Appendix C - Summary of Applicant response to issues raised by Representations made under s. 27 of the *Marine Farm Planning Act 1995* in relation to the Draft Storm Bay North Marine Farming Development Plan February 2018.

Contents

1 Introduction

The Planning Authority sought a response from Petuna in relation to the issues raised by representors. The applicant provided a response to the issues raised which the PA has summarised as follows within this document.

2 Impacts on the Natural Environment

2.1 Water quality

The Petuna EIS considers the impact of the proposed marine farm development on water quality at both nearfield and broad scales using contemporary and relevant scientific research and modelling. The level of impact from salmon farming varies in line with farm attributes such as stocking density, feed conversion ratio, cage design and orientation as well as the sites hydrodynamic, chemical and physical attributes.

Outcomes from scientific research in the last two decades indicate that improvements in feed formulation and feeding efficiency are resulting in decreased nutrient loading and improved water quality in and near farms and partly explains why significant enrichment to the water column at coastal or offshore farms is generally not detected (Olsen et al., 2008, Stenton-Dozey, 2013). Petuna refers to pg 116-134 of the EIS.

Offshore Farming

In response to comments made by representors that showed concern about the use of the term 'offshore' for the locations in which the marine farming is proposed, Petuna would be agreeable to a terminology change; suggest change to "exposed coastal waters" in line with the Offshore Constitutional Settlement relevant to other industries, the Australian Coastal Waters (State Title) Act 1980m and Tasmanian Coastal and Other Waters (Application of State Laws) Act 1982.

Stocking Density

In relation to a comment about stocking density, Petuna advises that modelling has been based on a harvest stocking density of 12kg/m due to the exposed nature of the site and the potential for available pen volume to be compromised during extreme weather events. Management controls included within any marine farm or environmental licence will be at the discretion of the regulator.

Harmful Algal Blooms

Tasmanian coastal waters are experiencing a significant biological shift as a consequence of intensification of the East Australian Current due to oceanic warming including the increasing occurrence of harmful algal blooms (HAB) (Buchanan et.al 2013), particularly off the East Coast of Tasmania. These HAB's have not been directly attributed to localised eutrophication (Hallegraeff, IMAS Submission 2016).

HAB's can be broadly grouped into three categories:

- Basically harmless (water discolourations) however under exceptional conditions in sheltered bays blooms can grow in density causing oxygen depletion killing fish and invertebrates.
- Species producing toxins that enter the food chain to humans causing illness such as PSP.
- Species that are non-toxic to humans but harmful to fish and invertebrates by mechanically damaging gill tissues, or by the production of hemolytic or neurotoxic substance production.

Soluble nutrient from fish farms has the potential to alter species composition and density of phytoplankton, increasing the risk of an algal bloom. In seawater ammonia excreted by the fish is the key limiting nutrient in the system, hence site selection for marine farming is crucial (Hallegraeff 2015).

Petuna accepts that most salmonid farming impact studies to date have focused on organic deposition in the localised benthic environment, and the associated changes to sediment biogeochemistry and fauna. Pelagic dispersal of aquaculture-derived nutrients is less well understood, and there is a need for further research; as such, Petuna has financially supported an extension to FRDC Research Project 2015-024 to improve the reliability of connectivity modelling (through the provision of more accurate reference information and to increase risk understanding), to provide data on pelagic biogeochemical processes and provide real-time understanding of actual dissolved nitrogen footprints at various biomass levels in Storm Bay and at Lippies Point. This project extension will occur in two parts; the first being the application of Systea nutrient auto-sampler technology to map the spatial distribution of nutrients in and around the leases and the second through a series of experiments to characterise ammonia uptake by marine biota. This multi-level approach will cover both spatial and temporal flux of aquaculture-derived nitrogen in these systems. The final report for this project is expected to be released by the end of 2018, prior to any expansion into Storm Bay.

Nutrient Dispersion

One commenter posed several questions about the nutrient dispersion modelling undertaken.

The Nutrient Dispersion Modelling (Hadley et al, 2017) included in the EIS was provided on the advice of DPIPWE, with the intent of using proposed farm derived nutrients to provide guidance for the development a monitoring program based on the likely near-scale, medium and broad-scale impact of fish farming in Storm Bay.

The Connie 3 model for Southeast Tasmania was developed using Sparse Hydrodynamic Ocean Code (SHOC). SHOC is a finite difference hydrodynamic model developed by the Environmental Modelling group at CSIRO Division of Marine Research. This model has evolved over the last 10 years, having over 100 documented revisions since its development see:
https://research.csiro.au/cem/software/ems/hydro/strucutured-shoc/

The assumptions used in the Connie3 Nutrient Dispersion Modelling were based on the expert scientific judgement of IMAS scientists and were not influenced by representatives of Petuna. Explanation of the assumptions is available in Appendix 7 of the EIS.

An estimate of background nutrient levels was included in the model based on data from previous research and monitoring undertaken in Storm Bay. This background information was used to calculate risk levels based on ANZECC (2000) guidelines. The data used to calculate both background levels, the 80th and 95th (ammonium only) percentiles were provided by DPIPWE and represent the compilation of data from a number of independent studies in Storm Bay.

The CONNIE3 Soluble Nutrient Modelling for the EIS was used to demonstrate the dispersion of dissolved nutrients generated within a single period.

As per Appendix 2 of the EIS, whilst CONNIE3 is 'early stage modelling' and therefore is only indicative of system conditions, the estimates of connectivity are described by the authors (Hadley, MacLeod and Ross) as being 'fairly reliable as the hydrodynamic patterns in Storm Bay are reasonably well understood and have been derived from environmental forcing that is well

represented'. Additionally, the 14-day release period was chosen to cover the spring-neap tidal cycle and other cycles of synoptic weather systems that influence wind and rainfall.

In relation to food conversion ratios and associated nutrient yields used to convert feed volumes to TPDNO's, both reported actuals and the forecasted TPDNO are formula based. For forecasted TPDNO, the default BFCR that is used in the calculation is 1.35. This is consistent across the industry in reporting forecasted TPDNO to Marine Farming regulators.

The intent of the Nutrient Dispersion Modelling was to represent the dispersion of dissolved nitrogen (ammonium) in isolation (absence of background nutrient loading) and with an estimate of background nutrient levels (from previous research). This was used to calculate risk levels based on the ANZECC (2000) guidelines. The ANZECC guidelines provide guidance for the establishment of threshold levels for water quality indicators that can be used to protect environmental values. As discussed in the EIS, Petuna accepts the need for a management system that takes into account baseline reference condition data and threshold levels in an adaptive management system.

It is acknowledged on pg 120 of the Petuna North Storm Bay EIS that the Connie3 model outputs only show dispersion and does not fully account for ecological processes and biological uptake. Petuna acknowledges the development of an integrated model capable of simulating and predicting the physical hydrodynamic state, sediment transport, water quality and basal ecology are expected to be developed to serve regulatory authorities as a tool to assist in the evaluation of effectiveness of various management strategies and actions. The development of a near real-time, calibrated and validated biogeochemical model is expected to commence prior to any significant expansion.

Derwent Estuary

Once commenter raised concerns that a significant change in nutrient inputs from Storm Bay could have far-reaching impacts on the Derwent estuary.

Petuna acknowledge that saline waters of the D'Entrecasteaux Channel and Storm Bay enter the Derwent estuary, and is supportive of a broadscale environmental monitoring program design based on expert scientific advice.

Petuna supports the development of a validated 3D biogeochemical model to quantify the nutrient budget, spatial and temporal impact of projected future salmon farm nutrient inputs.

Petuna support the development of a suitable broadscale environmental monitoring program and a biogeochemical model for the Storm Bay region.

Resuspension of accumulated particulate fish farm wastes has been observed in locations exposed to large waves and also long period ocean swells (Norði et al, 2012) such as those likely to be encountered in Storm Bay. While the Petuna Storm Bay Environmental Impact Assessment included depositional modelling (DEPOMOD), the study by Keely et al., 2013, demonstrated that the association between current flow, sediment resuspension and ecological impacts is more complex than presently encapsulated within this version of DEPOMOD. Petuna's production planning for Storm Bay has taken into account potential resuspension of farm wastes

Petuna have supported a research project (FRDC 2015-024 'Managing ecosystem interactions across differing environments: building flexibility and risk assurance into environmental management strategies) this project was initiated to investigate appropriate environmental monitoring strategies for new farming areas in Tasmania, including Storm Bay. One of outputs

from this project will be a regional field guide for Storm Bay (similar to Macleod, C (2004) Guide to the assessment of sediment condition at marine finfish farms in Tasmania).

Frederick Henry Bay, Norfolk Bay and small embayments fringing Storm Bay

One commenter raised concerns about the potential eutrophication impacts to Frederick Henry Bay, Norfolk Bay and small embayments fringing Storm Bay.

Petuna will commence baseline bi-annual reef life biodiversity assessment (Edgar Barrett Methodology) at four sites including the Iron Pot, North East and south west of Betsy Island and North West Head during May 2018. These sites have been selected as key reference sites either within the 50th percentile of the CONNIE 3 dispersion modelling output where nitrogen loads are more likely to have an ecological effect.

Monitoring key reference sites spatially closer to the proposed development increases the likelihood of early detection of any environmental change attributable to the proposed development, rather than monitoring far-field sites that may be impacted by other anthropogenic sources.

If expert scientific advice recommends monitoring of sites further afield such as Norfolk Bay, Fredrick Henry Bay or into the Derwent Estuary these sites would be incorporated into the Storm Bay broad scale environmental monitoring program.

Petuna have committed to nearfield reef life monitoring commencing in Autumn 2018, that will provide baseline and ongoing environmental monitoring including macroalgal abundance and; also, to support the development of a full biogeochemical model for the region.

Previous similar conceptual models have predicted algal growth based on nutrient availability, against physical factors (suitable habitat, wind, currents, wave action) to predict "nuisance macroalgal stranding events". If expert scientific advice suggests that this is a significant risk, it may be considered during biogeochemical model development.

References

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Olsen, L. M., Holmer M. and Olsen, Y. (2008). Perspectives of nutrient emission from fish aquaculture in coastal waters. Literature review with evaluated state of knowledge. FHF project no. 542014. The Fishery and Aquaculture Industry Research Fund.

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Hallegraeff, G. M, 2015 Aquaculturists' Guide to Harmful Australian Marine Microalgae.

Gunnvør á Norði 1,2, Øystein Patursso Influence of waves and current speed on resuspension of fish farm waste: Case study in Funningsfjørður, Faroe Islands ICES CM 2012/Q:13n

N. B. Keeley, C. J. Cromey, E. O. Goodwin, M. T. Gibbs, C. M. Macleod (2013) Predictive depositional modelling (DEPOMOD) of the interactive effect of current flow and resuspension on ecological impacts beneath salmon farms

2.2 Substrates and fauna

Some commenters raised concerns about potential ecological effects of feed and faeces disposal into the environment and the potential impacts to abalone, lobster and other marine fauna.

The culture of fish in sea pens has the potential to cause nutrient enrichment of the seabed. This has been extensively researched, with identified and adopted methodologies for monitoring allowing both on-farm and regulatory management. The proponent will comply with regulatory environmental standards as required.

Potential ecological effects of feed and faeces disposal into the environment

A significant body of peer reviewed, scientific environmental research focused on the impacts of salmon farming in Tasmania has been underway for the past two decades. This research has included study of the impacts of farming on the soft sediment benthic habitats below and adjacent to the cages (Crawford et. al. 2002; MacLeod et. al. 2002, Edgar et. al. 2005), and on broad scale impacts of nutrient enrichment in the water column and its effect on primary production.

More recent research has focussed on the potential impacts of salmon farming on reef ecosystems and other potential broad scale effects including changes in macroalgal composition and community structure (Oh, et. al. 2015, Valentine et. al. 2016).

To further understand these effects in Storm Bay a research project (FRDC 2015-024 Managing ecosystem interactions across differing environments: building flexibility and risk assurance into environmental management strategies) is underway, and due for completion in late 2018. The key objectives of this project include: Definition of the recovery response principles and benthic condition criteria for areas in which farming currently occurs; To evaluate the potential for interactions between local reef systems and salmon farming and; to improve our understanding of how local scale environmental condition data, can integrate with local scale modelling to improve management outcomes.

Waste Capture systems

In response to a comment that waste collection systems should be utilised, Petuna considers that unlike mortalities, fish faeces has a small particle passing unhindered through the pen netting. Waste capture liners that have been used with some reported success in Macquarie Harbour are unlikely to be technically feasible in northern Storm Bay due to the high wave energy at the site. A waste capture liner at this site is likely to be affected by the wave action causing resuspension of the faeces into the water column potentially causing a less predictable environmental impact.

Additionally, waste capture or semi-closed containment systems add significant financial cost to the salmon farming operations. A feasibility study of closed containment options for the British Columbia Aquaculture Industry completed in 2010 (http://bcsalmonfarmers.ca/wp-content/uploads/2015/04/Feasibility_Study_ClosedContainment_BC.pdf) provides useful context to the challenges presented by these types of systems including difficulty maintaining dissolved oxygen levels, and efficient methods for particulate waste removal and subsequent disposal.

Potential impacts to abalone, lobster and other marine fauna

Some commenters were concerned about the potential impacts to abalone, lobster and other marine fauna.

Please see Section 5.1.3 of the Environment Impact Statement – Draft Storm Bay North Marine Farming Development Plan

Finfish farms produce multiple nutrient emissions streams including from fish excretions, net washing and waste feed. These waste streams result in the release of both soluble and particulate nutrients. Recent scientific studies focused on the potential impacts of salmon farming on reef ecosystems in Tasmania has been inconclusive. Valentine et.al., (2016) under took analysis of subtidal macroalgal communities at Ninepin point and at the Tinderbox Marine Protected Area to characterise community assemblages to determine potential broad scale impacts from salmon farm developments. Analysis of data from the Tinderbox MPA monitoring sites for the period 1992-2015 showed no consistent patterns of broad-scale change in macroalgal community structure over time. While key functional groups and dominant taxa showed some variability, these tended to be fluctuations rather than directional change.

One of the few changes identified in the time series analysis was at one of the Tinderbox sites (Central Tinderbox) where there has been a considerable increase in cover of Caulerpa spp. (particularly C. trifaria) since 2004. Reasons behind this change remain speculative, but there is no documented evidence in the scientific literature to suggest that Caulerpa spp. respond to increases in nutrient levels. One possible explanation relates to changes in sand or sediment deposition at this site, since Caulerpa species tend to flourish on the reef/sand edge.

In a second project Crawford et. Al., (2017) from the Institute for Marine and Antarctic Studies at the University of Tasmania repeated the survey of intertidal macroalgae conducted in 2002/03 to assess whether abundances have significantly changed in the Huon and D'Entrecasteaux Channel region. Sites for this study were chosen to be close to salmon farms (< 1 km), mid distance (1-3 km) and far from salmon (reference) (> 7km). Although the percentage cover of all species of intertidal algae in the quadrats was recorded, the analysis focussed on the two dominant species types Ulva spp and Hormosira banksii. Similar to the previous surveys conducted in 2002/03, there were no clear patterns in abundance of Ulva or Hormosira with distance from salmon farms, even though production from salmon farms had increased substantially over that time.

During 2015 a third major research project being led by the Institute for Marine and Antartic Studies at the University of Tasmania commenced (FRDC 2015-024).

FRDC 2015-024 research project scope was determined through consultation with a broad range of stakeholders. Two priority research issues were identified: i) understanding broad scale interactions with reef systems and ii) validation (identification) of local scale sediment condition indicators in new farming regions - with the intention that this information would underpin adaptive management and optimise compliance and operational management practices.

The objective of the reef interaction study within this major project was to evaluate the potential for interactions between local reef systems and salmon farms – determining main risk factors, recommending risk appropriate monitoring and assessment approaches and identifying risk mitigation strategies where relevant.

This research has included a comprehensive reef sampling field program including baseline biodiversity surveys, abalone/epiphyte plate deployments, rapid reef assessments and nutrient and sediment trap sampling, nutrient flux assessment and towed video trials. The field work component

of this study was completed in March 2018 and is expected to be published in seven separate manuscripts in late 2018.

One commenter was concerned about the potential effects on wildfish if they were to eat feed pellets not consumed by farmed fish. The occurrence of waste feed in stomach samples from wild fish caught underneath and around salmon farms has been quantified for a number of species overseas but little research has been completed in the Tasmanian context. It has been theorised that waste feed could increase the reproductive potential of wild fish, through increasing energy reserves and growth, enhancing fecundity (Dempster, T., et. Al 2011). This area may require further research to understand impacts in the local context

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Crawford, C., Lucieer, A., and Harwin, S., (2017), Reassessment of intertidal macroalgal communities near to and distant from salmon farms and an evaluation of using drones to survey macroalgal distribution, FRDC Project Report No 2014-241

2.3 Decommissioning and Rehabilitation

One commenter queried what the decommissioning and rehabilitation plans were. Please refer to section 2.7 of the Environmental Impact Statement Draft Storm Bay North Marine Farming Development Plan.

2.4 Marine vegetation

Concerns were raised about the potential for impacts to seagrass and macrophyte communities.

Giant Kelp

The Giant Kelp Forests of South East Australia are a diverse ecological community that exist in rocky coastlines with cool and nutrient rich water. There are known populations of Giant Kelp around the coastline surrounding Storm Bay, but none in proximity to the proposed zone, given the absence of rocky substrate in the vicinity.

The primary threat to Giant Kelp is sea temperature increases associated with changes in oceanic circulation and weather patterns.

Petuna, in conjunction with the other salmon producers, has committed to undertaking ongoing monitoring of Giant Kelp communities in the region at locations informed by the nutrient dispersion modelling undertaken as part of the Broadscale Environmental Monitoring Program. This monitoring program is a key component of the proposed adaptive management approach proposed by the regulator for all proposed operations in Storm Bay.

Seagrass

The impact of the proposed aquaculture operations on seagrass beds was not specifically assessed in the EIS. Marine habitat mapping was undertaken by TAFI in 2000 for the south east Tasmania region, including Storm Bay and Frederick Henry Bay.[1] This included identification of seagrass beds in these regions. There are few seagrass beds present in Storm Bay, with the only mapped areas being in Parsons Bay and off White Beach. Frederick Henry Bay contains more extensive seagrass bed coverage, mainly in the eastern extents of the bay. Given the substantial distance from Petuna's proposed zone to the nearest known seagrass bed (>12 kms) there will be no direct impact, and an indirect impact from soluble nutrient emissions is unlikely.

However, Petuna would support the incorporation of seabed condition monitoring at agreed locations into the proposed Storm Bay BEMP based on scientific advice.

Algal blooms

The combined proposals are unlikely to contribute to algal blooms in the Channel as the soluble nutrient emission modelling undertaken by IMAS (section 5.1.1.3 of the EIS) demonstrates that the nutrients do not disperse to the Channel or Derwent Estuary.

2.5 Birds

Concerns were raised about the potential impacts of lighting and entanglement on birdlife.

It is acknowledged that on-lease lighting has a potential to impact on oceanic bird species, and this has been specifically addressed in the EIS section 5.1.4.4.5.

Lighting is not expected to significantly impact upon any other flora or fauna.

Numerous colonies of short-tailed shearwater exist in the broader Storm Bay area. Potential impacts to this and other migratory bird species is presented in section 5.1.4 of the EIS.

The risk of bird entanglement in net pen infrastructure and disorientation from on-lease lighting is assessed in section 5.1.4 of the EIS.

2.6 Marine mammals

Concerns were raised about the potential impacts to marine mammals such as seals and whales.

It is unknown whether seal numbers will increase due to the establishment of marine farms in Storm Bay. Petuna recognises the importance of predator exclusion from its pens, and its existing net pen infrastructure is effective at excluding seals. This is discussed in section 5.1.5 of the EIS.

It should be noted that both the Australian fur seal and the Long-nosed fur seal are listed marine species under the EPBC Act and thus an increase in their population would be considered a positive environmental outcome.

Petuna supports the recent regulatory change to prohibit long-distance seal relocations, and the inclusion of this control in the MFDP. Petuna strives to implement industry best practice wildlife interaction protocols. This is presented in section 5.1.4, 5.1.5 and 5.1.6 of the EIS.

It is unavoidable that there will be an increase of marine mammal interactions associated with the proposed marine farm when comparing against a baseline where no marine farm currently exists.

An assessment of potential impacts to marine mammals and proposed mitigation measures are provided in section 5.1.5 of the EIS

Petuna supports further industry research into potential impacts of aquaculture-specific noise emissions on marine mammals in migratory routes. A further noise-impact mitigation commitment beyond what is provided in section 5.1.6.2.3 of the EIS is the cessation of operation of noise-generating equipment at the lease when whales are known to be present in the vicinity of the lease. In conjunction with this, Petuna will develop early warning methods to alert staff to whales in the region. These measures are discussed in Petuna's Environmental Risk Assessment developed to support its EPBC referral.

Potential impacts to the Southern right whale and humpback whale (and generally to all cetaceans) from vessel and equipment noise generation, and proposed mitigation measures are discussed in section 5.1.6 of the EIS.

2.7 Threatened species

Representors queried what potential impacts to threatened species may occur.

Petuna will be submitting a referral to the Commonwealth for this project under the EPBC Act. It has developed a comprehensive environmental risk assessment against MNES to support the referral, which has demonstrated that the proposal will not result in a significant impact on any MNES. This risk assessment considers known observation records to validate the preliminary MNES list and assesses the likelihood and consequence of potential impacts of the proposal on each MNES, as well as considering EPBC significant impact criteria.

Please refer to section 4.2.3 of the Environmental Impact Statement – Draft Storm Bay North Marine Farming Development Plan.

A search of the NVA did not identify any records of threatened marine fish within 5000m of the study area.

References

https://www.naturalvaluesatlas.tas.gov.au/#SpeciesSearchPage

Wong L (2017). Density estimates of spotted handfish (Brachionichthys hirsutus) - GPS Underwater Visual Census (2015,2016). CSIRO Oceans and Atmosphere. Occurrence Dataset https://doi.org/10.15468/i5n5op accessed via GBIF.org on 2018-03-23.

http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64418

2.8 Species escapes

One commenter recommended that the Panel investigate the fish welfare and environmental implications of the failure of pens proposed to be used in light of the recent failure of Huon Aquaculture's "fortress pens" in Port Stephens

The proponent intends to utilise equipment appropriately designed, engineered and built to appropriate standards for exposed waters. The proponent has a long history of testing and trailing new equipment designed for specific environmental challenges (for example brass alloy and stainless steel nets in strong tidal current conditions). The proponent intend to undertake new equipment testing in Storm Bay without stock to minimise the risk of species escapes.

It was acknowledged in the NSW DPI incident investigation that biofouling growth led to the damage of the failed pen. The barnacle growth caused damage to a number of ropes which resulted in remaining ropes being overloaded, biofouling growth created excessive weight and strain on the net and rigging. The barnacles in this incident are more robust and grow more rapidly than those species identified in Tasmanian waters, where Huon Aquacultures operations have withstood similar weather conditions.

Petuna has outlined in 2.4.5 of the EIS the infrastructure maintenance of pens, indicating that net inspections, reporting of the condition of nets will occur on a weekly basis and the net wash details are in 2.6.1.3.

References

https://www.huonaqua.com.au/wp-content/uploads/2018/02/Incident-Investigation-Summary.pdf

2.9 Disease and biosecurity

Some commenters raised concerns that the proposed developments may be susceptible to high biosecurity risks.

Petuna acknowledges that biosecurity is essential to ensuring the growth and sustainability of the salmon industry and has been supportive of the review of the Tasmanian Biosecurity Framework. Petuna are supportive and participating in the TSGA Biosecurity Program review.

It should also be acknowledged that as with any intensive farming enterprise there are disease risks and while biosecurity regulation aim to reduce these risks the risk will still be present. Petuna remain supportive of both industry driven and government biosecurity improvements in Tasmania.

Petuna recognises when considering biosecurity, lease proximity is one risk factor for consideration, but acknowledge that disease occurs due to host, pathogen and environment interactions. The recommended distance between leases aims to minimise exposure to a given pathogen through distance and dilution but does not address other aspects of pathogen exposure including; culling of index pens, stocking density, the number of individuals on a given lease, or the frequency of mortality removal. Petuna also note the minimum distance between zones of 5km is a recommendation only.

It is important to consider the environment-host interaction when assessing the risk of disease. At Petuna, the host (stocked salmon) are assessed by a fish health professional prior to transfer to the site to ensure fish stocked are fit for transfer to the site and of adequate size. Mitigation strategies

are in place to reduce physiological stressors placed on the host by management activities (eg smolt tansport). The Biosecurity and Fish Health Management Plan for each site aims to optimise fish health and welfare throughout the lifecycle of all stock.

Pilchard Orthomyxovirus (POMV) outbreaks have impacted the industry almost annually over the past decade. It is important to recognise that this disease has impacted all farming regions around Tasmania in recent years, including the most isolated farms. The lease in Rowella, over 300km from the nearest farming neighbour, has been impacted twice over the past 10 years. More recently, Trumpeter lease in Storm Bay has been impacted by the virus, located well over 10km from the nearest farming neighbour, and isolated from the inshore sites of the South East.

The first doses of POMV trial vaccine are expected to be available in August 2018. Should this vaccine be effective in reducing mortality in stock as a result of POMV, it will be available before Petuna stock the proposed lease. POMV vaccine will be administered to all stock destined for this proposed site.

Mitigation strategies include against POMV include transfer of stock assessed by a fish health professional to the site, vaccination against all diseases for which there are effective, commercially viable vaccines, providing adequate nutrition from a reputable supplier, stringent environmental monitoring (eg net biofouling assessments, phytoplankton monitoring) and implementation of effective management strategies to minimise the impact on fish health.

The proponents of the West of Wedge development were consulted during the scoping phase of this project and were not opposed to the location of the proposed North Storm Bay lease.

Full single year classes sites are considered ideal and Petuna's long term strategy supports the evolution towards this "ideal" in Storm Bay and other farming regions.

Petuna's EIS outlines a farming zone providing 1 km between each year class of fish. The zone will also accommodate a fallowing programme facilitating a timing separation between stocking and destocking.

Fish health is one of Petuna's key areas of investment in R & D will continue to support vaccine development and epidemiological investigations.

The detail of the fish transport bathing vessel is outlined in 2.4.4.2.2 of the EIS. Fresh water will be sourced from a reverse osmosis plant with back-up from Taswater mains.

Currently the only effective treatment for AGD is freshwater bathing and increasing the freshwater bath time intervals through the use of genetically selected stock from the Tasmanian salmon selective breeding program. Petuna will also use stock from the Saltas Tasmanian Salmonid selective breeding program to stock this proposed lease.

Use of Antibiotics

Petuna is cognisant of the global concern relating to antimicrobial resistance. Petuna has a long investment history in the research and development of vaccines and epidemiological investigations, to aid in disease prevention and the need for antibiotic usage.

Petuna has strict internal policies regarding the use of antibiotics in our stocks. If a bacterial disease is identified as a cause for disease and fish welfare becomes compromised, Petuna will only use antibiotics based on culture and sensitivity testing and when prescribed by a registered veterinarian.

Petuna has demonstrated its commitment to this and has not used antibiotics on any stock since October 2014.

Feed components

One commenter queried what is in the feed.

- Vegetable or poultry oil/tallow – by products of human food production
- Fish Oil – from sustainably managed fisheries (e.g. south American anchovies) and fish trimmings
- Fish meal – from well managed fisheries eg South American anchovy) and fish trimmings.
- Meat protein – from by-products of human food production (e.g. poultry meal, meat meal, blood meal, feather meal).
- Vegetable Proteins – e.g. lupin meal, soya meal, and soya protein concentrate
- Cereal grains – e.g. wheat, beans and starch
- Vitamins, minerals and supplements – e.g. astaxanthin, probiotics, phosphorous, calcium, zinc and folic acid.
- Krill meal – from WWF and MSC Certified providers

Our major feed suppliers understand the importance of feed safety, security and traceability at a local and global level. To ensure the food safety of both raw materials and finished feed products, our suppliers are certified against both the Feedsafe® Stock Feed Manufacturer's Council of Australia standards, and Global GAP Compound Feed Manufacturing standards. These certifications are underpinned and complemented by a comprehensive HACCP program.

Further information regarding these standards can be located at:

Feedsafe®: http://www.sfmca.com.au/

Global GAP: https://www.globalgap.org/uk_en/for-producers/globalg.a.p./cfm/

HACCP: http://www.mhlw.go.jp/english/topics/importedfoods/guideline/dl/04.pdf

Astaxanthin

Queries about astaxanthin/ what turns the flesh pink?

The European Food Safety Authority set an inclusion rate of 100mg/kg in complete diet for salmonids and states that "the maximum permitted dietary level for salmon and trout is of no concern for the safety of the consumer."

The diets that Petuna uses have inclusion rates of astaxanthin well under this level.

Astaxanthin and canthaxanthin are pigmenting carotenoids that turns the flesh pink in colour. These pigments are naturally occurring in plankton, crustaceans and fish. Salmon in the wild would usually get these carotenoids from the consumption of krill, which are small crustaceans.

Astaxanthin used in modern salmonid diets is "nature identical" in that the chemical structure is exactly the same as that which is naturally occurring.

References

https://pdfs.semanticscholar.org/ac9f/c45376aca151de6d0e5d1801130474ae14a8.pdf

http://www.petuna.com.au/sustainability/

https://pdfs.semanticscholar.org/15f5/bc421aca5acbfbde662c1d74110e4e4589fc.pdf

https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2014.3725

2.10 Introduced marine pests (IMP's)

Concern about the potential for increased nutrients in the marine environment to encourage the proliferation of introduced marine pests.

Undaria pinnatifida (Harvey) Suringer was first detected on the east coast of Tasmania by J. C. Sanderson and D. Steane in 1988. Anecdotal evidence suggests colonization of this coast by the alga since 1982. The alga is most prevalent on rocky reefs that would normally support few macroalgae such as 'urchin barrens', on sheltered coasts subject to the influence of oceanic waters (Sanderson, 1990).

A subsequent study by Valentine (2003), indicated that patterns of abundance of U. pinnatifida demonstrate clearly that disturbance resulting in removal of the native algal canopy is a critical step in the process leading to establishment of U. pinnatifida.

Since Undaria appears reliant on disturbance to facilitate invasion the proponent refers back to Sections 4.1.2 and 4.2.1 of the EIS, describing the benthic habitat mapping and marine vegetation of the zone, which described the substrate as uniformly hard-compacted coarse sand with some shell grit, and that the bottom sediments are likely mobile and dynamic. During the benthic habitat mapping no macroaglae (attached or drifting) was located within the zone, as such it seem unlikely that disturbance of the seabed will create a new opportunity for colonisation of U.pinnatifida. It is however possible that U. pinnatifida may colonise on aquaculture equipment but that standard procedural net and equipment cleaning will remove this growth.

The DPIPWE Undaria Action Plan states that microscopic spores of U. pinnatifida is easily spread on boats and other equipment hence the proponent will manage this risk by following the Tasmanian Salmonid Growers Association Biosecurity Protocols and the National System (control plans) for the Prevention and Management of Marine Pest Incursions to ensure that this marine pest is not transported to other areas around the state on aquaculture equipment.

References

Sanderson J. C., (1990) A Preliminary Survey of the Distribution of the Introduced Macroalga, Undaria pinnatfida (Harvey) Suringer on the East Coast of Tasmania, Australia, Botanica Marina Vol. 33, pp. 153 – 157.

Valentine, J.P, Johnson, C.R., (2003), Establishment of the introduced kelp Undaria pinnatifida in Tasmania depends on disturbance to native algal assemblages, Journal of Experimental Marine Biology and Ecology 295 (2003) 63– 90

http://dpipwe.tas.gov.au/conservation/the-marine-environment/marine-pests-and-diseases/undaria-action-plan

2.11 Freshwater Use

Commenters queried the freshwater supply that will be used by Petuna.

One representor had the following comments about the proposed use of reverse osmosis for water supply:

- the EIS does not detail the likely impacts of disposal of reverse osmosis concentrate on the marine environment or the methods of mitigating these impacts.
- the EIS does not detail what, if any, other permits or approvals would be required to operate the plant.
- if the RO plant is to be based on shore, what opportunities there will be for members of the affected community to voice any concerns they may have as to potential noise or other impacts?

Various options for water supply have and continued to be explored. Petuna's motivation remains on minimal reliance on the existing resource with "self sufficiency" a key driver for the business. This focus will result in no material impact on existing freshwater resource for the community.

At this stage Petuna continue to investigate off shore desalination as the primary source of fresh water with modelling indicating a capacity of 189 megalitres annually. On shore desalination is also being investigated in concept.

We have engaged with the necessary expertise around design and efficiency around this technology. Recognising the risk around technology, short term backup storage onshore is also being investigated conceptually which may or may not be integrated into the freshwater supply chain.

Containment and disposal/release of concentrate and used fresh water remains an important factor for consideration around the suitability of this technology and the avenues to manage this will go through the appropriate regulatory approval processes.

2.12 Waste Streams on Land

Query about where the smolt needed to stock these farms will come from, and how are the environmental impacts of their production being managed?

The smolt needed to stock the Storm Bay area will grown at Petuna's Cressy hatchery. The Cressy hatchery operates under strict environmental conditions regulated by the EPA, Inland Fisheries Service and Biosecurity Tasmania.

2.13 Marine Debris

A number of commenters raised concerns about marine debris.

Petuna acknowledges that marine debris from fish farms has been an ongoing issue. During 2017 all operations created a register of equipment that is now supplied to the regulator to allow identification of any marine debris including ropes, floats and feed pipes. Major or larger items are also labelled to allow easy identification, and the proponent is currently trialling a live AIS tracking device on its lease markers.

2.14 Climate change & Greenhouse gas emissions

Commenters queried whether climate change could affect industry sustainability in Storm Bay.

The EIS section 5.1.14 responded to how the expected sea physicochemical changes resulting from climate change will impact upon the proposed development. It should be noted that the worst case CO2e atmospheric concentration scenario (RCP 8.5) modelled by CSIRO[1] predicted an increase in

sea surface temperature of 0.8°C by 2030 and 3.6°C by 2090. This represents a very small predicted annual increase in temperature rise, substantially less than the typical temperature variances currently experienced at Storm Bay.

A predicted worst-case increase of 0.05°C /year in sea surface temperature is unlikely to have a material impact on freshwater, therapeutant or antibiotic usage during the expected project lifetime.

Petuna has a selective breeding program underway to improve the heat tolerance of its stock.

DEPOMOD is a solids deposition modelling product that uses inputs of feed type and size, and site hydrodynamic and bathymetric data to predict the distribution of waste feed and faeces. Predicted changes to sea temperature and salinity as a result of climate change will not affect outputs of this modelling process as presented in the EIS.

The nutrient emissions modelling undertaken by IMAS and CSIRO represent contemporary sea physiochemical properties and did not consider future forecast changes to water temperature and salinity due to climate change. That said, given the exceedingly small forecast rate of sea temperature and salinity change modelled by CSIRO, there is likely to be a negligible impact on the soluble nutrient emissions modelling outputs in the short to medium term.

Greenhouse gas emissions from RO plant

There was one comment that estimated greenhouse gas emissions do not appear to include emissions from an operating RO plant**.** The Greenhouse gas estimate of 0.7t CO2e/t/production cycle did include energy usage attributable to a SWRO plant, however this was not clearly stated in the EIS.

References

[1] https://www.climatechangeinaustralia.gov.au/en/climate-projections/coastal-marine/marine-explorer/

2.15 Environmental management

Representors commented on the BEMP, the need for characterising and monitoring reef habitats and adaptive management.

Petuna supports the establishment of a Broadscale Environmental Monitoring Program (BEMP) in Storm Bay. Also, Petuna has been collecting monthly water quality data from Storm Bay since 2016. Petuna supports the use of appropriate sensors to inform the development, validation and calibration of the BGC model. Petuna agrees that baseline and ongoing monitoring should be implemented prior to the establishment of new salmon leases within Storm Bay.

Petuna supports public annual reporting of environmental performance if other comparable Tasmanian industries are required to do similar. Petuna is not opposed to the publication of key data/metrics if they do not put Petuna at a competitive disadvantage to other businesses or industries.

TACL recommended that a comprehensive baseline environmental assessment is conducted on rocky reef systems that lie adjacent or proximate to the proposed "Storm Bay North" finfish lease and also recommended two additional rocky reef monitoring sites - one at the southern end of Betsey Island and the other at Outer North Head on the Tasman Peninsula. These two locations are the closest to rocky reef that currently support the commercial harvest of abalone. Petuna will

collect four seasonal cycles (Autumn and Spring over two years) of reef-life biodiversity assessment baseline data prior to stocking this proposed development. Petuna biodiversity survey sites have been nominated at the Iron Pot, south-west of Betsey Island, north-east of Betsey Island and at North West Head.

The Derwent Estuary Program Ltd stated that it would like to be involve in the development of the BEMP. Petuna supports engagement with DEP regarding development of the proposed Storm Bay BEMP and incorporation of DEP's existing environmental monitoring data.

3 Impacts on the Human Environment

3.1 Navigation

Several commenters stated that the proposals obstruct marine traffic and present safety hazards to navigation.

The shape and size of the zone proposed for North Storm Bay was determined in a consultative process with a number of stakeholders including Marine and Safety Tasmania. This zone has been located outside of major transit routes to avoid becoming a navigation hazard. The location of this proposed development was selected taking into consideration the major commercial and recreational vessel routes and the rhumb line of the Sydney to Hobart yacht race. During the 2017 Sydney to Hobart Yacht Race 93.6% of competing yachts travelled either on the rhumb line or further south, noting that the rhumb line is one kilometre south west of the proposed zone.

Safety of life at sea is a key priority of Petuna, measures to improve the visibility of marine farms for boating traffic are being developed in consultation with Marine and Safety Tasmania.

Marine Debris

The salmon industry understands that marine debris may cause potential harm to the environment in which it operates and may impact the enjoyment and safety of other users of the waterway and the community more broadly. It is a shared responsibility of the TSGA member companies to reduce marine debris in all our growing regions.

During 2017 all operations created a register of equipment that is now supplied to the regulator to allow identification of any marine debris including ropes, floats and feed pipes. Major or larger items are also labelled to allow easy identification, and the proponent is currently trialling a live AIS tracking device on its lease markers.

3.2 Reservations

This proposed development is over 2.7km from the originally proposed Betsey Island MPA (This proposed MPA was not recommended by the RPDC due to replication with the Sloping Island proposed MPA).

3.3 Noise and Lights

Petuna recognises local concerns around increased vessel traffic generally and the potential impact of both acute and cumulative noise generated through this traffic.

A comprehensive noise survey was conducted primarily within the Northwest Bay, Tinderbox and Dennes Point modelled around indicative vessel movement and type, there can be no dispute that traffic will increase. In response to this:

- A commitment to encompassing noise restriction into the design of vessels

- Vessels will travel at the greatest proximity from residences through the points between Tinderbox and Dennes Point
- A policy of "automate where possible" will be committed to reduce vessel traffic.
- Supply chain considers vessel traffic through the area to ensure key movements are completed within daylight hours
- Petuna supports industry collaboration to address and develop local vessel impact strategy through the area in conjunction with local community.
- Petuna recognises the shorebase location has not been confirmed and will commit to further stakeholder consultation regarding noise management.

Petuna acknowledges that net cleaning operations create additional localised underwater noise and will ensure a review of science and engineering to understand possible impact and solutions to address.

A visual impact assessment undertaken for the EIS demonstrated that the resultant visual impact at all sensitive receptor locations is minor significance to no significance. This is predominantly due to the substantial distance between the proposed lease and the nearest sensitive receptor of greater than 9 km. Thus Petuna believes that no mitigation is required. (Section 5.2.1 of the EIS.)

3.4 Commercial fishing

Some commenters raised concerns about impacts to commercial fishing.

Impacts on commercial fisheries have been addressed in Sections 4.5.3 and 5.2.8.1 of the EIS.

Petuna will commence baseline bi-annual reef life biodiversity assessment (Edgar Barrett Methodology) at four sites including the Iron Pot, North East and south west of Betsy Island and North West Head during May 2018. These sites have been selected as key reference sites either within the 50th percentile of the CONNIE 3 dispersion modelling output where nitrogen loads are more likely to have an ecological effect.

Petuna acknowledge marine farm leases by nature exclude public access to previously available water space and that any predictive assessment of impact on the commercial Danish Seine fishery for Whiting and Flathead is limited.

3.5 Recreational fishing

Some commenters raised concerns about impacts to recreational fishing.

The proponent acknowledges that any impact on commercial or recreational fisheries are likely to be similar in nature. Refer to 2.1 and 2.2 and 3.4

3.6 Recreational activities

One representor commented that Tasmanian’s are being locked-out of waterways that have traditionally been used for recreational activities.

The location of the proposed lease is greater than 6 km from the nearest shoreline and the total proposed area under lease is less than 0.5% of the total area of Storm Bay.

The proposed lease location was adjusted to ensure that it was outside of recreational boating/fishing transit lanes developed by MAST.

3.7 Tourism

Some representors were concerned that tourism amenity and tourism businesses could be impacted.

Salmon aquaculture does not irreversibly impact, much less destroy the marine environment if undertaken in conjunction with robust environmental monitoring and associated adaptive management. Various studies have shown that the impact of salmon aquaculture is localised and reversible (Macleod et al., 2002, 2004a,b, 2008).

Petuna's proposed zone is located 11 km east of Bruny Island and thus visual impacts to tourism operators on Bruny Island is negligible.

3.8 Socio-economic impacts

Concerns were raised about the potential impacts to Bruny Island's reputation for 'clean, green food' and the Tasmanian Brand. Concerns about potential impacts to tourism and commercial fishing businesses were also raised.

Petuna believes that sustainable salmon aquaculture is compatible with Tasmania's reputation for the highest quality food and beverage produce.

Petuna assessed potential impacts on commercial fishing in section 5.2.8 of the EIS and on the tourism industry in section 5.2.11 of the EIS.

4 Cumulative Impacts

Petuna acknowledges that there will be a cumulative impact across the three proposed marine farming zones. This is most relevant to potential impacts on water quality, which is why the soluble emissions modelling was undertaken on the cumulative emissions of all 3 proposals.

The proposed adaptive management approach via a total Storm Bay TPDNO, informed by a whole of Storm Bay BEMP, acknowledges the need to manage water quality on a cumulative scale.

5 Stakeholder Consultation

Petuna undertook a comprehensive stakeholder engagement process and sought to identify and engage with all major stakeholders with an interest in the proposal, as detailed in Section 3 of the EIS.