1990's and Mowi has undertaken regular monitoring of the seabed environment since. Our most recent survey for sediment biology assessment (macrobenthic taxonomy) and sediment chemistry (organic carbon) was carried out at locations approaching a distance of 900m distant from the farm which have confirmed compliance with Environmental Quality Standards and seabed quality that meets the requirements for Good-High Ecological Status.

We take great care in understanding the marine environments where we operate and that includes an understanding of the presence of sensitive species and habitats so that we ourselves can monitor to improve our own knowledge of a sites environmental interactions. We have mapped the presence of all recorded sensitive species and habitats in the vicinity of all our fish farms across the west coast of Scotland. To do this we have used the best available locational information

[23] Duarte C. M., (2017) Reviews and syntheses: hidden forests, the role of vegetated coastal habitats in the ocean carbon budget. *Biogeosciences.* **14**: 301–310
[24] Merzouk A. & Johnson L. E., (2011). Kelp distribution in the northwest Atlantic Ocean under a changing climate. *Journal of Experimental Marine Biology and Ecology*. **400**: 1-2

on seabed features considered to be most sensitive to fish farming as contained within the Marine Scotland MAPS NMPi[25] (National Marine Plan interactive) tool. Many of our fish farms are located within designated areas such as Marine Protected Areas and Special Area of Conservations in close proximity to sensitive features without any significant adverse effects to the designations or features.

In terms of Loch Hourn there are no recorded sensitive features within 4km of the Loch Hourn fish farm. The nearest feature of conservation interest to the site identified by SEPA has been native oysters (PMF Habitat) located in the Sound of Sleat.

To support the future planning application, we are intending to undertake a new seabed video survey in Spring 2021, the output of which will be made available to the community. If there is local knowledge on the presence of sensitive features that are in the vicinity of our Loch Hourn fish farm, we would be happy to extend our planned monitoring to include these areas.

18. <u>How do you explain the fact that there are so few wild salmon left in Loch Hourn and the two largest rivers (Arnisdale and Barisdale)? Does the risk of incremental declines in wild fish correlate with an increase in sealice loading associated with such a large biomass of farmed fish?</u>

Atlantic salmon, sea trout and other native migratory and freshwater fish species face a wide range of pressures in freshwater, coastal areas and in oceanic waters and are in decline across the North Atlantic. In particular significant pressures on salmon stocks are known to take place during their marine phase, with factors such as fishing by-catch, reduced feeding due to climate change and increased predation all increasing and adversely impacting the survival of Atlantic salmon in the marine environment.

Estimates of salmon returning to Scottish coastal water suggest that populations have been in decline since the 1970s[26] before salmon farming started. Salmon populations are presently declining across the North Atlantic whether fish farming is present or not. It is accepted that declines in Atlantic salmon and sea trout have been influenced by a wide range of contributory factors and the Scottish Government has identified 12 groups of high-level pressures which salmon face, including fish farms. It is recognised that salmon farms can increase the number of sea lice in the local environment and that this can have an impact on wild salmon under certain conditions, where sites are located on tidally constrained waterbodies with increased risk of interaction potential. We recognise that given the wider declines in wild salmon population status that we have a role to play in conserving remaining stocks and specifically to how we manage the potential for adverse interactions between farms fish and wild salmonids.

The Scottish Government's response to the Rural Economy and Connectivity Committee's report on Salmon Farming stated that Marine Scotland will expect an

[25] https://www2.gov.scot/Topics/marine/seamanagement/nmpihome
[26] https://digitalpublications.parliament.scot/ResearchBriefings/Report/2019/8/19/Wild-Salmon

Environmental Management Plan (EMP) to be delivered as a condition of any consents for marine aquaculture planning applications where there is potential for interactions between farmed and wild salmonids. The EMP sets out the procedures an operator will follow to both prevent a sea lice problem arising, and how they will react should issues arise. Mowi will develop and agree in consultation with wild fish stakeholders an EMP for the Loch Hourn site that contains the minimum recognised elements, including following:

- monitoring and reporting of lice burdens on farmed fish.
- lice connectivity modelling to inform locations for wild fish monitoring.
- monitoring of lice burdens on wild fish.
- a framework for cooperation and transparency.
- a framework for adaptive management – management measures taken in response to evidence of negative impacts on wild salmonids.

Mowi has worked in partnership with wild fish stakeholders to agree and implement EMPs elsewhere and has adopted the above principles. We will document these measures further within our proposed planning application including the significant investment and advances Mowi Scotland has made in sea lea lice control in recent years.

We are fully committed to support the measures to address interactions between the farmed and wild salmon sectors as recommended in the recent report from the Scottish Governments Salmon Interactions Working Group. We have worked hard in recent years in consultation with wild fishery stakeholders to create frameworks for information sharing and discussion, to identify mechanisms for the implementation of adaptive farm management actions and to agree and support, where appropriate joint local management priorities and projects.

19. Wild salmon and sea trout are Priority Protected Marine species. Has Mowi consulted local fishery boards and Salmon and Trout Conservation Scotland? If so, what do they advise?

    We consult the recognised wild fish stakeholders, namely the local fisheries board and fisheries trust. We have attempted previously to engage directly with Salmon and Trout Conservation staff on aquaculture matters. Our invitation has yet to be accepted.

    The Wester Ross Area Salmon Fishery Board (WRASFB) was consulted in 2018 as part of the screening and scoping process for the modification to the Loch Hourn site. They have commented on the proposal and have provided advise on key areas to investigate[27]. These areas will be addressed by Mowi in the planning application, which will be available on The Highland Councils website after submission.

[27] http://wrasfb.dsfb.org.uk/files/2019/01/WRASFBs-Response-to-Loch-Hourn-Application.pdf

20. Has Mowi consulted local the Ross, Sutherland, Skye and Lochalsh Fisherman's Association with regard to interference with local creel fishermen?

The Mallaig and North West Fishermen's Association were consulted on the original proposal to modify Loch Hourn fish farm via the Scottish White Fish Producers Association Limited (SWFPA; November 2018). Given that the original proposal maintained the existing mooring boundary, no comments were received from SWFPA. However, given the recent changes to our proposal, we will be in contact with SWFPA once we have finalised the mooring extent of the revised proposal. We will aim to minimise any increase in the mooring extent of the fish farm as far as possible.

21. Why did 257 tonnes of fish die during 2019; how and where were they disposed?

Our goal is to rear healthy fish and to protect their welfare. Our salmon are reared under conditions that satisfy their biological needs for food, clean water and space and we ensure they obtain the necessary nutrients for good health throughout their lives. In 2019 Mowi achieved 97.85% average monthly survival (% biomass in seawater), with the equivalent figure for Loch Hourn at 98.97% survival.

Losses in 2019 at Loch Hourn were primarily associated with Cardiomyopathy Syndrome (CMS) which is virus which affects the heart muscle of fish. When affected, fish become weak and susceptible to stress such as through treatment for sea lice. Through our breeding and genomic selection programme, advances are being made in selection of fish stocks with resistance to CMS and sea lice, and this is expected to result in further improvements in survival rates.

The mortalities were transported by licensed waste carriers to the approved facilities at Glenfarg Perth or Dundas Cumbernauld. A copy of waste transfer notes is kept on site for inspection and audit by regulators.

22. Will Mowi continue to transport dead fish, causing pollution and a vile stench, via Arnisdale by road?

Transporting fallen stock is inevitable in any farming operation and should be done in such a way as to contain all matter and any odour emanating from it. In 2018 we had an incident where a licenced operator called to collect fallen stock from the shorebase (something we would always consider a last resort). Unbeknown to the operator the container had been damaged on a previous run and had not been noticed, which resulted in some run off at the farm. Farm staff noticed it and quickly set about containing, cleaning, and disinfecting the affected area. They spoke to local residents and informed them of what had happened and asked if they could avoid the area until it was cleaned up.

Going forward Mowi have invested £2.5M in a 'state of the art' feed barge with an in-built ensiling and storage system, and a work boat due in 2021 with the capability of transporting a tanker from a commercial port to the site, where waste will be uploaded and transported off site in a sealed container. As a result of these investments, we can assure residents of Arnisdale that the practice of transporting fallen stock ashore will not happen again.

23. Thirteen kilos of azamethiphos, a highly toxic organophosphate to control sea lice, was reported used in the last year. Have sea lice become resistant to chemical treatments with azamethiphos, deltamethrin and/or emamectin benzoate?
Sea lice treatment strategies have evolved in recent years from one which was based predominantly on medicinal control to a more balanced strategy, including the use of cleaner fish and physical removal, alongside the use of licensed medicines.

The aquaculture industry currently has access to a very limited number of medicinal treatments to treat their salmon for infestation of the two sea louse species that attack the fish. For any integrated pest management programme, to maintain efficacy of treatment for each medicinal product and to prevent resistance, it is essential that their use be rotated and that repeat treatments with the same active ingredient are minimised.

The efficacy of all methods of sea lice treatment are kept under constant review by Mowi. Genetic resistance profiling is used to assess sea lice sensitivity to medicinal treatments.

24. Have wild salmon, prawns, lobsters etc. been sampled for the impact of azamethiphos?
In response to questions 14 and 15 we detailed the rigorous ecotoxicological assessment that medicines undergo by both the Veterinary Medicines Directorate and the Scottish Environment Protection Agency before they are licensed. This process as outlined considers operator, environmental and consumer safety and as such offers a 'in built' precautionary approach for species which are either exploited commercially or by 'capture' fishing techniques.

Mowi has no specific local information on which to answer this question. Any questions on food safety should be directed in the first instance to the relevant authorities, The Highland Council and / or Food standards Agency Scotland.

From our experience at Loch Hourn and other farms it is not unusual for creel boats to fish very close to our farming operations. The farms are sometimes seen as artificial reefs or protective areas to many sea creatures as there obviously no access to dredging or trawling in their vicinity.

25. How many kilograms of antibiotics in total (or mg/kg of production) were used during the last three years. Which diseases and injuries were the causes of antibiotics use?
No antibiotics have been used on the Loch Hourn site in the past 3 years. The last recorded use at Loch Hourn was in March 2011.

26. On average 24kg of copper and 500kg of zinc have been dispersed from this farm each year over the last three years. Explain the source of these toxic elements and whether or not tests have been carried out on the toxicity these have caused in the environment.
There is no direct discharge of copper or zinc to the marine environment from fish farms. These figures relate to indirect releases either through fish feed or antifouled

nets and are derived from data reported by Mowi and publicly available via The Scottish Pollutant Release Inventory (SPRI).

No net antifouling is employed by Mowi at Loch Hourn. All animal feeds contain both copper (Cu) and zinc (Zn) as they are required for normal growth, development, and function (in all animal species not just fish), indeed the average adult human recommended daily intake (RDI) for copper is 900mcg whilst the RDI for Zinc is between 8-11mg to maintain a balanced healthy diet. There are strict EU and UK regulatory controls regarding additives and their amounts in animal feeds. Only approved additives can be used and there is a continuing process of 're-authorisation' at regular intervals which include detailed examination of efficacy for the animal concerned and assessment of environmental impacts. The regulations prescribe set limits on how much of an additive can be in the feed from both an animal health and environmental perspectives.

As stated in the response to question 8 the pollutant load data from SPRI are theoretical and based on complex formulae that SEPA is using with regards retention efficiency and excretion when their models were created in 2004. Importantly there are also a number of assumptions that require to be made to derive the pollutant load including the type of feed used, the Cu/Zn concentration in the feed product and the release rate of Cu/Zn. As stated previously Mowi is presently assessing whether the calculations and assumptions are still relevant given the advance and evolution for feed diets since 2004. Our initial review confirms that the reported figures are a significant overestimate.

While excess levels of copper and zinc in the environment can exert toxicity on fish or other aquatic organisms the concentrations used and potential environmental effects are assessed during the licensing of feed additives to ensure appropriate and safe levels are set. There is no evidence that the copper or zinc levels that are contained within feed are resulting in any adverse environmental effects within Loch Hourn. Mowi's own environmental monitoring confirms a healthy seabed around the Loch Hourn fish farm both in terms of animal abundance and diversity. SEPA's own assessment of the condition of Loch Hourn confirms it to be of over Good Ecological Status with the monitoring element, Invertebrate Benthic Animals assessed as being of Good quality. See question 12 for further information on SEPA's Water framework directive monitoring and the Loch Hourn waterbody classification status.

27. Your letter of October 9th states that your plans have changed in response to "representations received from our previous consultation exercise". What consultation do you refer to here? We are unaware that any consultations have so far taken place.

We have undertaken consultation exercises with different stakeholders at various stages of the proposed modifications at our Loch Hourn site which have been ongoing since 2018.

We have received comments from statutory consultees including The Highland Council, SEPA, WRASFB, Historic Environment Scotland, Marine Science

Scotland, Scottish Natural Heritage (now NatureScot) during the Screening and Scoping request to The Highland Council in December 2018. We have written to other non-statutory consultees (e.g. Mallaig and North West Fishermen's Association, Ministry of Defence) to inform them of our intention to modify the site. We will also be recommunicating the changes to the Loch Hourn site modifications to these consultees and stakeholders in due course.

In terms of consultation with the Glenelg and Arnisdale Community Council, we contacted the CC during the Screening and Scoping process in November 2018 and received no comments. A further letter was sent to the Community Council in April 2020 providing an update on the application and confirming Mowi's intention to display an information poster relating to the development, which was to be displayed on Glenelg, Arnisdale and Corran community notice boards. Given the strict Covid-19 lockdown restrictions in April 2020, this was believed to be the most appropriate way of communicating safely with local residents in the first instance. An email address was provided on these posters for any concerns/ questions to be directed to Mowi, of which none were received. During this time Mowi has been in communication with the Community Council who have shared this list of questions from the community. The Community Council have relayed that an online presentation from Mowi with a question and answer session is not supported by the community. However, given the current status of the global pandemic and the need to progress with this application, it remains the best available method and we have held several recent such meetings with other community councils. Online discussion forums are being recognised by The Highland Council as a suitable alternative to physical consultation meetings, and as indicated we are successfully progressing meetings with other communities and stakeholders using this approach. Our operations and business planning decisions continue despite Covid-19 and we hope we can have further discussions in due course on progressing an online community event.

28. <u>What are the projected 'low' stocking densities and how will this 'minimise seabed environmental impacts, presuming that feed and biomass actually increase?</u>
The current stocking density for the 12 x 120m circumference pens with a biomass of 2500T is 11.4 kg/m^3. The proposed stocking density for the 8 x 160m circumference pens with 3100T is 12.68 kg/m^3. These figures are calculated using the cylindrical section of the pen only (Figure 2). Based on these values, there is a slight increase in stocking density between the current and proposed values. However, there are different options for calculating the stocking density based on different components of the net.

The pen net from the surface hangs straight down which gives an area within a cylinder, and beneath this is the cone which encloses the bottom of the net (Figure 2).

Despite the increase in biomass, the proposed pen configuration and stocking density will reduce the intensity of deposition at the pen edge, which in turn will assist in the compliance to SEPA Environmental Quality Standards. There will be an increase in the amount of feed utilised when comparing the current versus

proposed biomass. However, feed is the most significant financial outlays in fish farming and therefore it is within Mowi's own interest to feed efficiently and effectively. To do this a new, state-of-the-art feed barge has recently been installed at Loch Hourn and will remain at the site to service the proposed pen configuration. This feed barge allows semi-automated feeding using video-controlled feeding systems to reduce feed wastage.

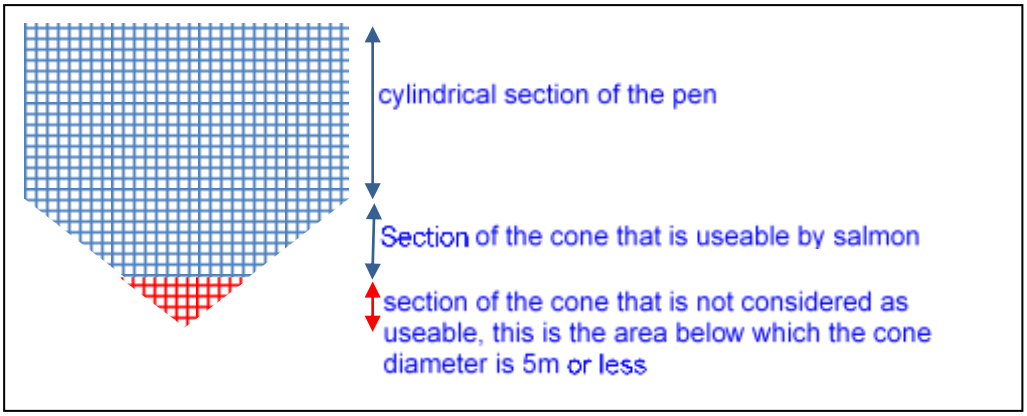

Figure 2. Typical pen net shape showing the cone and useable area

For further information, stocking density is the weight of fish kept in a given volume of water. Marine Scotland advised in their scoping response for the Loch Hourn proposal to keep the stocking density below 22 kg/m^3. Mowi Scotland follows the RSCPCA Freedom Foods standards for stocking density. This states that the maximum stocking density for a seawater enclosure is 17kg/m^3 with an overall site maximum stocking density of 15kg/m^3. Whichever net design is being used, the proportion of the cone which is included in the stocking density calculations must permit a minimum of a 5m diameter swim circle. The calculations of the proposed stocking density for the Loch Hourn

If the useable cone space were to be included in the stocking density calculations above the results would mean that when the site reached maximum biomass the percentage of fish to water would be as follows:

- Current layout: 12 x 120m circumference pens with 2500T = 0.85% fish and 99.15% water;
- Proposed layout: 8 x 160m circumference pens with 3100T = 1.05% fish and 98.95% water

29. <u>What is the latest proposal for the maximum biomass after this expansion?</u>
As a result of current compliance with environmental standards, and results from calibrated NewDepomod modelling predicting continued compliance, we are proposing to increase the maximum biomass of the Loch Hourn site from 2500T to 3100T.

30. <u>What are the depths and above water heights of the 160m pens?</u>
The Loch Hourn fish farm is classified as a relatively deep site with depths of up to 100m within the current mooring grid. We are currently proposing 44m net depths which includes the cylindrical section of the pen and cone (Figure 2).

Figure 3 illustrates that the poles that hold up the top net on pens is the tallest component of the pen above water; typically, this is 6m. The handrail around the circumference of the pen is 1m above the water.

Final details of equipment dimensions will be confirmed in the planning application submitted to The Highland Council.

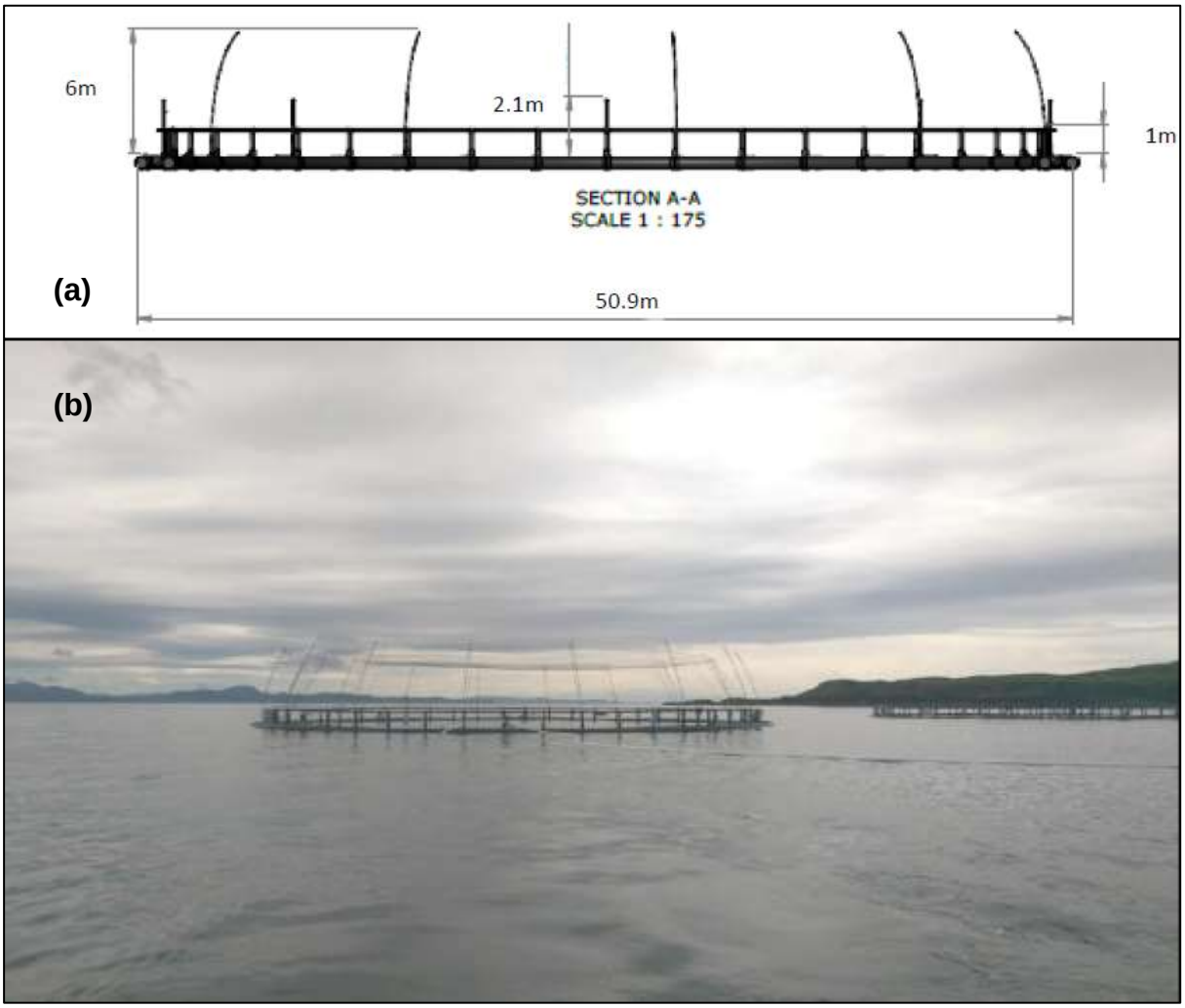

Figure 3. (a) Cross-section of a typical 160m circumference pen (b) Photo of a circular pen with poles at the walkway to support the top netting

31. <u>How confident is Mowi that it can use bath-type treatments safely in such large cages?</u>

The use of 160m pens has been very common in Norway over the past 10 years, but has to date not been embraced in Scotland, due mainly to a lack of service infrastructure to deploy, manage and harvest from this size of pen. In recent years though significant investment has been made by Mowi Scotland in service vessels, workboats and well boats of a suitable mass that can now handle larger sized pens and associated equipment. Mowi Scotland has the company knowledge, operational expertise, and equipment to operate the use of 160m pens and release the wide range of environmental benefits that such a change will bring. The plan which is being implemented across a range of sites over a 5-year period will help

Mowi Scotland remain competitive and be 'fit for the future' as salmon farming moves into its 6th decade here in Scotland.

32. What species of cleaner fish are used and where are they sourced?

Mowi utilises Ballan Wrasse and Lumpsuckers to provide a symbiotic service to the farmed salmon by the removal of parasites. Currently 100% of all Lumpsuckers deployed per annum in Mowi sites are of farmed origin; however, at present only 10% of Ballan Wrasse are of farmed origin. Mowi is committed to the development of in-house cleaner fish farming to provide a consistent and sufficient demand to meet requirements. Since early 2020, a full-scale production recirculation plant has started to produce farmed Ballan Wrasse with the first deployable fish delivered to the seawater production sites in the second half of 2021. When fully operational, this facility will provide 100% of Ballan Wrasse demand for all of Mowi's seawater production. Our sites typically are stocked with cleanerfish at around 6% of the total number of salmon on site with either lumpfish or wrasse being deployed depending on the time of year and size of the fish.

33. Tubenet technology is untried in Scotland with only one other site at Port na Cro. Should this technology prove insufficient to control sealice, what chemicals will be used?

'Tubenet' is the commercial name of the snorkel lice prevention concept. They are a patented technology which reduces the attachment of lice on salmon with no handling of the fish. Tubenets work by keeping fish well below the traditional sea lice belt that is in the upper water column (top 5-10m). This is achieved by installing a large cylindrical passageway in the centre of a cage, from which tarpaulin hangs and protects our salmon from lice infestations when they swim to the surface to fill their swim-bladders[28]. A study in Norway has shown during a full-scale commercial test, Tubenets can decrease sea lice infestation on salmon by 75%[29].

This innovative and proactive approach to controlling sea lice via the use of Tubenets is being utilised at Mowi's Port Na Cro site in Scotland. However, should other methods also be needed to control sea lice numbers, Mowi has a suite of management tools available as part of a wider sea lice control strategy. These include freshwater treatments, biological controls in the form of cleaner fish (further detail in Q32), mechanical methods in the form of thermolicer[30] and hydrolicer units. Lastly, medicinal control will also be available in the form of in-feed medications (Emamectin Benzoate), and bath treatments (azamethiphos, cypermethrin, deltamethrin).

We are considering the use of Tubenets on the Loch Hourn site and this will be informed by our continuing trial of this innovation at our Port na Cro site in Argyll.

[28] https://mowiscotland.co.uk/2020/06/01/tubenet-video/
[29] Geitung L., Oppedal F., Stien L. H., Dempster T., Karlsbakk E., Nola V., & Wright D. W., (2019). Snorkel sea-cage technology decreases salmon louse infestation by 75% in a full-cycle commercial test. *International Journal for Parasitology*. 49: 843-846
[30] https://mowiscotland.co.uk/2020/06/04/new-vessel-and-sea-lice-management-kit-to-be-delivered-in-2021/

34. Does Mowi use any acoustic deterrents and if so do they have an EPS licence? If not, why does Mowi use them?
Currently, there are no acoustic deterrent devices (ADDs) on site at Loch Hourn and we do not intend on using them going forward. If ADDs were proposed to be used in the future, Mowi Scotland would follow statutory controls and licensing procedures.

35. To what extent will the expansion of the Mowi farm put increased pressure on the creel fishing ground and if large pens replace the existing pens, how will Mowi mitigate further obstruction of traffic in the loch?
The modification to equipment at Loch Hourn results in a net reduction of number of pens, which equates to a 19% increase in equipment surface area when compared the current surface equipment. The mooring extent of the proposed configuration is currently being reviewed; however, we will aim to maintain the mooring extent of the current fish farm if possible.

The current Loch Hourn site has a Marine Licence granted by the Scottish Government, which is required for navigational purposes. This license will be updated to reflect any changes to the fish farm and to aid navigation.

36. Plastic waste is increasing on the shoreline downwind of the farm. What steps is Mowi taking to prevent further plastic pollution?
The Loch Hourn site responds immediately to any reports of plastic debris. Our farm manager is approachable and has been reactive to reports of aquaculture related debris sourced from Mowi fish farms or other operators. Mowi's commitment to retrieving marine debris has been published in several local papers and is quoted as stating "If aquaculture equipment washes ashore in areas where we operate we will take steps to remove the debris, regardless of source". Mowi will continue to work with local communities in a proactive manner to help reduce or eliminate plastics pollution and general beach litter. Furthermore, to ensure we are not a contributor to plastics pollution, Mowi's global sustainability charter provides clear targets to ensure responsible use and reuse of plastics, including:
    - By 2025, 100% of our plastic packaging will be reusable, recyclable or compostable
    - By 2025 at least 25% of plastic packaging will come from recycled plastic content
    - By 2023, all plastic farming equipment (nets, ropes, feeding pipes) is reused or recycled

    More information on our Sustainability Strategy can be read at https://mowi.com/sustainability/.

37. Finally, we consider Stephen MacIntyre's suggestion that members of the community submit applications for proposals for donations from Mowi ("in order to develop a proactive partnership with the community council") to be inappropriate and distasteful while we are discussing the environmental impacts on our marine environment and as long as the issues around Mowi's expansion plans remain unresolved.
We are disappointed that us highlighting this has been received negatively and for the avoidance of doubt there is no attempt by Mowi to conflate discussions on the

development of our Loch Hourn fish farm with community engagement and support activities. Our intention was to simply highlight that we have an ongoing community donations fund which has been in existence and utilised by many community groups across Mowi's operating areas but we are not aware that the Arnisdale and Glenelg CC has made any recent application. We welcome all applications to our community support fund which is available to all groups. As an example, during 2020 we have funded a total of 17 projects in and around the Skye and Lochalsh area.

Fish farming has the potential to bring economic benefits and we have a track record of delivering success at a local level including provision of housing or other infrastructure improvements such as community moorings or pontoons to smaller scale support for groups or activities. Mowi engages on a daily basis with the communities where we are based offering proactive and positive support to those communities and we would welcome further discussions on how we can develop this within Arnisdale and Glenelg.

Annex 1:

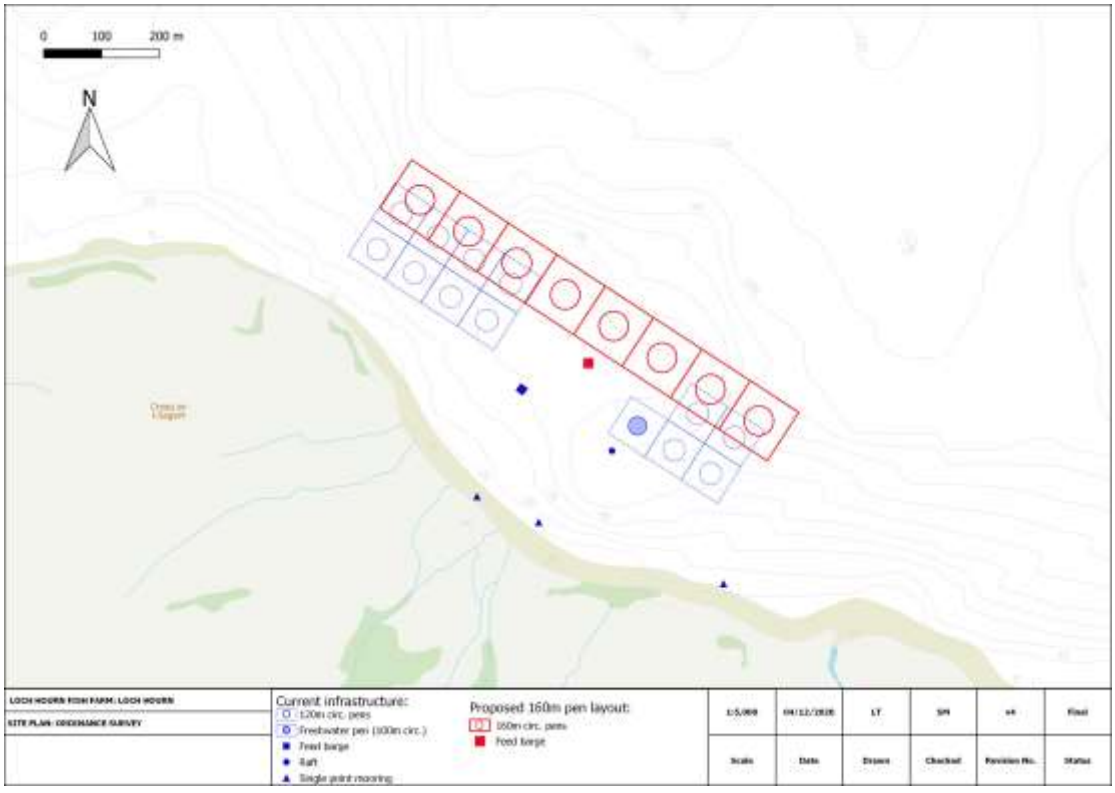

Figure 4. Equipment Plan – Existing Equipment versus Proposed