Avalon Aquaculture Fisheries Reserve Management Plan 2024

Victorian Fisheries AUTHORITY

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Child Safe Statement
The VFA is committed to the Victorian Child Safe Standards and is focused on creating a safe environment that fosters the protection of all children to keep them safe from harm.

Acknowledgement of Country
This document acknowledges the Wadawurrung Traditional Owners of the Country in which the Avalon Aquaculture Fisheries Reserve is situated and recognises their deep connection to their ancestral lands and waters.

Contents

Executive summary

The purpose of the Avalon Aquaculture Fisheries Reserve Management Plan (the Plan) is to specify the objectives, strategies and actions for managing activity within the Avalon Aquaculture Fisheries Reserve (Avalon AFR). The Plan has been prepared in accordance with the requirements of the *Fisheries Act 1995* (Fisheries Act) and prescribes management arrangements for the Avalon AFR within an ecologically sustainable framework.

The Avalon site was declared a fisheries reserve under the provisions of the Fisheries Act on 14 August 2008. The Avalon AFR is a 16.99 hectare land-based site located at Bates Point at the northern end of the Point Lillias peninsula on the northern shore of the Geelong Arm in Port Phillip Bay, Victoria. It is occupied by a single aquaculture operation and provision for a road. The Avalon AFR does not include the abutting Point Lillias Aquaculture Fisheries Reserve or the coastal shoreline.

The scope of the Plan is limited to the Avalon AFR and its immediate environs.

The vision of the Plan is:

"*to develop an environmentally sustainable and economically viable aquaculture industry at the Avalon Aquaculture Fisheries Reserve that recognises and respects the cultural heritage of the site while contributing a commercial supply of high quality seafood.*"

The Plan has four management objectives to assist in achieving this vision:

1. Protect Aboriginal cultural heritage and values;
2. Maintain ecological health;
3. Facilitate economic viability; and
4. Maintain social licence.

The Plan prescribes a suite of strategies to achieve these objectives including:

- Ensure that the cultural values of the Avalon AFR are not compromised as a result of aquaculture activity within the Avalon AFR;
- Ensure that the legislative obligations to the Wadawurrung Traditional Owners are met whilst managing the Avalon AFR;
- Ensure the ecological health of waters and land adjacent to the Avalon AFR are not jeopardised as a result of aquaculture activity within the Avalon AFR;
- Minimise ecological impacts within the Avalon AFR as a result of aquaculture activity to local, acceptable and reversible change;
- Facilitate economically viable and sustainable commercial aquaculture production within the Avalon AFR;
- Encourage aquaculture investment within the Avalon AFR by providing secure tenure over the site;
- Enhance commercial production by facilitating research and development;
- Recognise the rights and safety of other users of the environment of the Avalon AFR; and
- Provide information on the use of a community resource by the aquaculture industry (excluding commercial-in-confidence data).

The Plan will provide the basis for the management of the Avalon AFR until a new Plan is declared.

1. Introduction

Overview

This management plan (the Plan) applies to the Avalon Aquaculture Fisheries Reserve (Avalon AFR), a 16.99 hectare land-based site located at Bates Point on the northern shore of the Geelong Arm in Port Phillip Bay, Victoria.

The Victorian Fisheries Authority (VFA) has prepared the Plan in accordance with Part 3 of the *Fisheries Act 1995* (Fisheries Act). It comes into effect following its declaration in the Victoria Government Gazette and remains in place until a new Plan is declared or is cancelled in accordance with the requirements of the Fisheries Act.

Under the Fisheries Act, the Minister may amend a management plan by notice published in the Victoria Government Gazette.

This Plan sets out a series of strategies and actions to achieve the management objectives for the Avalon AFR.

The Environment Conservation Council's Marine, Coastal and Estuarine Investigation

Marine aquaculture is the cultivation and harvesting (or farming) of fish, shellfish and other aquatic species, utilising seawater as the growing medium. There are three categories of marine aquaculture, each with specialised requirements and different impacts on the environment: land-based aquaculture, extensive marine aquaculture (generally shellfish) and intensive marine aquaculture (generally finfish).

Historically, a major factor identified as limiting the development of marine aquaculture in Victoria was a lack of access to suitable sites in marine waters.

In September 1997, the Victorian government formally requested that the Environment Conservation Council (ECC) undertake an investigation of marine, coastal and estuarine areas in Victoria. The Terms of Reference required the ECC to recommend options for the establishment of at least one marine park and at least one marine aquaculture area.

Following extensive research, consultation and consideration of the environmental, social and economic implications, the ECC prepared recommendations for a system of marine protected areas as well as areas suitable for marine aquaculture in a final report (ECC 2000).

The ECC recommended 12 marine aquaculture zones, including two land-based zones (Avalon and Point Lillias). The ECC also recommended that management plans be prepared for each zone.

The Victorian government endorsed all of the recommendations of the ECC for marine aquaculture.

2. Avalon Aquaculture Fisheries Reserve

The Avalon Aquaculture Zone was declared a fisheries reserve by Order in Council under s88(1) of the Fisheries Act for the purpose of aquaculture. The Order took effect on the date that the declaration was published in the Victoria Government Gazette (14 August 2008).

Attributes of the Avalon Aquaculture Fisheries Reserve

The Avalon AFR is an irregular shaped area of land located at the northern end of the Point Lillias peninsula between Bates Point and historical salt production facilities, which are now mostly located within the Avalon Coastal Reserve. The Point Lillias peninsula is located on the northern shore of the Geelong Arm of Port Phillip Bay, Victoria. It is approximately 13km southeast of Lara and 7km south of Avalon Airport (**Figure 1)**.

The Avalon AFR is 16.99 hectares and is comprised of an existing aquaculture operation and provision for an access road, which provides future access to the Point Lillias Aquaculture Fisheries Reserve (Point Lillias AFR) and beyond.

The Avalon AFR encompasses decommissioned salt pans, formerly utilised in the production of salt by Cheetham Salt. The footprint of the existing aquaculture facility, an operation that grows abalone, occupies a former part of the salt farm consisting of saltpans with circular levees and embankments.

The Avalon AFR with the GDA coordinates (Geocentric Datum of Australia) that define its boundaries is shown in **Figure 2**. The boundaries are based on drainage channels, tracks and the coastline.

An assessment of the attributes of the Point Lillias peninsula, which includes the Avalon AFR and the Point Lillias AFR, was conducted as part of the Environmental Effects Statement for the proposed relocation of the Coode Island Chemical storage facility to Point Lillias in 1995 (Maunsell Pty Ltd 1995). A summary of information from Maunsell Pty Ltd (1995), as well as from other sources, is provided in **Appendix 1**.

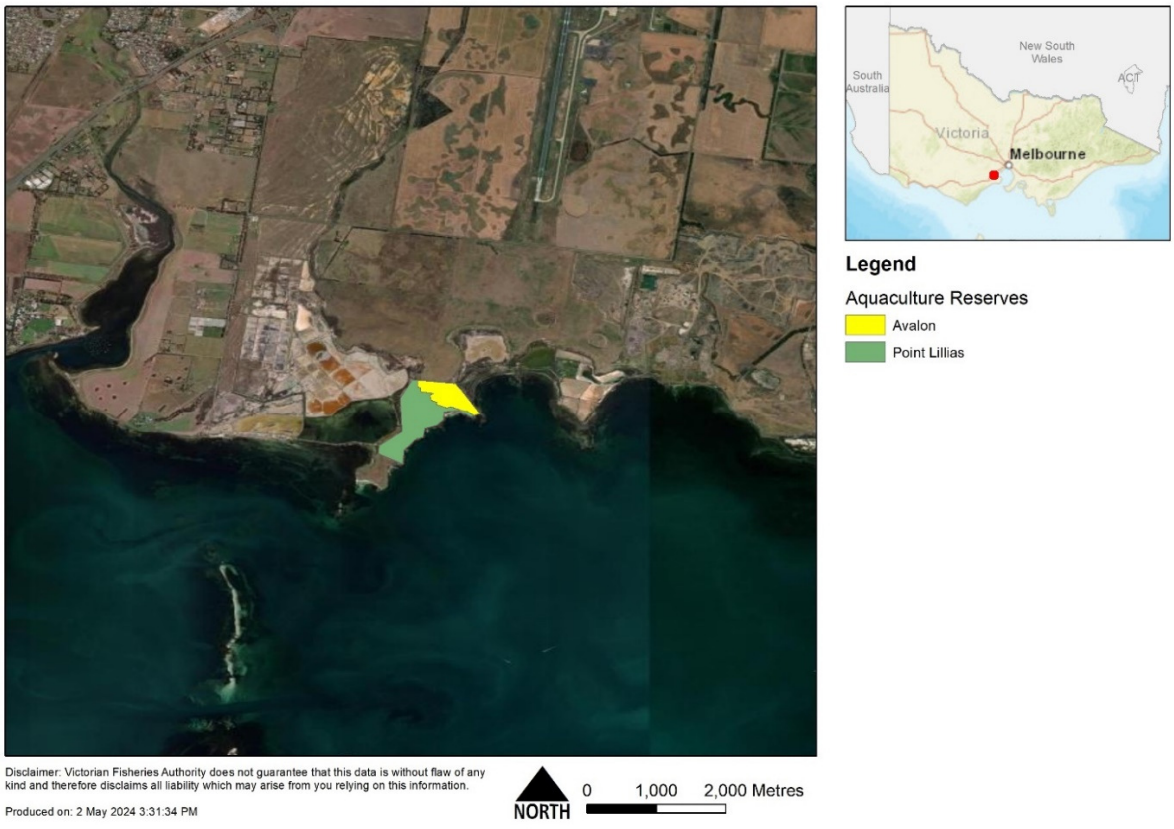

Figure 1. The Point Lillias peninsula, which includes the Avalon (yellow) and Point Lillias (green) Aquaculture Fisheries Reserves.

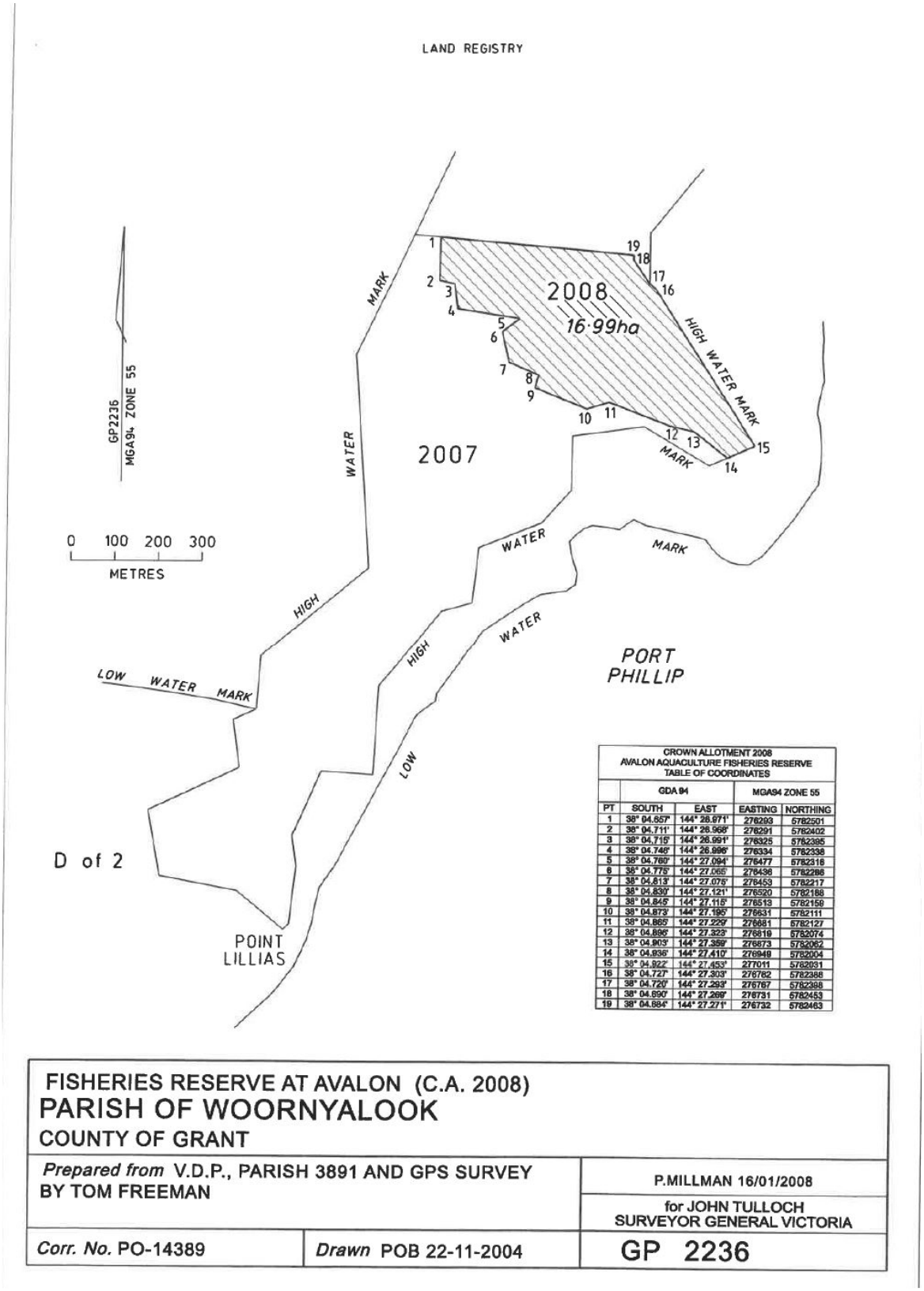

Figure 2: Avalon Aquaculture Fisheries Reserve (Crown Allotment 2008).

Overview of aquaculture activity in the Avalon Aquaculture Fisheries Reserve

Marine aquaculture, in the form of land-based abalone farming, commenced in the Avalon AFR in 1998.

The facility consists of buildings associated with site's operation located on the eastern boundary of the site, growing ponds and tanks in the centre of the site, seawater pumps, pipelines and drainage channels for water transport to and from Port Phillip Bay. The abalone farm uses decommissioned saltpans to the west and north west as settlement ponds for the treatment of aquaculture waste water.

Seawater is pumped from Port Phillip Bay, through the farm, and back out to the bay through the Avalon Coastal Reserve, after treatment in the settlement ponds.

Land and waters within and adjacent to the Avalon Aquaculture Fisheries Reserve

The Avalon AFR has been reserved for the purpose of aquaculture. Other users are not permitted within the site without authorisation under the Fisheries Act and the permission of the Crown Land lease holder. The shoreline, which is outside the boundaries of the Avalon AFR is used intermittently by recreational fishers, bird watchers and walkers.

Surrounding the Point Lillias peninsula is the Avalon Conservation Reserve, which extends along the coastline from Limeburners Lagoon to the edge of the Commonwealth Department of Defence facility at Point Wilson (**Figure 3**). An Avalon Conservation Reserve Action Plan is currently being developed by Parks Victoria and partners to guide restoration of the area for the benefit of shorebirds and seagrass and saltmarsh habitats.

Some parts of the Avalon AFR are within or are immediately adjacent to the Port Phillip (Western Shoreline) Bellarine Peninsula Ramsar Site, which extends from Point Cook to Lake Connewarre near Barwon Heads (**Figure 4**). The Ramsar Convention is an international treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Victoria has twelve Ramsar-listed wetlands. The Ramsar Convention obliges contracting parties to manage Ramsar sites in such a way as to maintain their ecological character equivalent to that at the time of listing. The definition of 'ecological character' is the 'combination of the ecosystem components, processes and benefits/services that characterise the wetlands' (Department of Environment, Land, Water and Planning 2018). The Port Phillip (Western Shoreline) Bellarine Peninsula Ramsar Site was listed in 1982.

The boundaries of Port Phillip (Western Shoreline) Bellarine Peninsula Ramsar Site are currently under review by Department of Energy, Environment and Climate Action (DEECA) with the purpose of recommending additional areas that meet criteria for listing to be added to the site.

To the north of the Avalon AFR is a large area that is an area earmarked for development as the Greater Avalon Employment Precinct (https://vpa.vic.gov.au/project/greater-avalon-ep).

Figure 3. The Avalon Coastal Reserve. Source: Parks Victoria

Figure 4. The Port Phillip (Western Shoreline) Bellarine Peninsula Ramsar Site (blue). Source: Department of Environment, Land, Water and Planning (2018).

Aboriginal cultural heritage in the Avalon Aquaculture Fisheries Reserve

The Wadawurrung Traditional Owners Aboriginal Corporation was appointed as a Registered Aboriginal Party (RAP) under the Victorian *Aboriginal Heritage Act 2006* in May 2009. Wadawurrung Country extends from the Great Dividing Range of Ballarat, to the coast from the Werribee River to Aireys Inlet, thereby including the Point Lillias peninsula.

Under the *Aboriginal Heritage Act 2006*, the Avalon AFR and Point Lillias AFR are located in an area of cultural heritage sensitivity. This means that a Cultural Heritage Management Plan (CHMP) is required before development can occur within the reserves.

A comprehensive CHMP was completed and approved in 2011 (Marshall and Walker 2011) for the 'Activity Area' (the Avalon AFR and Point Lillias AFR and the proposed road). 'Activity' refers to any potential development (i.e. buildings, roads, tanks, pipelines, pumps etc).

Marshall and Walker (2011) noted that the construction of saltpans for the historical salt farm had caused significant ground disturbance in the Avalon AFR. During a Standard Assessment (a foot or ground survey) and a Complex Assessment (an assessment based on the excavation of the 'Activity Area'), the authors found that surface artefacts were located in low numbers across wide areas, indicating disturbance to the soils, i.e. from widespread and deep mechanical excavations. The aquaculture operation (built in 1997, operational in 1998) probably caused further disturbance to artefact bearing deposits (Marshall and Walker 2011).

The CHMP provides procedures to minimise harm to archaeological sites in the form of management actions that need to be completed prior, during and after any development in both the Avalon and Point Lillias AFRs.

Any person undertaking activity in the Avalon AFR must be fully compliant with the requirements of the CHMP. Failing to comply with an approved CHMP is an offence under the *Aboriginal Heritage Act 2006*. All legislative requirements must also be met for any other activities that are not specifically covered by the existing CHMP.

Climate change and the Avalon Aquaculture Fisheries Reserve

Climate change has significant implications for land-based aquaculture, affecting various aspects of production, infrastructure, and sustainability.

Modelling by Victoria's Future Climate Tool shows a projected sea level rise of 20cm by 2040 and 47cm by 2070 (Future Climate Tool - https://vicfutureclimatetool.indraweb.io/project). While much of the Avalon AFR will be not be affected by sea level with a 20cm rise, most of the surrounding area will be inundated, thereby potentially affecting access to the site and water sources. For example, the height of the underground water table will increase, which may affect the salinity of groundwater and soils (**Figure 5**).

In addition to sea level rise, other elements of climate change such as water temperature, extreme weather events and increased risk of disease, could affect operations at the Avalon AFR in the future. Increased water temperature can affect the growth, reproduction, and survival rates of cultured animals and, although it is possible to control water temperature in land-based systems, the required infrastructure is costly to install, maintain and operate. An increase in extreme weather events can result in storm surge and rainfall that potentially damages infrastructure and disrupts operations. It will be important for the lease holder to factor these increased risks into future decisions around development at the site as well as other aspects of aquaculture production, such as which species are produced.

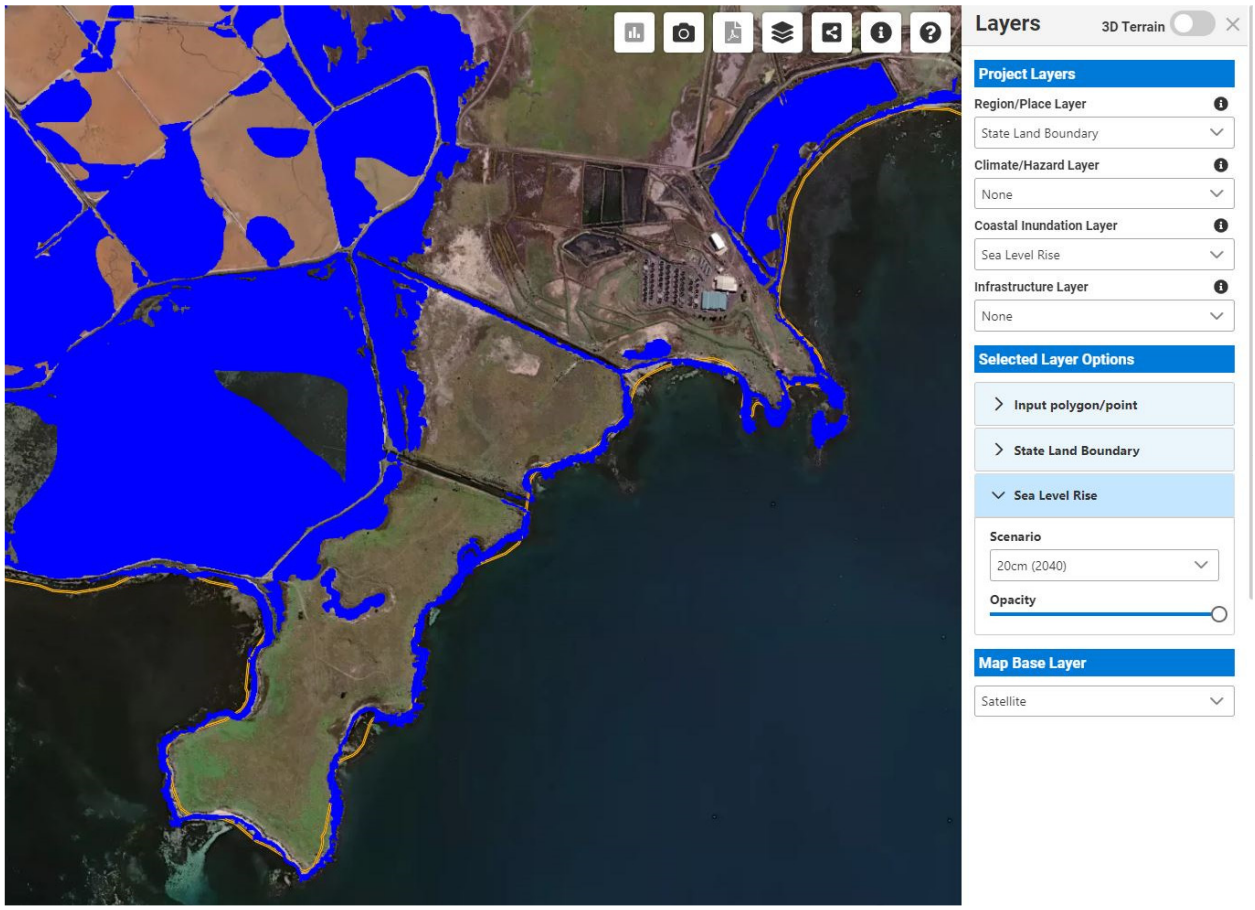

Figure 5. Projected impact of a sea level rise of 20cm by 2040 on the Avalon AFR and surrounds. Source: https://vicfutureclimatetool.indraweb.io/project.

3. Framework for managing the Avalon Aquaculture Fisheries Reserve

Legislative and policy framework

The Victorian Fisheries Authority (VFA) is the lead agency for aquaculture development in Victoria. Marine aquaculture in Victoria is managed in accordance with the Fisheries Act, the Fisheries Regulations 2019 and the Fisheries (Fees, Royalties and Levies) Regulations 2017.

The Fisheries Act provides the legislative framework for managing Victoria's fisheries resources and sets out the general provisions applicable to aquaculture, commercial and recreational fishing. The objectives of the Fisheries Act that are relevant to aquaculture are:

- *to provide for the management, development and use of Victoria's fisheries, aquaculture industries and associated aquatic biological resources in an efficient, effective and ecologically sustainable manner;* and
- *to promote sustainable commercial fishing and viable aquaculture industries and quality recreational fishing opportunities for the benefit of present and future generations.*

To deliver on these objectives, the VFA provides the core functions of licensing, administration, policy development and management. In addition, the VFA provides resources to facilitate research and development, fish health management and shellfish quality assurance.

Other key Victorian legislation and policy, relevant to aquaculture, include the:

- *Land Act 1958;*
- *Crown Land (Reserves) Act 1978*
- *Marine and Coastal Act 2018;* and
- *Environment Protection Act 2017.*

The *Land Act 1958* provides for the granting of leases and licences for the use of Crown Land. Section 134 of the *Land Act 1958* provides for the issue of leases for non-agricultural purposes (e.g. aquaculture). Section 134 leases provide exclusive occupancy rights.

The *Crown Land (Reserves) Act 1978* provides for the reservation of Crown Land for various public purposes, including preserving areas of ecological significance and the development of public utilities. The *Crown Land (Reserves) Act 1978* also provides for the management of such reserved lands.

The *Marine and Coastal Act 2018* provides for an integrated and coordinated whole-of-government approach to approvals for the use and development of marine and coastal Crown Land.

The *Environment Protection Act 2017* makes provisions for 'the protection of the environment'. Accordingly the *Environment Protection Act 2017* provides for the regulation of waste in the environment, for the prevention and control of pollution and noise, and for the protection and improvement of the quality of the environment.

Management of the Avalon AFR will be consistent with other legislation including, but not limited to:

- *Victorian Fisheries Authority Act 2016;*
- *Seafood Safety Act 2003;*
- *Aboriginal Heritage Act 2006;*
- *Occupational Health and Safety Act 2004;*
- *Interpretation of Legislation Act 1984;*
- *Livestock Disease Control Act 1984;* and

- *Marine Safety Act 2010*.
- *Climate Change Act 2017*

From a policy perspective, all Australian jurisdictions, including the State of Victoria, have made a commitment to manage fisheries resources according to the principles of ecologically sustainable development. These principles include:

- ensuring that fishing is carried out in a biologically and ecologically sustainable manner;
- ensuring that there is equity within and between generations regarding the use of fish resources;
- maximising economic and social benefits to the community from fisheries within the constraints of sustainable utilisation;
- adopting a precautionary approach to management, particularly for fisheries with limited data; and
- ensuring that the processes and procedures involved in management of a fishery are appropriate, transparent and inclusive.

Policies relevant to aquaculture activity in Victoria include:

- *Victorian Aquaculture Fisheries Reserves - leasing and licensing policy;*
- *National Policy for the Translocation of Live Aquatic Organisms - Issues, Principles and Guidelines for Implementation;*
- *Guidelines for Assessing Translocations of Live Aquatic Organisms in Victoria;*
- *Victorian Abalone Aquaculture Translocation Protocol;* and
- *Abalone Health Accreditation Program.*

Authorisations to conduct aquaculture activity

In order to conduct aquaculture activity in an aquaculture fisheries reserve in Victoria, the following authorisations are required:

- An aquaculture licence - an annual licence issued under the Fisheries Act to authorise aquaculture activity in a specified area;
- And/or a general permit, also issued under the Fisheries Act to authorise aquaculture activity for research and development purposes;
- A Crown Land lease - a lease issued under the *Land Act 1958* or the *Crown Land (Reserves) Act 1978* to provide exclusive occupancy rights over a site for aquaculture purposes;
- Coastal consent - consent provided under the *Marine and Coastal Act 2018* to authorise the use and development of coastal Crown Land; and
- An Environment Protection Authority (EPA) Operating/Development Licence – an operating/development licence issued under the *Environment Protection Act 2017* to authorise the cultivation of fish or other edible aquatic organisms in land-based or on-shore facilities.

Aquaculture licence

In Victoria, a person or company that wishes to conduct aquaculture activity is required to hold an aquaculture licence issued under s43 of the Fisheries Act, subject to certain conditions (Part 13 of the Fisheries Regulations 2019).

Aquaculture licences specify the area, the species of fish (as defined under the Fisheries Act) that may be farmed, the licence period, production return requirements, operational management controls and environmental management requirements.

Aquaculture licences are issued consistent with the *Victorian Aquaculture Fisheries Reserves – leasing and licensing policy*.

For the purposes of the Fisheries Act, an aquaculture licence is a prescribed class of renewable and transferable fishery licence.

The Fisheries Act currently prescribes five classes of aquaculture licences that specify Crown Land including: Aquaculture (Crown Land - Other), Aquaculture (Crown Land—Offshore), Aquaculture (Crown Land - Bivalve Shellfish), Aquaculture (Crown Land – Eels) and Aquaculture (Crown Land - Abalone) Licence. The Aquaculture (Crown Land - Abalone) Licence applies to abalone grown in marine systems, not on land.

For land-based aquaculture of abalone on private or Crown Land, the Fisheries Act prescribes the Aquaculture (On-shore Abalone) Licence.

An Aquaculture (On-shore - Abalone) Licence authorises the licence holder, on private land or on Crown Land as specified in the licence, in or on protected waters, other than marine waters:

- to use, form or create a habitat for hatching, rearing, breeding, displaying or growing abalone specified in the licence for sale or other commercial purposes;
- to hatch, rear, breed, display or grow abalone (including a commercial quantity) specified in the licence for sale or other commercial purposes;
- to use commercial aquaculture equipment specified in the licence;
- to possess abalone which has been hatched, reared, bred or grown under the licence at the area specified in the licence;
- to process (other than to shuck) abalone which has been hatched, reared, bred, displayed or grown under the licence at the area specified in the licence;
- to sell abalone which has been hatched, reared, bred, displayed or grown under the licence at the area specified in the licence; and
- to engage one or more persons to carry out any activity authorised by the licence.

In accordance with the Fisheries Act, aquaculture licences are subject to any conditions imposed by the Fisheries Act, any conditions that are set out in the Fisheries Regulations 2019 and any other conditions that are expressed or referred to on the licence. Failure to comply with a condition of a fishery licence is an offence under the Fisheries Act.

Under section 61 of the Fisheries Act, the Minister may make directions specifying eligibility criteria that must be met before the issue, renewal or transfer of an aquaculture licence can be approved.

As per the relevant Ministerial Direction (Victoria Government Gazette, 6 July 2006), if an applicant applies for the issue, renewal or transfer of an aquaculture licence for an area within an aquaculture fisheries reserve, the applicant must either have:

- a lease or sub-lease of Crown Land under s134 of the *Land Act 1958*; or
- the written consent of the holder of a lease of Crown Land under s134 of the *Land Act 1958*; and
- must sign a deed poll that provides indemnity to the State Government of Victoria in a form required by the State consistent with the warranty and indemnity provisions specified in the Crown Land lease, for the specified area for which the licence is to be issued, transferred or renewed.

Cost recovery for management of the Avalon AFR will occur through the implementation of levies on aquaculture licences. Costs are recovered in accordance with cost recovery principles, including:

- those who benefit from government services pay for the associated costs; and
- the design, nature and extent of services should take account of the risks posed and the value of production.

General permit

A person or company that wishes to conduct aquaculture activity for research and development purposes may be issued with a General Permit under s49 of the Fisheries Act. A General Permit can be held in addition to an aquaculture licence.

Crown Land lease

Crown Land leases for marine aquaculture within aquaculture fisheries reserves are allocated consistent with *Victorian Aquaculture Fisheries Reserves – leasing and licensing policy*.

Within each aquaculture fisheries reserve, the VFA, as the Committee of Management appointed under s14 of *Crown Land (Reserves) Act 1978,* is able to allocate exclusive occupancy rights to licensed operators for the purpose of conducting aquaculture activity in the form of a lease. Under previous arrangements, leases were granted under s134 of the *Land Act 1958* by the Department of Energy, Environment and Climate Change (DEECA) but all future leases will be granted by the VFA under s17D of the *Crown Land (Reserves) Act 1978*. Crown Land leases will also managed by the VFA.

Coastal consent

Aquaculture fisheries reserves are located within 'marine and coastal Crown Land' within the meaning of the *Marine and Coastal Act 2018*. It is an offence for a person to use or develop, or undertake works on, marine and coastal Crown Land without consent (s66 of the *Marine and Coastal Act 2018*).

Consent to use aquaculture fisheries reserves for aquaculture activity is obtained from the Minister for Environment as the responsible Minister for administering the *Land Act 1958*, the *Crown Land (Reserves) Act 1978* and the *Marine and Coastal Act 2018*.

EPA Operating/Development licence

Environment protection laws in Victoria require proactive steps to be taken to manage risks of harm from pollution and waste. The Environment Protection Regulations 2021 support the *Environment Protection Act 2017* by providing clarity and further detail on how to fulfil environmental obligations under the Act including through permissions for prescribed activities.

Environment Protection Authority permissions have three tiers based on the level of risk to human health and the environment. Operating and development licences are issued for prescribed activities with the highest risk.

Under Schedule 1 – Prescribed Permission Activities and Fees of the Environment Protection Regulations 2021, a B03 (Fish farms) Operating and/or Development Licence is required for cultivating fish or other edible aquatic organisms in a land-based or on-shore facility with a design water flow rate of 0.2 or more megalitres per day.

Species

Within the Avalon AFR, there is the opportunity for increased production of presently cultured species, plus the opportunity for the commercial and experimental culture of new species.

Consideration of the species permitted for culture in the Avalon AFR will be determined on a case-by-case basis.

Food safety requirements

The *Seafood Safety Act 2003* requires that all seafood businesses in Victoria obtain a licence issued by PrimeSafe, the Statutory Authority responsible for regulating meat, poultry, seafood and pet food in Victoria. For businesses that grow and harvest seafood for human consumption, a 'PrimeSafe Aquaculture Licence' is required. Licence requirements include a food safety plan, which describes how the business controls food safety hazards to ensure that the food produced is safe for human consumption.

Victorian Shellfish Quality Assurance Program

The Victorian Shellfish Quality Assurance Program (VSQAP) is a quality assurance program protecting human health through the active monitoring of bivalve shellfish harvest areas. It is the Victorian implementation of the Australian Shellfish Quality Assurance Program.

Aquaculture operations that harvest bivalve shellfish for human consumption must hold a relevant Aquaculture (Crown Land – Bivalve shellfish) licence and be compliant with the requirements of VSQAP.

Bivalve shellfish are not produced at the Avalon AFR at present.

Compliance

The VFA maintains a state-wide risk-based enforcement and compliance strategy, which identifies risks to fisheries resources and targets enforcement resources appropriately. Aquaculture operations are part of this strategy and are monitored accordingly.

Officers authorised under the Fisheries Act have the power to enter aquaculture premises at any reasonable time for the purpose of examining compliance with the conditions of the licence or permit issued under the Fisheries Act. Fisheries officers are also authorised for the purposes of the *Crown Land (Reserves) Act 1978*, the *Land Act 1958*, the *Marine and Coastal Act 2018*, and the *Marine Safety Act 2010*.

4. Objectives, strategies and actions

Purpose

The purpose of the Plan is to specify the objectives, strategies and actions for managing activity within the Avalon AFR.

Scope

The scope of the Plan is limited to the Avalon AFR and its immediate environs.

Vision

The vision of the Plan is:

"*to develop an environmentally sustainable and economically viable aquaculture industry at the Avalon Aquaculture Fisheries Reserve that recognises and respects the cultural heritage of the site while contributing a commercial supply of high quality seafood.*"

Management objectives, strategies and actions

The objectives of the Fisheries Act that are relevant to aquaculture are:

- *to provide for the management, development and use of Victoria's fisheries, aquaculture industries and associated aquatic biological resources in an efficient, effective and ecologically sustainable manner;* and
- *to promote sustainable commercial fishing and viable aquaculture industries and quality recreational fishing opportunities for the benefit of present and future generations.*

The following 'guiding' management objectives and subsequent strategies and actions are consistent with these legislated objectives.

Objective 1. Protect Aboriginal cultural heritage and values

Strategy 1.1 Ensure that the cultural values of the Avalon AFR are not compromised as a result of aquaculture activity within the Avalon AFR.

Strategy 1.2 Ensure that the legislative obligations to the Wadawurrung Traditional Owners are met whilst managing the Avalon AFR.

Action Ensure those undertaking activity in the Avalon AFR undergo training in the Aboriginal cultural heritage of the Avalon AFR and surrounds.

Action Ensure those undertaking activity in the Avalon AFR are fully compliant with their obligations under the Cultural Heritage Management Plan and their legislative obligations to the Wadawurrung Traditional Owners.

Objective 2. Maintain ecological health

Strategy 2.1 Ensure the ecological health of waters and land adjacent to the Avalon AFR are not jeopardised as a result of aquaculture activity within the Avalon AFR.

Strategy 2.2 Minimise ecological impacts within the Avalon AFR as a result of aquaculture activity to local, acceptable and reversible change.

Action Ensure that the ecological health of waters and land adjacent to the Avalon AFR are safeguarded through compliance with the conditions of the aquaculture licence, the Crown Land lease and the operating licence issued by the Environment Protection Authority.

Action Ensure that development of the site is done in a manner that minimises environmental harm and that approvals are obtained from all relevant authorities before any building activity or disturbance of land commences.

Action Ensure that the site is maintained in good order and condition during the lease and is returned to its original condition at the expiration of the lease.

Objective 3. Facilitate economic viability

Strategy 3.1 Facilitate economically viable and sustainable commercial aquaculture production within the Avalon AFR.

Strategy 3.2 Encourage aquaculture investment within the Avalon AFR by providing secure tenure over the site.

Strategy 3.3 Enhance commercial production by facilitating research and development.

Action Provide authorisation for occupation and security of tenure to encourage investment in aquaculture at the Avalon AFR.

Action Facilitate research and development by providing appropriate authorisation for Fisheries Research and Development Corporation (FRDC) funded projects.

Objective 4. Maintain social licence

Strategy 4.1 Recognise the rights and safety of other users of the environment of the Avalon AFR.

Strategy 4.2 Provide information on the use of a community resource by the aquaculture industry.

Action Provide access for other users of the coastline adjacent to the Avalon AFR and hold public liability insurance to protect the public in the event of injury/loss.

Action Comply with environmental monitoring requirements and make available environmental and production data for broader public scrutiny (excluding commercial-in-confidence information).

5. Managing the Avalon Aquaculture Fisheries Reserve

This section describes how the Avalon AFR will be managed to meet the objectives, strategies and actions outlined in Section 4.

Objective 1: Protect Aboriginal cultural heritage and values

As noted in Section 2, a comprehensive Cultural Heritage Management Plan (CHMP) was completed and approved in 2011 for the 'Activity Area' – the entire Avalon AFR and Point Lillias AFR and the proposed road (Marshall and Walker 2011).

'Activity' was defined as 'likely be in the form of buildings, roads, tanks and pipelines as well as seawater pumps and intake lines that will move water from the sea to the location of aquaculture infrastructure'.

The CHMP noted that any 'Person' (defined in the *Interpretation of Legislation Act 1984*) undertaking an 'Activity' within the 'Activity Area' must ensure that the activity undertaken by them, or by others acting on their behalf, complies with the CHMP.

The CHMP provides procedures to minimise harm to archaeological sites in the form of management actions that need to be completed for any development in both the Avalon and Point Lillias AFRs. These actions include appropriate inductions or training for personnel with regard to Aboriginal Cultural Heritage Places within the 'Activity Area', carried out by the Cultural Heritage Advisor with assistance from the Wadawurrung Traditional Owners. All personnel should be made aware of the form and location of the Aboriginal archaeological sites documented during the CHMP as well as those registered during previous assessments.

As well as these general actions, the CHMP specifies actions to be taken prior, during and after an 'Activity'.

As noted earlier, failing to comply with an approved CHMP is an offence under the *Aboriginal Heritage Act 2006*. All legislative requirements must also be met for any other activities that are not specifically covered by the existing CHMP.

Objective 2: Maintain ecological health

Land-based marine aquaculture is a form of aquaculture which is contained to a site. The environmental concerns of a land-based operation therefore relate to water quality and contamination of water and soils. The actual impacts of an operation are site-specific and dependent on the species, location (characteristics and sensitivity), culture system and husbandry methods employed.

In land-based operations, seawater is pumped into the facility, diverted into holding structures and subsequently discharged to sea, recirculated or utilised elsewhere. One concern therefore relates to the seawater that returns to the sea, which, in the case of the Avalon AFR, is Port Phillip Bay.

As well as the quality of returning seawater, there are other aspects of a land-based operation that require management in order to safeguard the wider environment. Farm activities such as supplementary feeding, post-harvest processing, equipment cleaning, equipment maintenance, and the storage and use of hazardous substances can all affect the ecological health of the site through the production of waste and potential contamination of water and soils. Stock mortality is an additional source of waste. Managing waste is an important aspect of land-based aquaculture systems.

There is also the risk that water circulated through an aquaculture operation is discharged into the receiving environment containing disease and exotic organisms, if these are present in the operation. Disease and marine pests can be also be transferred from a land-based aquaculture operation into the environment or other operations via stock (including deliberate movement of stock, mortalities, discarded product, escaped fish), via staff and visitors, via equipment and vehicles, and via other animals (for example, vermin and wild birds).

The development of an aquaculture operation includes built infrastructure such as buildings, tanks, drainage channels, pipelines and settlement ponds. As one objective of the Plan is to limit the ecological impacts of the aquaculture activity to 'local, acceptable and reversible change', the VFA requires aquaculture operators to pay a rehabilitation fund contribution in the event that an operation fails or is discontinued. This ensures that aquaculture infrastructure is removed at the cost of the operator and the site is returned to a pre-operation state.

Environmental management requirements for the Avalon AFR are described under Objective 4.

2a. Water quality

Land-based aquaculture operations use flow through culture systems where water is pumped from the marine environment and then discharged back out to sea after it circulates through the operation. In the case of land-based abalone farms, discharged water can contain uneaten feed and abalone faeces and be elevated in nutrients and sediment levels. The release of nutrients into the marine environment may result in algal blooms or the growth of epiphytes on aquatic vegetation such as seagrass. Additionally, sedimentation can affect the composition and function of benthic fauna and flora and lead to the formation of anoxic sediments, thereby negatively impacting the receiving environment.

Water quality can be improved through the use of settlement ponds, which help to reduce nutrient and sediment loads prior to discharge. Settlement ponds need to be of a sufficient size to hold the volumes of wastewater discharged and a sufficient period of settlement time needs to be provided in order for nutrients and sediment to be retained.

Key criteria for returning seawater includes levels of nitrogen, ammonia, phosphorus, dissolved oxygen and suspended solids. Other aspects of water quality that may also be monitored include pH, temperature, salinity and the presence of chemical residues. All discharges of water from aquaculture operations in the Avalon AFR must be conducted in accordance with the requirements of the operating licence issued by the Environment Protection Authority (EPA) under the *Environment Protection Act 2017*.

2b. Waste management

The management of waste is an important environmental issue for land-based aquaculture. Waste can be generated as a result of supplementary feeding, during harvesting and processing, when cleaning and maintaining equipment and premises and via stock mortality.

Abalone usually require supplementary feeding in the form of pellets or algae. The production of algae for land-based systems may be achieved by the addition of fertilisers to stimulate algal growth. Fertilisers can be added directly into culture tanks or through the use of purpose-built algae culture containers. The addition of feed into the culture system may contribute to an increase in nutrient levels in the water and/or sedimentation at the end of discharge pipes.

As noted above in Section 2a, sediments and nutrients in wastewater can be managed via the use of settlement ponds. The amount of feed and fertiliser can also be adjusted to minimise discharged waste.

Harvesting and processing fish can produce solid waste in the form of ofal and carcasses/shells as well as contaminated wastewater. It should be noted that, in accordance with the Fisheries Regulations, while abalone can be processed by an Aquaculture (On-shore Abalone) Licence holder, this does not include shucking (removing the meat from the shell). Only the holder a Fish Receiver(Abalone) Licence is authorised to shuck abalone.

Cleaning of equipment will produce waste predominantly in the form of contaminated water and sludge. Maintaining equipment (e.g. pumps, generators, nets, ropes, compressors, vessels, vehicles) can produce waste in the form of disused, broken or replaced equipment and waste oils and fuels.

Solid waste in the form of stock mortalities is also present in land-based operations as it is inevitable that some level of stock mortalities will occur throughout the culture cycle. Stock mortalities in land-based systems can result from disease, poor animal health, sub-optimum water quality as well as a variety of other reasons. The extent of mortalities may range from day-to-day mortalities of a few fish to large-scale mortalities resulting from disease or an environmental event such as an algal bloom.

All waste that is generated from the land-based aquaculture operation must be contained, collected, treated and/or disposed of in an appropriate manner as per EPA requirements in order to prevent contamination of land and waters on-site and in the receiving environment. The Crown Land lease also sets out conditions to prevent and manage contamination and changes to the environment of the site.

2c. Hazardous substances

Chemicals may be used in aquaculture operations to treat stock, sterilise equipment, induce spawning and/or prevent disease. Land-based aquaculture systems are also likely to use fuels, oils, cleaning agents and other hazardous substances.

All aquaculture licence holders must only keep what is required for the aquaculture operation on site and all chemicals, inflammable liquids, acids and other hazardous substances must be stored and disposed of appropriately to ensure that they do not cause environmental harm.

2d. Translocation

The translocation of a live aquatic organism at its broadest definition encompasses any human-assisted movement of that organism. The translocation of aquatic organisms is recognised as a potentially threatening process to the environment, particularly where such translocation occurs outside the natural range of the species being translocated.

As aquaculture presents opportunities to utilise a range of species within and outside their natural range in a variety of farming systems, it is important to identify and manage the risks associated with this activity.

Translocations of live aquatic organisms pose an ecological risk through the potential transmission of diseases and parasites, potential impacts on biodiversity from changes in genetic integrity, and the establishment of feral and/or exotic marine pest populations.

Recognising the need for a nationally consistent, risk-based approach to managing translocations of aquatic organisms across Australia, a '*National Policy for the Translocation of Live Aquatic Organisms – Issues, Principles and Guidelines for Implementation*' was developed in 1999. The national policy, principles and guidelines recognised that the previous ad-hoc approach to managing translocations of live aquatic organisms did not adequately manage the risk to Australia's economic, social and environmental well-being.

In response to the national policy, the Victorian government developed the '*Guidelines for Assessing Translocations of Live Aquatic Organisms in Victoria*' in 2003. In doing so, Victoria met the National requirements for translocation of live aquatic organisms though a process consistent with that adopted by other Australian jurisdictions.

The '*Guidelines for Assessing Translocations of Live Aquatic Organisms in Victoria*' provide a structured and transparent approach to managing the risks associated with deliberate translocations in Victoria of aquatic biota to public and private waters managed under the Fisheries Act. They describe a risk management and decision-making process for assessing translocation applications. Amendments to the guidelines were made in 2009 and 2014.

Specific protocols were also developed for the most common types of translocation. The '*Victorian Abalone Aquaculture Translocation Protocol*' (the Protocol) was developed to manage the risks associated with the translocation of abalone to, and within, Victorian abalone aquaculture sites. Specific risks considered for abalone translocation are disease and parasite introductions, genetic shift in wild populations, translocation of associated species (i.e. marine pests), environmental impacts from the release of translocated species and establishment of feral populations.

The Protocol documents the risk assessment process undertaken in relation to the translocation of abalone in Victoria and the subsequent controls recommended for translocation activities associated with the abalone aquaculture industry.

It is a condition of the abalone aquaculture licences that licence holders comply with the requirements of the Protocol.

2e. Disease

Intensively cultured fish and shellfish are susceptible to bacterial, fungal, and parasitic infections, as systems may be stocked at high densities and animals can be under stress due to a sub-optimal environment. Diseases and aquatic pests can enter a land-based facility via a number of mechanisms including translocation of animals from another location, via supplementary feed, via staff and visitors, via equipment and vehicles, via other animals such as wild birds, or via the intake water supply.

Environmental concerns associated with diseases include the potential spread to wild populations, issues associated with disposal of mortalities and chemical use to control outbreaks.

In relation to abalone, there a number of diseases which are currently listed as 'notifiable' including Abalone viral ganglioneuritis and *Perkinsus olseni*. A 'notifiable disease' is one for which early recognition is one of the most important factors in controlling the disease and thus reducing its economic and social impact. It is a requirement under the *Livestock Disease Control Act 1984* that notifiable diseases, if suspected or detected, are reported to the Chief Veterinary Officer, Agriculture Victoria.

Abalone viral ganglioneuritis (AVG), caused by the abalone herpes virus, is highly infectious and can cause high mortalities in both farmed and wild abalone populations, thus resulting in substantial economic and environmental loss.

AVG was first detected in land-based abalone farms in Victoria in 2005. The disease was subsequently found to occur in the natural environment in 2006 and has continued to affect wild populations of abalone in Victoria, with the most recent detection occurring in western Victoria in 2023. AVG has also been detected in

Tasmania and New South Wales (in land-based processing and live-holding systems) and in South Australia in 2024 (in wild populations).

In response to the risk of AVG transmission in Australia, a nationally agreed document, the *Abalone Health Accreditation Program* (AHAP), was endorsed in 2015 to facilitate the safe movement of abalone livestock within and between Australian jurisdictions. The program only refers to cultured abalone on land-based farms (semi-closed facilities). The AHAP requires an auditable biosecurity plan to protect aquaculture operations and the wider environment from disease and pests.

Holders of abalone aquaculture licences in Victoria are required to comply with disease reporting requirements and with legislation, policies and procedures that minimise disease risk including the *Victorian Abalone Aquaculture Translocation Protocol* and the *Abalone Health Accreditation Program*.

As a general principle, the risk of disease can be avoided or minimised by:

- ensuring stock are free of disease prior to transfer;
- appropriately quarantining new stock before release into culture tanks or ponds;
- maintaining optimal conditions to minimise the potential for animal stress, including water quality;
- ensuring there are provisions to prevent stock escape; and
- regular monitoring of stock for signs of disease.

In relation to the farm management component, the procedures and protocols adopted by industry to avoid, mitigate and or treat disease incidents will be critical to ensuring that disease risks are (economically and environmentally) manageable.

2f. Site development and maintenance

New aquaculture facilities or expansions of existing operations need to be designed and constructed in a manner that minimises the potential for environmental harm.

Environmental issues associated with the construction of land-based facilities can include machinery noise, waste from disused or broken equipment, the impact on vegetation and soils from buildings, roads, tanks, pipelines and treatment ponds, the impact on the marine environment from discharge infrastructure, and the generation of industrial and construction waste.

Aquaculture facilities should include systems that avoid uncontrolled water leakage/seepage into the environment, including stormwater runoff from hardstand areas (e.g. concreted areas). Pipelines and associated infrastructure should be installed in a manner that minimises disruption to vegetation and foreshore areas.

Development approval must be obtained from relevant planning authorities before any construction work commences. Operators must comply with all relevant legislation, including that associated with native vegetation clearance, excavation and the Cultural Heritage Management Plan.

The aquaculture licence holder is required to mark the most seaward point of any water intake or output pipes with buoys that meet the specifications of Marine Safety Victoria and Parks Victoria. Deployment and maintenance of buoys is the responsibility of the licence holder.

The presence of redundant and/or dilapidated commercial aquaculture equipment, associated infrastructure, and industrial waste affects environmental values, visual amenity and creates a safety hazard. As per the conditions of the Crown Land lease, it is the responsibility of the lease holder to maintain the site in good repair and condition and ensure the site is kept secure, clean and free from debris and rubbish.

2g. Rehabilitation bond

One objective of the Plan is to limit the ecological impacts of the aquaculture activity to ‘local, acceptable and reversible change’.

In the event that ‘a person's authorisation to conduct aquaculture activities under an aquaculture licence or a general permit ceases’, section 60A of the Fisheries Act requires the licence or permit holder to remove ‘any commercial aquaculture equipment, fish, fishing bait or aquatic flora’ from the relevant area within a specified time. If the person does not comply with this direction, the VFA can proceed to restore the site with all costs and expenses recovered from the licence or permit holder.

Similarly, conditions of the Crown Land lease require the lease holder to return the site to its original condition at the expiration of the lease. In order to have a record of ‘original condition’, an Environmental Report must be completed (Objective 4).

In the event that the aquaculture operation fails or is discontinued and the licence or lease holder is no longer financially viable, the VFA still requires the ability to recover the costs of clean-up, removal of infrastructure and site restoration. This is achieved through the payment of a 'rehabilitation fund contribution' by the lease holder.

Objective 3: Facilitate economic viability

The economic viability of an aquaculture operation is ultimately the responsibility of the lease and licence holder but the VFA assists aquaculture operators by providing authorisation for the occupancy and use of public land.

The VFA provides security of tenure through lease agreements that allow aquaculture operators to invest in the growth and development of their business.

The VFA can also foster the extension and development of aquaculture businesses by providing authorisation for research and development activities as part of FRDC funded applications. General permits that authorise aquaculture activity for the purposes of research and development may be issued for the Avalon AFR on a case by case basis. Research and development will generally be undertaken by the licence holder.

Objective 4: Maintain social licence

Implementation of the Avalon AFR alienates a community resource for the exclusive use of the aquaculture industry. In order to maintain community approval for this activity, the rights and safety of other users of the environment of the Avalon AFR need to be recognised and safeguarded, and information on the ecological health of the Crown Land needs to be collected and provided for public scrutiny.

In addition, there is a community expectation that the public resource is used by the aquaculture industry in a manner that maximises the return to the community. Return to the community is achieved in part by aquaculture development within the Avalon AFR, output of commercially valuable aquaculture product, and the creation of employment opportunities. The provision of production data enables the public to determine if this return has been met.

4a. General public access

Other users of the environment of the Avalon AFR include recreational fishers, bird-watchers, and walkers. Public access is available along the foreshore of the Point Lillias peninsula, outside the boundaries of the Avalon AFR. Public access within the Avalon AFR is not permitted without the permission of the lease holder. This is to protect the aquaculture operation as well as to minimise human health and safety risks.

4b. Public liability insurance

The development of Crown Land creates a possibility for injury/loss resulting from interactions with aquaculture infrastructure. The holder of the Crown Land lease within the Avalon AFR is required to obtain appropriate public liability insurance covering the Crown Land lease site.

Prior to the renewal of an aquaculture licence, or upon request, the licence holder must provide a Certificate of Currency for the insurance policy held by the Crown Land lease holder to the VFA.

4c. Environmental monitoring and reporting

An environmental management framework was developed for offshore marine aquaculture fisheries reserves in Victoria, based on a review of survey and monitoring methods for aquaculture operations in marine environments (Gavine and McKinnon 2002). The framework is based on three components: 1) a Characterisation Survey, 2) a Baseline Survey, and 3) Ongoing Monitoring. Methods for conducting the baseline survey and ongoing monitoring of Crown Land lease sites within marine aquaculture fisheries reserves are provided in the *Guidelines for Environmental Baseline Surveys and Ongoing Monitoring of Aquaculture Fisheries Reserves in Port Phillip and Western Port* (Fisheries Victoria 2006). In marine environments, the focus is on the characteristics of the sediment and seabed beneath the culture infrastructure.

A similar framework applies to land-based sites where the focus is on water quality and potential contamination of water and soils at the site. The three components are:

1. A Characterisation Survey is a broad one-off assessment of the habitat, physico-chemical and biological attributes of an aquaculture fisheries reserve. An assessment of the Point Lillias peninsula

was completed by the environmental consulting company, Maunsell Pty Ltd in 2005. A summary of information from Maunsell Pty Ltd (1995), as well as from other sources, is provided in **Appendix 1**.

2. An Environmental Report sets out the condition of the site prior to the date on which a Crown Land lease commences and must be undertaken in accordance with applicable Environmental Protection legislation. The Environmental Report provides a benchmark for the condition of the environment at the site on the commencement date.

   In the Avalon AFR, where an aquaculture facility has occupied the site since 1998, earlier environmental reports will act as the benchmark for the condition of the environment at the site.

3. Ongoing Monitoring is undertaken at intervals as specified by the Environmental Management Plan. Monitoring refers to ongoing assessment of the health of the site and provides the basis for the VFA to amend licence conditions in order to maintain the impacts of aquaculture at the site to acceptable, local and reversible.

Reporting on the environmental monitoring undertaken within the Avalon AFR is important for public accountability. Information on the environmental management of aquaculture fisheries reserves is published on the VFA website.

In addition to the environmental monitoring requirements of the VFA, which are specified as conditions of the aquaculture licence and the Crown Land lease, the aquaculture operator must obtain permission from the Environmental Protection Authority (EPA) to operate a land-based aquaculture system. As noted earlier, the EPA provides permission in the form of an operating licence, which has reporting and record-keeping requirements. One requirement is the submission of a Permission Information and Performance Statement (PIPS) on request.

Information provided in PIPS is made available to the public via the EPA Public Register. Each section of the PIPS states what information is included in the public statement. Commercial-in-confidence information, including volumes of waste and the product produced, is not released publicly. The EPA is required by law to maintain, and make available, information provided by businesses, thereby creating public value through a transparent reporting culture.

It is the responsibility of the Crown Land lease holder to undertake and fund all monitoring requirements, as specified.

4b. Production reporting

In order to provide the VFA and the public with information on production within the Avalon AFR, the aquaculture licence holder is required to complete an Aquaculture Production Return Form twice per year as specified in the Fisheries Regulations 2019 as well as any further record keeping conditions as specified on the licence.

Collective production data are made available to the public by VFA in the *Commercial Fish Production Bulletin* for each financial year. All information provided on production within the Avalon AFR is provided in a form that protects commercial confidentiality of the licence holders.

6. References

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7. Appendices

Appendix 1: Attributes of the Point Lillias peninsula

A detailed assessment of the attributes of the Point Lillias peninsula, which includes the Avalon AFR and the Point Lillias AFR, was conducted as part of the Environmental Effects Statement for the proposed relocation of the Coode Island Chemical storage facility to Point Lillias in 1995 (Maunsell Pty Ltd 1995). A summary of information from Maunsell Pty Ltd (1995), as well as from other sources, is provided below.

Geology and soil characteristics

The geology of the Point Lillias peninsula is classified as Quaternary/Late Tertiary formed by Newer Volcanic basalt of 15 to 20 metre (m) thickness. The sub-surface commonly contains high plasticity residual basaltic clay overlying basalt of 3 to 3.5m depth throughout the centre of the area, but also comprises some isolated areas around 1m in depth. These clays react differently to moisture, resulting in changes in volume with seasonal changes from soft conditions in winter, to substantial shrinkage and cracking in summer. Basalt boulders in a clay matrix extend from 4 to 7m depth, and high plasticity clay extends from 10 to 12m.

Hydrogeology

Previous drilling investigations showed that basalt layer out-crops extend over a large proportion of Point Lillias and appear within Relative Level (RL) –8m to RL –11m of Australian Height Datum (AHD) level. An uppermost aquifer is formed in the basalt within Point Lillias, which functions as an unconfined, fractured rock aquifer. Another aquifer appears to exist in the sand layer beneath the basalt and is separated by about 2m of clay. Both aquifers are influenced by tidal processes.

A low hydraulic gradient exists at Point Lillias with water depth approximately less than 1m AHD. The salinity of groundwater in the area ranges from 2.4 to 53 parts per thousand (ppt) suggesting strong links to seawater, and possibly nearby brine evaporation ponds.

Wind

The predominant wind directions for the Point Lillias area, measured at Point Wilson, are from the west (22%) and south (19%), followed by the north-west (13%) and north (12%). Wind speeds exceeding 5 metre per second (m/s) and 10 m/s occur approximately 50% and 7.5% of the time, respectively.

Flora and Fauna

Information on the flora and fauna of Point Lillias comes from the Flora Information System (FIS 2004) of the Department of Environment, Land, Water and Planning (DELWP, now Department of Environment, Energy and Climate Action, DEECA), and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool, which were reviewed for a 5km radius around Point Lillias.

Appendices 7 and 8 from Maunsell Pty Ltd (1995), Blakers (1996) and the Orange-bellied Parrot Recovery Team (1998) provided specific information on the terrestrial flora and fauna of Point Lillias.

Maunsell Pty Ltd (1995) concluded, although that the natural values of Point Lillias itself were relatively low, the values of adjoining areas were very high and should be protected.

I. Flora

Point Lillias was inspected by a botanist on 20 January 2005 (GHD Pty Ltd 2005). One local area plant species list (T02905) was sampled from Point Lillias. Discussion of the surrounding terrestrial, wetland and marine environments are based on general observations and information from previous studies.

Native vegetation in Victoria is classified into unique units known as Ecological Vegetation Classes (EVCs). EVCs are described according to a combination of unique floristic, life form and ecological characteristics, and through an inferred fidelity to particular environmental attributes. Each EVC occurs under a common regime of ecological processes within a given biogeographic range and may contain multiple floristic communities.

The majority of Point Lillias is dominated by introduced herbland (no botanical significance). There are, however, patches of Coastal Saltmarsh, Coastal Tussock Grassland and Wetland Formation EVCs along the eastern, western and southern boundaries of Point Lillias. Coastal Saltmarsh and Wetland Formation are classified as “endangered” in the Victorian Volcanic Plains Bioregion and Coastal Tussock Grassland is classified as “vulnerable”.

A total of 85 flora species (41 endemic, 44 introduced) were recorded at Point Lillias (GHD Pty Ltd 2005). Two State significant species (rare in Victoria) were recorded at Point Lillias, Coast Saltwort *Salsola tragus ssp. pontica* and Tasman Grass-wrack *Zostera tasmanica*.

Small pockets of prickly speargrass (*Stipa stipoides*) grassland (of local-regional significance), glass wort (*Halosarcia spp.*) shrubland (of State significance), beaded glasswort (*Sarcocornia quinqueflora*) shrubland and shrubby glasswort shrubland (both of local-State significance) are also present at Point Lillias. The coastline is generally comprised of shoreline saltmarsh on exposed basalt.

II. Avian Fauna

Detailed fauna records for Point Lillias come from Ecology Australia (1995), the FIS (2004 DELWP, now DEECA), and the EPBC Act Protected Matters Search Tool. No field survey was conducted in 2005 (GHD Pty Ltd 2005).

The Werribee-Avalon area is an area of international and national importance for wading birds, with resident and migratory species identified in the region (Ecology Australia 1995).

Ecology Australia (1995) found that a large number of waders and waterbirds utilise the area in and around Point Lillias. The adjacent saltworks typically support approximately 20% of the internationally significant Bay shorebird community, internationally significant numbers of Banded Stilts and nationally significant numbers of Double-banded Plovers and Marsh Sandpipers. The majority of shorebirds that are in the area utilise the ponds of the saltworks including the shallows around the Avalon Beach Main Pond. Relatively few birds have been observed on Point Lillias itself, however they are observed in ponds directly adjacent to Point Lillias. The inshore waters around Point Lillias are foraging sites for Cormorants and Grebes and foraging and roosting sites for Fairy Terns and Crested Terns following breeding. The 1995 sighting of a recently fledged Fairy Tern chick being fed by an adult on rocks on the eastern shore of Point Lillias suggests the area may be an important post-natal foraging site. Bird Rock, just offshore from Point Lillias, supports large numbers of waterbirds (GHD Pty Ltd 2005).

The distinctive fauna of saltmarshes includes numerous shorebird species including the Orange-bellied Parrot (*Neophema chrysogaster*), a species that is considered critically endangered and is listed under the EPBC Act as being of national environmental significance. However few sites of significant saltmarsh habitat have been identified at Point Lillias (Ecology Australia 1995).

Ecology Australia (1995) provided a detailed account of Orange-bellied Parrot sightings at Point Lillias. While numerous (12-13) birds were sighted in the past (Pescott 1983), only one bird was repeatedly sighted near the southern edge of Point Lillias over a period of two months during the 1995 study. As the bird was able to survive in the area for two months, it demonstrates that suitable Orange-bellied Parrot habitat exists in the area (GHD Pty Ltd 2005).

Characteristic fauna of beaches and intertidal flats is largely comprised of a diverse shorebird assemblage, of regional to international zoological significance.

III. Other Fauna

Specific studies of terrestrial faunal assemblages in the region of Point Lillias are limited. Brief surveys of vertebrate terrestrial fauna have been conducted throughout the area encompassed by the Point Lillias and Avalon AFRs (Ecology Australia 1995). The introduced Rabbit, Fox and Dog were observed either directly or from predator scat analysis in the area (Ecology Australia 1995). An Echidna (*Tachyglossus aculeatus*), Fat-tailed Dunnart (*Sminthopsis crassicaudata*), and the introduced House Mouse (*Mus domesticus*) were sighted during the GHD field visit (GHD Pty Ltd 2005).

Threatened fauna including Short-beaked Echidna, Fat-tailed Dunnart, Swamp Wallaby, White-striped Mastiff Bat, Lesser Long-eared Bat, Gould's Wattled Bat, and Water Rat have all been recorded in the area (Ecology Australia 1995).

In general, the area is likely to support 20 (including 8 introduced) mammal species, 169 bird species (11 introduced), 5 frog, 9 reptile and 1 freshwater fish species (Ecology Australia 1995). Of these, 27 are threatened species.

Marine Habitat

The marine habitats adjacent to the Point Lillias peninsula are largely determined by seabed and sediment type, water depth, light penetration, water circulation and shelter from wave action (Marine Science and Ecology Pty Ltd 1995). The seabed along the east coast of Point Lillias is characterised by rocky reef and scattered reef with sparse seagrass (*Heterozostera tasmanica*) to approximately 200m offshore (Marine Science and Ecology Pty Ltd 1995).

Seagrass beds are distributed among the intertidal zones and subtidally to a depth of around 5m. Light penetration is the main limiting factor for seagrass distribution subtidally, although distribution can vary from year to year. Dwarf Grass-wrack, *Zostera muelleri,* dominates the intertidal zones, and Tasman Grass-wrack, *Heterozostera tasmanica*, dominates the subtidal zones, however they are often found together in mixed seagrass beds. Filamentous algae is often found growing epiphytically on seagrass.

Seagrass mapping by Blake and Ball (2001) shows dense beds of *Zostera-Heterozostera* and filamentous algae south of Avalon Beach, while on the southern and eastern sides of Point Lillias there is a combination of bare reef, medium and sparse Halophila / filamentous algae and sparse *Zostera-Heterozostera* / filamentous algae beds.

In addition to subtidal seagrass beds and rocky reef, the majority of the marine habitat adjacent to Point Lillias consists of soft silty to muddy substrate, with sediment grain size diminishing with depth (Marine Science and Ecology Pty Ltd 1995).

The predominant marine habitat adjacent to the Point Lillias peninsula is exposed bedrock.

Marine Flora and Fauna

Infauna in the subtidal soft bed habitat adjacent to Point Lillias is comprised of numerous species, in order of abundance and diversity, within the taxa Polychaeta, Crustacea, Mollusca and Echinodermata, with a mean of 57 species per 0.1 m^2 and 16262 organisms per m^2 (Marine Science and Ecology Pty Ltd 1995).

The epibenthic communities consist of sponges, the ascidian *Pyura stolonifera*, the sabellid worm *Sabella spallanzanii*, the holothurian *Stichopus mollois* and a number of sea star species (Marine Science and Ecology Pty Ltd 1995). The most abundant epibenthic organism in the subtidal zone adjacent to Point Lillias is the introduced sabellid worm, *S. spallanzanii* (Marine Science and Ecology Pty Ltd 1995).

Data from the study of three intertidal reef outcrops on the eastern side of Point Lillias indicates the most common organisms were gastropods, mussels and seastars, with decreasing trend in the abundance of mussels and seastars heading southward along the Point Lillias peninsula (Marine Science and Ecology Pty Ltd 1995).

Subtidal reef habitat is generally colonised by the green algae, *Ulva* and *Caulerpa*, and small brown and red species. Below a depth of about 1m dominant species are sea urchins (*Heliocidaris erythrogramma*), Blue Mussel (*Mytius edulis*), Flat Oyster (*Ostrea angasi*), sponges, ascidians, sea stars and hydroids (Marine Science and Ecology Pty Ltd 1995).