Eden-1
Kelp Aquaculture Farm
Disaster Bay, NSW

Environmental Impact Statement

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DOCUMENT DETAILS

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Document subtitle	Environmental Impact Statement
Applicant	Auskelp Pty Ltd (Auskelp) ABN 33 644 315 613
Auditor	KPMG
R&D Advisor	KPMG
Acknowledgment	Auskelp gratefully acknowledges the Marine Bioproducts Cooperative Research Centre (MBCRC) for their ongoing support in the development of this EIS
Planning Approval Framework	Under the State Environmental Planning Policy (Planning Systems) 2021, the Eden-1 Kelp Aquaculture Farm in Disaster Bay is classified as a State Significant Development (SSD). Consequently, it requires approval from the Minister for Planning under Part 5.2 of the Environmental Planning and Assessment Act 1979
Lease Area	NSW Department of Primary Industries (NSW DPI) lease area classification: AL21/004 (awarded to Auskelp 18 May 2021 following a competitive tender process)
Lease Size	200 ha
Kelp Species	Ecklonia radiata (Golden Kelp)
NSW Case ID	SSD-41680467
Publish Date	13 March 2026
Final Version	v9.4
Prepared by	Christopher Ride – Auskelp Pty Ltd Dr Maddy Dyring – Scientific Advisor
Contributing Authors and Specialist Inputs	Details provided in Author Qualifications section
Register Environmental Assessment Practitioner (REAP)	NGH Consulting: Nick Graham-Higgs NGH Consulting: Brooke Marshall
Cover Image Credit	Ecklonia radiata, Auskelp, 2024
Disclaimer	The information contained in this publication is based on knowledge and understanding at the time of writing (2026)
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Project Definition	Kelp Aquaculture Farm

DOCUMENT VERIFICATION

Revision	Date	Prepared by	Reviewed by	Approved by
Draft v7.6.9	21/07/2025	Dr Maddy Dyring	Christopher Ride	N/A
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FINAL v9.4	13/03/2026	Christopher Ride	NSW DPHI Jake Bailey Nick Graham-Higgs	Nick Graham-Higgs REAP R80014

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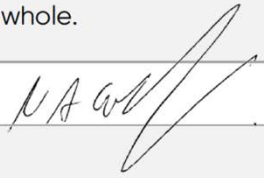
REAP DECLARATION

This Environmental Impact Statement has been prepared by Auskelp Pty Ltd with the assistance of specialist contributors and has been reviewed and endorsed by a duly authorised Registered Environmental Assessment Practitioner (REAP), as follows:

Declaration of registered environmental assessment practitioner	
Name	Nick Graham-Higgs
Registration number	R80014
Organisation registered with	NGH Pty Ltd

The undersigned declares that this EIS:

- Has been prepared in accordance with Schedule 2 of the *Environmental Planning and Assessment Regulation 2021*
- Contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates
- Does not contain information that is false or misleading
- Addresses the Secretary's Environmental Assessment Requirements (SEARs) for the Project
- Identifies and addresses the relevant statutory requirements for the Project, including any relevant matters for consideration in environmental planning instruments
- Has been prepared having regard to the Department's *State Significant Development Guidelines - Preparing an Environmental Impact Statement*
- Contains a simple and easy to understand summary of the Project as a whole, having regard to the economic, environmental and social impacts of the Project and the principles of ecologically sustainable development
- Contains a consolidated description of the Project in a single chapter of the EIS
- Contains an accurate summary of the findings of any community engagement
- Contains an accurate summary of the detailed technical assessment of the impacts of the Project as a whole.

Signature 

Date 13 March 2026

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EXECUTIVE SUMMARY

Eden-1 Kelp Aquaculture Farm

Auskelp Pty Ltd | 2025

The Proposal

Auskelp Pty Ltd proposes the development of the Eden-1 Kelp Aquaculture Farm, a 200-hectare offshore seaweed farming operation located in Disaster Bay, southern New South Wales. The farm will cultivate native kelp species *Ecklonia radiata* using longline infrastructure designed for high-energy open ocean environments. The Project's goal is to successfully pioneer and develop kelp farming as a sustainable form of ocean farming in Australian waters.

The Eden-1 farm will deploy modular 1-hectare kelp rigs within the proposed lease area (AL21/004), located approximately 1.1–3 km offshore. Each rig includes low-profile, sub-surface longlines anchored to the seafloor, supporting vertical droppers which will be annually seeded with locally propagated kelp sporophytes. No permanent above-water structures will be installed. Operations will occur seasonally, with activities including deployment, monitoring, maintenance, and harvest conducted via vessels operating from Snug Cove and Edrom in Twofold Bay. All marine infrastructure is removable and designed to minimise ecological disruption.

Rationale

The Eden-1 Project addresses the increasing global demand for sustainable, regenerative food sources, biostimulants for organic farming, and other kelp-based bioproducts by establishing Australia's first offshore kelp farm. As climate change, biodiversity loss, and agricultural emissions place pressure on terrestrial and aquatic food systems, seaweed aquaculture offers a high-yield, low-impact alternative that requires no fresh water, fertiliser, arable land, or feed. The Project proposes to grow >1,500 tonnes of wet seaweed annually valued at >$9 million and employing >30 full time staff to meet the increasing demand for domestically produced, sustainably sourced seaweed.

Kelp farming supports the production of a wide range of value-added products, including human food, animal feed supplements, biofertilisers, bioplastics, cosmetics, and pharmaceuticals. In parallel, the cultivation of native *Ecklonia radiata* in high-energy marine environments provides ecosystem benefits such as nitrogen and phosphorus cycling, habitat complexity and offshore sequestration that may facilitate ongoing marine biodiversity. With global oceans warming, coupled with significant loss of wild kelp beds and increasing algal blooms in Australian waters, kelp farming offers a practical mitigation option to tackle climate change. Kelp farming also offers a nature-based solution aligned with Australia's blue economy objectives. In addition, the Project supports regional economic development by creating skilled employment in marine operations, processing, research for coastal communities, like Eden.

Approvals Pathway

The Project is classified as State Significant Development (**SSD**) under Part 4, Division 4.7 of the Environmental Planning and Assessment Act 1979. Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021 (**SEPP**) identifies classes of development that are declared to be State Significant Development, including aquaculture development located within environmentally sensitive coastal waters of New South Wales. Coastal waters of NSW are identified as environmentally sensitive coastal waters under this SEPP.

The Minister for Planning, or their delegate, is the consent authority for SSD projects, and applications are assessed by the NSW Department of Planning, Housing and Infrastructure (**DPHI**). As an SSD project, the proposal must be accompanied by an Environmental Impact Statement (**EIS**) that assesses the potential environmental, social and economic impacts of the development.

The EIS must be prepared in accordance with the Secretary's Environmental Assessment Requirements (**SEARs**) and undergo a period of public exhibition, during which community consultation is required to ensure that the views of local residents, stakeholders, and government agencies are further considered. In addition, the proposal must demonstrate consistency with relevant state legislation, state planning policies, marine estate management objectives, and strategic land use frameworks. The Project also requires assessment under the

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Commonwealth's Environment Protection and Biodiversity Conservation Act 1999 (**EPBC Act**), due to potential impacts on Matters of National Environmental Significance (**MNES**).

Strategic Alignment

The Eden-1 Kelp Aquaculture Farm shows direct alignment with key New South Wales and Commonwealth government strategies that prioritise sustainable marine development, regional economic resilience, and innovation in emerging primary industries. At the NSW level, the Project directly supports the objectives of the NSW Marine Waters Sustainable Aquaculture Strategy (2021), which establishes a framework for responsible aquaculture growth. It is also consistent with the NSW Aquaculture Industry Development Strategy (2017), which advocates diversification into new aquaculture sectors, including seaweed. The Project advances the goals of the NSW Marine Estate Management Strategy 2018–2028, which promotes ecologically sustainable use of the marine estate, and aligns strongly with the NSW South East and Tablelands Regional Plan 2036, which identifies aquaculture as a key economic opportunity for the Eden region.

Nationally, the Project aligns with the National Aquaculture Strategy (2017), which aims to expand Australia's aquaculture industry to $2 billion annually through sustainable, innovative production. It is directly aligned with the Australian Seaweed Industry Blueprint (2020), which outlines the development of a high-value, environmentally beneficial seaweed industry. The Project supports the goals of the Modern Manufacturing Strategy – Food and Beverage National Manufacturing Priority Roadmap (2021) by fostering low-emission, value-added processing of Australian biomass. While located outside the Great Barrier Reef, the Project reflects the restoration and carbon-mitigation principles of the Reef 2050 Long-Term Sustainability Plan, which recognises seaweed aquaculture as a contributor to improved marine ecosystem health.

The NSW Seaweed Prospectus (2024) reinforces the Project's strategic importance, identifying seaweed as a major growth industry and highlights the value of establishing world-class hatcheries and offshore farms in regions such as Eden. The Project directly supports the South East and Tablelands Regional Plan 2036 and the Far South Coast Regional Economic Development Strategy (2023 Update), both of which emphasise aquaculture growth, enabling infrastructure, and the strategic significance of the Port of Eden. And at the regional level, the Project aligns with the Bega Valley Shire Community Strategic Plan 2042, advancing goals for sustainable industry development, marine-based employment, Indigenous engagement, and revitalisation of the Eden Wharf precinct.

Risk Assessment and Mitigation

Risk assessments have been conducted in accordance with the Ecological Sustainable Development (**ESD**) framework. Key areas assessed include:

- Marine biodiversity: Low risk due to the use of locally sourced seedstock and the absence of feed inputs, chemical treatments or waste discharges.
- Marine mammal interaction and entanglement: Low risk due to the use of tensioned longline systems, absence of slack or drifting ropes.
- Navigation safety: Compliance with maritime safety requirements, chart marking, and the installation of yellow surface marker buoys and navigation markers to ensure visibility to vessels.
- Visual amenity: Restricted visual impact due to the offshore location (>1.1 km from shore), low-profile infrastructure.
- Cultural heritage: No known Aboriginal or historic heritage items occur within the proposed lease area; Aboriginal Cultural Heritage Report completed, significant buffer zones maintained.
- Biosecurity: Exclusive use of locally sourced species and hatchery protocols that prevent the introduction or spread of pests and diseases.
- Water quality and nutrients: Low risk due to the absence of feed inputs or effluent discharge.
- Infrastructure failure: Mooring systems, anchors and longlines are designed for offshore conditions and will be subject to routine inspection, maintenance and retrieval protocols to prevent infrastructure loss or marine debris.
- Terrestrial biodiversity: The Project is located entirely within offshore marine waters and does not involve clearing of native vegetation or interaction with terrestrial habitats.

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Response Plans

The following response plans have been developed to ensure ongoing compliance and adaptive management throughout the project construction and ongoing life cycle:

- Marine Fauna Interaction Plan
- Cultural Heritage Response Plan
- Emergency Response Plan
- Traffic Management Plan
- Seaweed Aquaculture Biosecurity Plan
- Monitoring and Maintenance Program
- Environmental Management Plan
- Waste Management Plan
- Construction Deployment Management Plan
- Decommissioning Management Plan

Consultation

Over more than four years, Auskelp has engaged in ongoing consultation with stakeholders, including government departments, Traditional Owners, local community, regulators, marine users and commercial operators. Information has been gathered through direct engagement and dedicated working groups conducted in partnership with the University of Wollongong to ensure a comprehensive understanding of local perspectives. This was complemented in addition to a blind survey (N = 520, including 180 respondents from the Bega Valley Shire), providing an unbiased and direct measure of community sentiment. All feedback received through these processes has been carefully analysed and integrated into site design, navigation planning, and impact-minimisation measures to ensure the Project reflects local priorities, views and concerns. Further engagement continues via Registered Aboriginal Parties (**RAP**) and Interested Parties Notification Program (**IPNP**) to more than 500 Interested Parties. In addition, comprehensive community information sessions have been conducted both in-person and online, the largest being the Wonboyn Information Session on 22 October 2025 (where 65 people attended in person, and 57 parties viewed the session online). Environmental testing and site-specific monitoring have been undertaken over multiple years, ensuring that the Project is informed by robust, place-based data and testing on oceanographic conditions and ecological baselines. Project updates are published on the Auskelp website and sent to all Interested Parties, which include Annual Reports, Frequently Asked Question (**FAQ**) documentation, project status and regulatory updates, and the website has an online feedback portal. In addition, all enquiries for information on Auskelp or the Project have been diligently actioned.

Registered Environmental Assessment Practitioner (REAP)

This Environmental Impact Statement has been reviewed by an accredited Registered Environmental Assessment Practitioner (**REAP**) in accordance with the *Registered Environmental Assessment Practitioner Guidelines* (DPIE, 2023). A formal declaration has been provided confirming that the EIS complies with the requirements of the Environmental Planning and Assessment Regulation and meets the standards prescribed under the NSW planning framework. This includes compliance with statutory requirements and demonstrates a high standard of professional integrity, completeness, accuracy, clarity, and transparency, ensuring that the assessment provides a reliable and robust basis for regulatory decision-making.

Conclusion

The Eden-1 Kelp Aquaculture Project represents a sustainable, low-impact development that supports regional diversification and environmental stewardship. The local community, Traditional Owners, the marine industry, and government regulators have been updated throughout the project development, and the Project aligns with both Commonwealth, State and Regional government planning objectives. Through appropriate site location, evidence-based testing and design, and robust environmental review and management, the Project avoids any significant impacts. The Project delivers a new and regenerative marine industry in Southern NSW that delivers quality natural products, an ongoing contribution to climate mitigation, biodiversity enhancement, and adds Blue Economy jobs in southern NSW.

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Table 3. Summarises the relevant consent considerations in accordance with the SSD Guidelines.

Table 4. Summarises the preconditions required to grant consent in accordance with the SSD Guidelines.

Table 5. Summarises the permissibility in accordance with the SSD Guidelines.

Table 6. Summarises approvals required in accordance with the SSD Guidelines.

Table 7. Identifies the matters that the consent authority must consider in deciding to grant consent to this SSDA. It also identifies the section(s) of this EIS and the appended documents that address these mandatory matters.

Table 8. Summarises considerations under other legislation that should be considered in accordance with the SSD Guidelines.

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Risk Table 4: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – noise during the construction stages of Kelp Aquaculture Farming (modified from NOAA Fisheries – Marine Mammals and Underwater Noise, 2025; and Fletcher et al., 2004; Vom Berg, 2008).

Risk Table 5: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – availability of land based infrastructure (modified from Fletcher et al., 2012, 2018; Vom Berg, 2009, DAWE/FRDC, 2020, FAO & UNEP, 2021).

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Risk Table 6: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – structural integrity and stability of the longline infrastructure (modified from Fletcher et al., 2012, 2018; Vom Berg, 2009, DAWE/FRDC, 2020, FAO & UNEP, 2021).

Risk Table 7: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – impacts of kelp aquaculture farming on navigation and other waterway users (modified from Fletcher et al., 2012, 2018; Vom Berg, 2009, DAWE/FRDC, 2020, FAO & UNEP, 2021).

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Risk Table 11: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – Aboriginal and European heritage items and areas (modified from Fletcher et al., 2012, 2018).

Risk Table 12: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – noise during the operational stages of Kelp Aquaculture Farming (modified from NOAA Fisheries – Marine Mammals and Underwater Noise, 2025; and Fletcher et al., 2004; Vom Berg, 2008).

Risk Table 13: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – Work, Health and Safety (WHS) hazards for Kelp Aquaculture Farming (modified from NOAA Seaweed Aquaculture Overview, 2025 and AgriFutures Australia's Marine Seaweed Aquaculture Risk Assessment, 2023).

Risk Table 14: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – Economic impacts (modified from NSW Seaweed Prospectus 2024, and BECRC Regenerative Aquaculture Farming on the New South Wales South Coast – Investigation of Business Cluster, 2024).

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Risk Table 18: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – entanglement and ingestion of marine debris (modified from NOAA Fisheries – Entanglement of Marine Life, 2025; National Guidance on the Management of Whale and Dolphin Incidents in Australian Waters 2013; and, Fletcher et al., 2004; Vom Berg, 2008).

Risk Table 19: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – vessel strike and acoustic pollution (modified from Fletcher et al., 2004; Vom Berg, 2008; Laist et al., 2001 and Van Waerebeek & Leaper, 2008).

Risk Table 20: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – threatened/protected species and Matters of National Environmental Significance (modified from Fletcher et al., 2004; Vom Berg, 2008 McGovern et al. 2025).

Risk Table 21: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – impacts on marine fauna behaviour (modified from Fletcher et al., 2004; Vom Berg, 2008 McGovern et al. (2025).

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Risk Table 22: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – impacts on areas of conservation significance (modified from Fletcher et al., 2004; Vom Berg, 2008; NSW DPI, 2023).

Risk Table 23: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – resource use and waste disposal (modified from Fletcher et al., 2004; Vom Berg, 2008; NSW DPI, 2023).

Risk Table 24: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – Offshore Resources (modified from Fletcher et al., 2004; Vom Berg, 2008; NSW DPI, 2023).

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Figure 2: Seaweed Aquaculture Farming United Nations Sustainable Development Goals (SDGs). Source United Nations Department of Economic and Social Affairs, Sustainable Development https://sdgs.un.org/goals.

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GLOSSARY OF TERMS

Aquaculture	The farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants.
Backbone / Mainline	Section of horizontal longline infrastructure that supports seeded kelp lines.
Benthic	Related to or occurring on the bottom of a body of water.
Biodeposit	Organic matter that settles from aquaculture operations, such as faeces or uneaten feed.
Development footprint	The area that would be impacted directly by the Project (including temporary and permanent impacts).
Dropper line	Vertical lines suspended from a longline that kelp grows on.
Ecklonia radiata	A species of kelp native to Australian coastal waters.
Environmental Impact Statement (EIS)	A document assessing the likely environmental effects of a proposed development.
Fouling	The unwanted accumulation of organisms such as algae, barnacles, mussels, and other marine life on surfaces like kelp, ropes, nets, and other farm infrastructure.
Lease area	A defined area of seabed granted for use by an aquaculture operator.
Longline	A taught horizontal line anchored to the seafloor suspended in the water column by floats used for aquaculture.
Mitigation	Measures taken to reduce adverse impacts on the environment.
Outplanting	Process of transferring hatchery-grown juvenile kelp (seeded onto ropes or lines) from controlled nursery conditions into the ocean
Pelagic	Relating to the open sea, away from the coast or sea floor.
Project Site	The area that is being investigated for siting of the Project.
REAP	Registered Environmental Assessment Practitioner
Seeding	The process of attaching young kelp or algae to grow-out lines.
Sorus/Sori	A sorus is a specialised reproductive area on kelp fronds of ferns where reproductive cells are formed.
Taxa	Groups of living organisms that are classified together in a biological classification.
The Project	Eden-1 Kelp Farm, Disaster Bay, NSW.
The Applicant	Auskelp Pty Ltd
Upwelling	An oceanographic phenomenon that brings nutrient-rich water to the surface.

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LIST OF ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACHAR	Aboriginal Cultural Heritage Assessment Report
ALR Act	Aboriginal Land Rights Act 1983 (NSW)
AHD	Australian Height Datum
AIMS	Australian Institute of Marine Science
AMSA	Australian Maritime Safety Authority
BC Act	Biodiversity and Conservation Act 2016 (NSW)
CP Act	Coastal Protection Act 1979 ()
CLM Act	Crown Land Management Act 2016 (NSW)
CM Act	Coastal Management Act 2016 (NSW)
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry
DCCEEW	Department of Climate Change, Energy, the Environment and Water (can be either Commonwealth or NSW government)
DGRs	Director-General's Requirements
DPHI	Department of Planning, Housing and Infrastructure
DPI	Department of Primary Industries (NSW)
EHC Act	Environmentally Hazardous Chemicals Act 1985 (NSW)
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EP&A Act	Environmental Planning and Assessment Act 1979 NSW)
EPA	Environmental Protection Authority (NSW)
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999 (Cth)
ESD	Ecologically Sustainable Development
FAO	Food and Agriculture Organization (United Nations)
FM Act	Fisheries Management Act 1994 (NSW)
FRDC	Fisheries Research and Development Corporation
GIS	Geographic Information Systems
GNS	Grey Nurse Shark
IPNP	Interested Parties Notification Program (Auskelp)
KTP	Key Threatening Process
LALC	Local Aboriginal Land Council

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LGA	Local Government Area
MNES	Matters of National Environmental Significance
NES	National Environmental Significance
NPW Act	The National Parks and Wildlife Act 1974 (NSW)
NPWS	National Parks and Wildlife Service
NSW	New South Wales
NT Act	Native Title Act 1993 (Cth)
POEO Act	Protection of the Environment Operations Act 1997 (NSW)
RAN	Royal Australian Navy
RAP	Registered Aboriginal Party
SEPP	State Environmental Planning Policies (NSW)
SSD	State Significant Development
TMP	Traffic Management Plan
WH&S	Work Health and Safety
NSW DPI	New South Wales Department of Primary Industries
UCH Act	Underwater Cultural Heritage Act 2018 (Cth)

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1.0 INTRODUCTION

1.1 Proponent

- Auskelp Pty Ltd
- ABN: 33 644 315 613

Auskelp Pty Ltd is a wholly Australian-owned and operated company, privately funded by the Ride family—fifth-generation residents of Wonboyn, and Bega Valley business owners. The company is founded by former IT executive, Christopher Ride.

Established in 2019, Auskelp has been progressively navigating the complex regulatory framework required to develop Australia's first commercial kelp farm, while simultaneously advancing kelp propagation science and conducting extensive offshore testing to validate farm design and environmental performance. The company's mission is to create regional employment, deliver climate-positive outcomes, produce high-quality food, develop environmentally responsible alternatives to synthetic fertilisers through high-value kelp-based biostimulants, and also produce other kelp related products.

Auskelp is committed to building a drought-proof, fireproof, and flood-resilient industry that strengthens the Bega Valley Shire, at the same time addressing the rapid decline of native kelp forests. The company has collaborated with world-leading seaweed scientists, regulatory specialists, and university researchers to deliver globally significant breakthroughs in hatchery propagation, offshore cultivation, and kelp-based product development. Its offshore testing program for *Ecklonia radiata* is now regarded as the most advanced in the southern hemisphere. In addition, Auskelp is a founding member of the Australian Sustainable Seaweed Alliance (ASSA) and was inducted as a core partner of the Marine Bioproducts Cooperative Research Centre (MBCRC) in 2025, recognising its commitment and leadership in advancing Australia's emerging seaweed industry.

1.2 Project Outline

Auskelp is seeking regulatory approval for the establishment of a Kelp Aquaculture Farm within the open marine embayment of Disaster Bay. Designated "Eden-1", the Project aims to be Australia's first commercial, open-ocean kelp farm. Located approximately 23 km southwest of Eden, New South Wales, the Project encompasses a 200-hectare marine lease, designated AL21/004 by NSW DPIRD Fisheries (see Figure 1 for location). The farm will cultivate native seaweed species, Golden Kelp (*Ecklonia radiata*). The biomass created from operations will be used in various applications, including human food products, livestock feed, liquid and solid fertilisers, bioplastics and various nutraceuticals.

The Project proposes to grow >1,500 tonnes of wet seaweed annually valued at >$9 million and employing >30 full time staff to meet the increasing demand for domestically produced, sustainably sourced seaweed. To meet commercial and industrial demand, reliable and scalable kelp biomass supply is critical. This requires consistent ocean cultivation, species-specific propagation and appropriate processing and storage infrastructure. The quality and quantity of kelp biomass directly determine the efficacy and market viability of downstream products. Without sufficient biomass, industries aiming to replace synthetic inputs with regenerative seaweed-based alternatives—such as biostimulants—cannot operate at their required scale. Therefore, establishing secure, high-yield offshore kelp farms like Auskelp's Eden-1 Project is fundamental to unlocking the environmental and economic potential of the seaweed sector in Australia.

The Kelp Aquaculture Farm will use longline structures which are used globally for seaweed cultivation, and similar to those already being used in Twofold Bay, Jervis Bay and Port Stephens for mussel aquaculture. The native species for cultivation is *Ecklonia radiata,* which occurs locally in Disaster Bay, has domestic and international value as food, supplements, biostimulants and animal feed products.

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The Eden-1 Project offers a forward-looking solution by establishing Australia's first commercial offshore kelp farm, creating approximately >30 direct jobs locally during both the infrastructure development and operational phases. These employment opportunities span marine operations, processing, logistics, hatchery management, administration, and scientific roles, directly benefitting Eden, the Bega Valley, and adjacent communities. Additionally, local First Nations groups and regional service providers are identified as key potential partners, with dedicated strategies to promote inclusive employment and local procurement. The Project is expected to catalyse broader regional development by fostering a new marine industry cluster centred around regenerative seaweed aquaculture. This includes enabling opportunities for downstream processing (e.g. biofertilisers, animal feed supplements, nutraceutical compounds, bioplastics etc), bolstered by academic partnerships to deliver ongoing high-value products for both local and export markets.

Figure 1: Regional map of Twofold Shelf Bioregion (including Eden and Wonboyn) with Eden marked in maroon and the proposed 200 ha farm indicated by the green rectangle (Source: Google Maps).

To eliminate biosecurity and genetic risks, kelp seedstock is sourced exclusively from specimens gathered within 10 km of Disaster Bay. Currently, Disaster Bay seaweed gametophytes are cultivated in Auskelp's dedicated laboratory facilities where they are stored and nourished in dedicated seaweed incubators and within dedicated water filtration systems. Auskelp has been conducting open ocean testing of locally sourced *Ecklonia radiata* since 2022, with ocean trials undertaken in the high-energy offshore waters of southern New South Wales (Twofold Bay and Disaster Bay). These trials have focused on refining hatchery propagation methods, substrate deployment, depth optimisation, and survivability and resilience of *Ecklonia radiata* in dynamic ocean conditions. Through extensive monitoring and adaptive design, Auskelp has successfully demonstrated consistent biomass growth and seasonal survivability in exposed offshore settings. To date, it represents the most successful offshore kelp farming program globally for this species, with no other known projects having achieved similar results for *Ecklonia radiata* farming in fully exposed, open ocean environments.

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1.3 Existing Approvals and Permits

Auskelp has provisionally obtained an aquaculture permit and marine aquaculture lease designated AL21/004 from the NSW Department of Primary Industries (NSW DPI) via a competitive, open tender process in 2021 that is contingent on State Significant Development (SSD) consent, supported by the preparation of an Environmental Impact Statement (EIS). We note that Landowner's Consent from NSW Crown Lands is not required post 16 August 2024, when the *Crown Land Management Amendment Regulation 2024* came into effect which removes the previous requirement for Landowner's consent from NSW Crown Lands for projects under State Significant Development approval.

The permit and lease area relate to the establishment of the Eden-1 Kelp Aquaculture Farm, a proposed 200-hectare offshore kelp farming operation in Disaster Bay, NSW. As part of the permitting and approvals process, Auskelp is required to meet all relevant planning, environmental, and marine use conditions under both the Fisheries Management Act 1994 and the Environmental Planning and Assessment Act 1979. Under Division 4.7 of the Environmental Planning and Assessment Act, the SSD designation ensures the Project undergoes a rigorous and transparent assessment process, including formal exhibition of the EIS, multi-agency review, and determination by the NSW Minister for Planning or their delegate.

Projects are classified as a State Significant Development (SSD) for the following reasons:

(1) The Project exceeds the Capital Investment Value (CIV) threshold of $30 million, as defined under Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021. [Note: Eden-1 Project does not exceed the CIV threshold];

(2) The Project is located within and adjacent to areas of recognised environmental and marine biodiversity value, including habitats used by protected species; and

(3) The proposal introduces new infrastructure into coastal waters, necessitating careful consideration of its cumulative and strategic impacts.

As a result of the assigned SSD classification, The EIS process must examine key issues including biodiversity, water quality, navigation, cultural heritage, and socio-economic factors, and it must incorporate input from technical experts, government agencies, and the local community.

1.4 Related Developments

The Eden-1 Kelp Aquaculture Farm leverages existing land-based infrastructure in the Eden and Edrom regions, enabling the Project to operate without the need for new land clearing or additional local government development approvals. Because these facilities are already constructed and approved for compatible maritime and operational uses, their integration into the Project falls outside the scope of this SSD. Historically developed to support the town's commercial fishing and forestry sectors, infrastructure is now underutilised following the closure of the Eden fish cannery in 1999 and a decline in commercial fishing. Facilities such as Snug Cove Wharf, and Edrom industrial zones (Pentarch), and the Edrom Multi-purpose Wharf provide available logistical and operational hubs without the need for new construction or upgrades. These assets—originally established for large-scale seafood processing, wood exports, and naval logistics—offer kelp farming operations efficient staging, vessel mooring, and biomass handling capabilities.

Partnerships have been established to ensure the effective use of available infrastructure. Auskelp has formal agreements with Pentarch Group, which manages the Edrom facilities and slipway, as well as warehousing and rainwater collection systems. Partnerships are in place with Ocean2Earth (a Pentarch Group–owned company based at Edrom) to ensure that any biofouling material removed from submerged kelp infrastructure is responsibly managed. All recovered material will be recycled and value-added through Ocean2Earth's EPA-approved marine waste composting facility, which is co-located at the Edrom site, supporting circular economy outcomes and minimising waste. Similarly, buildings and infrastructure located in Eden and at Snug Cove can be repurposed for hatchery support and marine operations planning. These initiatives provide

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critical infrastructure continuity while revitalising somewhat dormant industrial sites, promoting Eden's broader economic diversification efforts.

The Eden-1 Kelp Aquaculture Project benefits from co-location with existing land-based infrastructure, particularly within the Edrom industrial precinct, which provides substantial commercial-scale capacity for aquaculture operations without requiring any new construction or modification of land use zones. The Edrom facility, owned and operated by the Pentarch Group, occupies industrial-zoned land with deepwater access, multiple warehouses, heavy vehicle logistics capacity, a private slipway, and two existing wharves—the Edrom Multi-purpose Wharf (managed by NSW Port Authority) and the Chipmill Pier. This site has been developed to support large-scale timber exports and naval logistics operations, and it remains a significant commercial asset in the region.

Within this site, kelp-related infrastructure — including longline rig assembly, anchor systems, floats, and biomass handling — will be prepared using existing warehouses, storage sheds, and hardstand areas. Critically, no new buildings are required, as the Pentarch facility already includes dedicated staging areas for vessel logistics, biomass management, and post-harvest processing. The facility is fully equipped with three-phase electrical power, supplied via the local grid, and has internal water supply systems including on-site rainwater tanks and private dams. These existing water sources will be used for periodic equipment cleaning, processing support, and maintenance activities, eliminating reliance on municipal water systems except for small-scale uses such as hatchery sanitation and staff amenities.

Kelp processing will be undertaken on-site within the existing Edrom industrial precinct and will fall entirely within current permitted industrial and maritime uses, requiring no additional land-use approvals. Processing activities will be limited to low-impact handling steps such as washing, dewatering, sorting, size reduction, and packaging of harvested kelp, utilising existing hardstand areas, warehouses, and utilities. Importantly, the Project is designed around a zero-waste processing model, with 100% of harvested kelp utilised across food, agricultural, and bioproduct value streams. Any residual organic material generated during processing will be captured for value-added agricultural inputs. There is no anticipated discharge of waste to sewer, stormwater, or the marine environment. Based on multi-year field trials, kelp productivity is expected to range between 9-15 tonnes per hectare per annum (wet weight), which is comparable to Sydney Rock oyster farming at 5-15 tonnes per hectare, Pacific oysters at 15-30 tonnes per hectare, and mussel farming at 20-60 tonnes per hectare.

The Project aligns with the Bega Valley Shire Council's regional economic diversification goals. All operational phases, from deployment to harvest, will use internal traffic corridors and service roads originally designed for heavy freight, maintaining very low community impact and avoiding public traffic disruptions. This integrated processing approach reinforces circular-economy outcomes, minimises environmental footprint, and leverages available regional infrastructure.

1.5 Cumulative Impact Assessment

The NSW Department of Planning, Industry and Environment's *Cumulative Impact Assessment Guideline* requires consideration of the combined effects of a proposed development with other existing, approved, and reasonably foreseeable activities in the surrounding region.

The 200-hectare Eden-1 Kelp Aquaculture Project (AL21/004) has been assessed in the context of other marine and coastal activities within Disaster Bay, the broader Eden coastal zone and across NSW, including commercial and recreational boating, fishing activities, existing aquaculture leases, port and marina operations, tourism vessels, and marine research activities.

The proposal involves low-intensity, spatially discrete infrastructure with no permanent seabed modification, dredging, blasting, or pile-driving. Activities associated with construction, operation, maintenance, and decommissioning are limited to routine vessel movements, longline installation and retrieval, and seasonal harvesting. These activities are comparable to existing maritime uses and do not introduce new or intensified environmental pressures.

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Potential cumulative impacts has been considered across the following key themes:

- Recreational boating and fishing
- Commercial fishing operations (including net and line fishing)
- Existing aquaculture leases
- Port, marina and wharf operations (Eden, Edrom and Wonboyn)
- Tourism and charter vessels
- Marine research activities
- General maritime traffic
- Recognition of community and visitors use of the area
- Assessment of amenity, access, and experience
- Consideration of visual, navigational, and recreational interactions
- Economic factors and job creation
- Environmental factors

It has been identified that:

- The 200 hectare spatial footprint of the proposed kelp aquaculture infrastructure is small relative to the broader marine estate of Disaster Bay – less than 5%.
- The 200 hectare ocean farm is small relative to the 3,189 hectares of oyster farms operating in NSW lakes and estuaries.
- The 200 hectare farm is comparable to the ~47 hectares of oyster leases located in nearby Wonboyn Lake and Wonboyn River estuary. Oyster farming within the nearby Wonboyn River estuary operates in a separate, primarily enclosed estuarine environment and is not hydrologically or operationally connected to the offshore kelp aquaculture site. The Eden-1 Project does not affect water quality, biosecurity, or farming operations within the Wonboyn oyster production area, and no cumulative impacts are anticipated.
- The 200 hectare farm is comparable to the 49.5 hectares of mussel farms operating in Twofold Bay, and 70 hectares of mussel farms operating in Jervis Bay NSW.
- Interactions with commercial fishing activities, including net and line fishing, are limited to the immediate lease area. The site has been selected to minimise overlap with primary fishing grounds and known high use net-fishing areas, and no wider displacement of commercial fishing effort is anticipated in Disaster Bay.
- Recreational boating and fishing activities will continue to occur throughout the surrounding waters, with the lease area clearly marked and managed in accordance with maritime safety requirements. Vessel movements associated with the Project are comparable to existing marine traffic and are not expected to materially alter recreational use patterns.
- Existing aquaculture leases, port, marina, and wharf operations operate independently of the proposed site, and the development does not contribute to any significant intensification of regional marine infrastructure or industrial activity.
- No effect on abalone or sea urchin collection or operations is expected.

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- Tourism and charter vessel operations will not be adversely affected, as the Project does not restrict access to key tourism areas or navigational routes.
- Marine research activities in the region are compatible with the presence of kelp farming and are not constrained by the proposed infrastructure.
- Visual impacts from key coastal viewpoints are possible, but considered minimal due to the offshore location, distance from shore, and low-profile nature of the longline infrastructure.
- Community access to the coastline and nearshore waters is not restricted, and no changes to public access, beach use, or coastal recreation is anticipated.
- Any environmental effects associated with the proposal are localised, low-intensity, and reversible, and do not contribute to cumulative habitat loss or long-term ecological degradation.

When considered alongside existing and approved marine activities in the region, the proposed kelp construction or operation does not result in significant cumulative environmental, social, or economic impacts. The scale, location, and low-impact nature of the development show that any interactions with other marine uses remain localised, manageable, and primarily compatible with the continued functioning of the broader marine estate.

The Project is consistent with, and actively supports, the objectives of key NSW Government, regional, and local strategic frameworks, including:

NSW Marine Waters Aquaculture Strategy 2018

The Eden-1 Kelp Aquaculture Project supports the NSW Marine Waters Aquaculture Strategy by enabling the planned expansion of marine aquaculture in appropriate offshore locations, utilising existing infrastructure, minimising land-use conflict, and supporting industry growth consistent with State aquaculture development priorities.

NSW Marine Waters Sustainable Aquaculture Strategy 2018

The Eden-1 Kelp Aquaculture Project is consistent with the NSW Marine Waters Sustainable Aquaculture Strategy by implementing a low-impact, feed-free kelp farming system that avoids chemical inputs and waste discharge, protects marine biodiversity, and demonstrates best-practice environmental stewardship in the NSW marine estate.

NSW Seaweed Prospectus 2024

The Eden-1 Kelp Aquaculture Project directly aligns with the Prospectus by:

- Enabling the establishment of a commercial-scale NSW seaweed industry.
- Building local supply chains through NSW-based hatchery, farming, and workforce capability.
- Supporting sustainable aquaculture using low-impact kelp farming methods.
- Expanding market opportunities for food, agriculture, and marine bioproducts.

South East and Tablelands Regional Plan 2036

The Plan identifies aquaculture as a priority growth industry and designates the Port of Eden and Snug Cove as strategic economic hubs. The Project reinforces NSW's long-term planning for marine industries, regional employment, and export-focused economic development.

Far South Coast Regional Economic Development Strategy (REDS) 2023 Update

The REDS recognises aquaculture and food production as key emerging industries driving regional growth. It encourages investment in enabling infrastructure that supports marine-based industries and regional tourism, and identifies the Port of Eden and Snug Cove as critical assets for marine trade, tourism, and industry development. The Eden-1 Project directly supports these priorities.

Bega Valley Shire Community Strategic Plan 2042

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The Project contributes to local community objectives by:

- Promoting sustainable economic growth through a new, environmentally responsible industry.
- Enhancing regional employment opportunities in marine science, aquaculture, and processing.
- Supporting the revitalisation of Snug Cove and the Eden Wharf precinct.
- Providing opportunities for Indigenous engagement in marine industry development.

Bega Valley Coastal Management Program (BVCMP) 2017-2024

The Eden-1 Kelp Aquaculture Project supports coastal ecosystem health through low-impact offshore kelp farming, contributes to improved water quality through nutrient uptake, and enhances marine habitat and biodiversity. By operating offshore, the Project avoids sensitive coastal areas while maintaining public access and scenic values. Long-term environmental monitoring will support evidence-based coastal management and community resilience.

1.6 Restrictions Applicable to Project Site

A review of relevant Commonwealth and New South Wales marine planning and environmental instruments indicates that no statutory spatial restrictions or exclusion zones apply to the proposed Eden-1 kelp aquaculture site within Disaster Bay. The site is located within State waters, outside all marine parks, aquatic reserves, critical habitat listings, and formal navigation exclusion zones. It does not overlap with any Commonwealth-listed Matters of National Environmental Significance (MNES), threatened ecological communities, or cultural heritage listings, and is sufficiently separated from sensitive coastal areas including Nadgee Nature Reserve and Beowa National Park so as not to trigger additional buffer limitations. While standard operating and environmental protection requirements apply under the NSW Fisheries Management Act 1994, Crown Land Management Act 2016, Marine Safety Act 1998, and relevant DPIRD Fisheries aquaculture policies, these constitute regulatory conditions rather than restrictions on the site itself. Accordingly, no prohibitions or spatial exclusions prevent the development of the Eden-1 longline kelp aquaculture farm at the proposed location.

1.7 Proportionate Assessment and Document Structure

Consistent with the *State Significant Development EIS Guidelines*, this Environmental Impact Statement attempts to adopt a proportionate assessment approach in which the level of analysis is scaled to the likelihood and consequence of potential impacts. The main report has been structured to present clear findings, impact pathways, and management responses in a concise and accessible manner, with detailed technical data, modelling outputs, and specialist studies provided in appendices and cross-referenced.

However, reducing complexity in an assessment of this nature is inherently challenging due to the breadth of intersecting factors that characterise an open-ocean kelp aquaculture farm (that has never been grown in NSW), including hydrodynamic processes, ecological connectivity, maritime use, regulatory and community interfaces, social and economic factors, and climate influences. In addition, the Secretary's Environmental Assessment Requirements (SEARs) prescribe specific matters and levels of detail that must be addressed to enable informed assessment.

Accordingly, every effort has been made to keep the documentation succinct while still addressing the required scope, regulatory expectations and context. It is important to note that the overall environmental and operational risks of the Project have been assessed as low; and consequently, the level of detail presented is greater than the risk profile alone might otherwise warrant, but this is necessary to ensure transparency, regulatory compliance, and confidence in the assessment outcomes.

1.8 Format of EIS

The purpose of the Environmental Impact Statement (EIS) is to assess the economic, environmental and social impacts of the Eden-1 Kelp Aquaculture Farm at Disaster Bay. The EIS incorporates thorough risk assessment of potential environmental impacts associated with the Project (construction and operation), identifies key

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issues for assessment, details mitigation measures and any potentially significant residual environmental impacts after the application of proposed mitigation measures.

This EIS is structured to help the community, local council, government agencies and the consent authority understand the Project and its impacts, so they can make informed submissions or decisions on the merits of the Project.

The EIS has been prepared in line with the following guidance documentation:

- State Significant Development Guidelines (DPHI, 2024).
- State Significant Development Guidelines Appendix B – preparing and environmental impact statement (DPHI, 2022)
- Undertaking Engagement Guidelines for State Significant Projects (DPHI, 2024a)
- Cumulative Impact Assessment Guidelines for State Significant Projects (DPHI, 2022)
- Social Impact Assessment Guidelines for State Significant Projects (DPIE, 2023)

It has been prepared in multiple sections:

1. The EIS describes the Project, summarises the findings of consultation activities and detailed environmental assessment of impacts. It includes all mitigation measures proposed to manage the impacts on the community and the environment.
2. The EIS also includes:
   i) The Project specific Secretary's Environmental Assessment Requirements (SEARs) which prescribe the structure and content of the EIS, including a cross reference to where each requirement is addressed in the EIS.
   ii) Statutory compliance of the Project.
   iii) Engagement activities and outcomes, with the community and agencies.
   iv) Management Plans that address the assessment of impacts.
   v) Detailed specialist assessments (each provided in full).
3. Section 9 includes a consolidated table of all risk profiles and the proposed mitigation measures to manage any impacts. These form part of the Project, and would be required to be implemented, pending Project approval.

Main Report Includes the Following:

- A detailed description of the Project proposal, including the need for the Project, a justification for the development, staging of the development, interactions with other developments and plans of any proposed building works.
- Relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments.
- Risk assessments of potential environmental impacts associated with the Project (construction and operation), identifying key issues for further assessment, detail mitigation measures and any potentially significant residual environmental impacts after the application of proposed mitigation measures.
- Description of the existing environment using sufficient baseline data.
- Assessment of the potential impacts of all stages of the development (Construction, Operation and Removal) and a description of the measures that would be implemented to avoid, minimise and if necessary, offset the potential impacts of the development.
- Summary of all the proposed environmental management and monitoring measures.
- Detailed impact assessment of key issues specified in the State guidelines and those identified in the risk analysis.
- Summary table of risk evaluations, with relevant mitigation criteria to justify assessment.

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- Cross reference table is provided in Section 12 to demonstrate the EIS has addressed the project-specific Secretary's Environmental Assessment Requirements (SEARs).
- Cross reference tables is provided in Section 10.1 that details the Consolidated Mitigation Measures adopted by the Project.

The following environmental, social and cultural factors are addressed:

Biodiversity

- Baseline assessment (habitat types, species types, assemblages).
- Assessment of impacts on critical habitats, threatened and protected species, populations, communities and their habitat.
- Potential for native fauna aggregation around the lease areas, including impacts from any effects on wild kelp or corals from nearby natural reefs and changes to fish swim paths and behaviour.
- Entanglement, potential disturbance of whale resting behaviour and proposed mitigation measures.
- Potential loss of plastic or other items from lease infrastructure and mitigation measures to prevent ingestion by marine organisms.
- Artificial lights, acoustic pollution and vessel strike risks for marine fauna.

Water Quality

- Impacts on water quality.

Disease Risks and Management

- Disease risks.
- Genetic integrity of local wild stocks.
- Disease and pest management protocols.
- Impacts on other aquaculture operations.

Navigation and Safety

- Impacts of lease infrastructure on vessel traffic on other water-based traffic and activities.
- Measures to ensure the safety of all commercial and recreational users of Disaster Bay.

Aboriginal Heritage

- Consult with local Indigenous leadership and people.
- Consider any Aboriginal Land Claims.
- Impacts on Aboriginal heritage sites/places.
- Protocols and measures to minimise risk of harm to relevant Aboriginal heritage sites/places.

European and Environmental Heritage

- Assess impact on European and Environmental heritage

Visual Amenity

- Assess the visual impacts of the lease infrastructure.
- Assess impacts on local community.

Noise

- Assess potential impacts of noise during construction and operation.

Coastal Processes

- Coastal hazards, wave run up/reflection/refraction.
- Adequacy of structure's stability and storm tolerance.
- Effects of projected sea level rise.
- Changes of wave behaviour including wave dispersion and creation via amendments to orbital/oscillatory motions.

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- Potential impacts on stability of shoreline of Disaster Bay.

Waste Management

- Identify type and classification of all waste/s generated during the construction and operation stage.
- Details of waste minimisation, management, treatment and disposal measures.

Traffic, Access and Parking

- Details of vehicle, boat and trailer type, traffic generation, proposed boat access and parking arrangements.
- Assess road, access (e.g. wharf, jetty, Nature or National Parks) and parking capacity.

Socioeconomics

- Direct and indirect socioeconomic impacts on all users of Disaster Bay and wider community.
- Consider any impacts associated with restricting the access of other users (Commercial Fishers) to this part of Disaster Bay.

Construction

- Measures to minimise potential noise, air quality, traffic, soil, water and waste impacts.

Decommissioning

- Process description and waste disposal measures.
- Arrangements to ensure lease areas are properly decommissioned, cleaned up and rehabilitated.

Community

- Effects on community, positive and negative
- Effects of existing aquaculture operations

Supporting Appendices Include the Following:

Appendix A: Specialist and Technical Appendices

- Appendix A1: EPBC Approval 20 June 2025 (EPBC 2025/10149) 2025
- Appendix A2: NSW Crown Lands Division: Landowner's Consent (not required) 2025
- Appendix A3: BMT Disaster Bay Coastal Processes 2022
- Appendix A4: Disaster Bay Nutrient Availability Report 2024
- Appendix A5: Aboriginal Cultural Heritage Report (AL21/004) July 2024
- Appendix A6: Community Consultation Report - Socio-Economic Considerations for Regenerative Aquaculture on the NSW South Coast 2024
- Appendix A7 Commonwealth and NSW Threatened and Protected Species Register
- Appendix A8: Disaster Bay Seafloor Survey 2024
- Appendix A9: Elgin Benthic Survey, Fish Assemblages and Seafloor Mapping 2025
- Appendix A10: NSW DPHI Biodiversity Development Assessment Report (BDAR) waiver 2025
- Appendix A11: Community Engagement Considerations for Regenerative Aquaculture on the NSW South Coast 2024
- Appendix A12: Regenerative Aquaculture Farming on the NSW South Coast – Investigation of Business Cluster 2024
- Appendix A13 Eden-1 Protected Species Register Summary 2025
- Appendix A14 Estimated Development Cost AQIS Certified 2026
- Appendix A15 Disaster Bay Site Mapping and Figures 2025

Appendix B: Proposed Mitigation Plan/Measures

- Appendix B1: Marine Fauna Interaction Plan (approved by DCCEEW)

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- Appendix B2: Cultural Heritage Response Plan
- Appendix B3: Emergency Response Plan
- Appendix B4: Traffic Management Plan
- Appendix B5: Seaweed Aquaculture Biosecurity Plan
- Appendix B6: Monitoring and Maintenance Plan
- Appendix B7: Environmental Management Plan
- Appendix B8: Waste Management Plan
- Appendix B9 Construction Deployment Management Plan
- Appendix B10 Decommissioning Management Plan

Appendix C: Community Engagement Strategy 2025/Measures and Documents

- Appendix C1: Community Engagement Strategy 2025
- Appendix C2: Socio-Economic Considerations for Regenerative Aquaculture on the NSW South Coast (2024)
- Appendix C3: Frequently Asked Questions (FAQ-1)
- Appendix C4: Frequently Asked Questions -2 (FAQ-2)

1.9 Commonwealth EPBC Referral

In early 2025, Auskelp Pty Ltd submitted a detailed referral to the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act). This referral was required to determine whether the proposed Eden-1 Kelp Aquaculture Farm constituted a "controlled action" and its potential interactions with Matters of National Environmental Significance (MNES), including listed threatened species and migratory marine fauna such as whales, seals, turtles, fish and seabirds etc. The referral process required detailed documentation of the Project's design, footprint, mitigation strategies, and marine biodiversity assessments. Auskelp's referral included data from scientific studies, desktop studies, operational experience, testing programs, side-scan sonar surveys, vessel operation protocols, and entanglement risk assessments, related to the Project's effect on MNES.

On 20 June 2025, the Department of Climate Change, Energy, the Environment and Water (DCCEEW) issued a decision confirming that the proposed Eden-1 Kelp Aquaculture Farm (EPBC 2025/10149), submitted by Auskelp Pty Ltd, is not a controlled action under the Environment Protection and Biodiversity Conservation Act 1999 (see Appendix A1), and no conditions of approval were required.

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2.0 REVIEW OF EXISTING INFORMATION ON SEAWEED AQUACULTURE

2.1 Introduction

Aquaculture is the farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants. Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding and protection from predators. Farming also implies individual or corporate ownership of the stock being cultivated (FAO, 1988). Aquaculture has been traditionally undertaken in a number of countries for centuries and has grown rapidly worldwide in the last 60 years. In Australia aquaculture has been practiced for approximately 40,000 years by Aboriginal communities who used sophisticated fish traps to capture and hold fish. The Aboriginal fish traps in the Brewarrina region of NSW still exist today and stand as a testament to Aboriginal knowledge of engineering and fish migration. In Victoria there also remains archaeological evidence in the Lake Condah region of a settled Aboriginal community farming eels for food and trade in what is considered to be the earliest and possibly largest ever land based aquaculture venture in Australia. The NSW oyster industry has a history dating back to the 1870's in the Georges River and is now the State's largest aquaculture sector with 3,189 hectares in operation (2023) generating >$77m per year in annual revenue (Source: NSW Government, Aquaculture in NSW, Facts & Figures 2024).

In the 19th century Acclimatisation Societies undertook aquaculture to produce fish species for stocking rivers and streams. Trout was the primary fish aquaculture industry in NSW until the 1980's, followed by introduction of tiger prawn farms on the north coast and native fish hatcheries (Murray Cod) in inland NSW. By the 1990's silver perch, yabbies, barramundi, snapper and blue mussels were being cultivated. There are a variety of aquaculture production systems used to culture finfish, crustaceans, molluscs and algae. The choice of systems depends upon the physiological requirements of the species (e.g. space, water quality and nutrition), the site (i.e. offshore, estuarine or land based) and operational criteria (e.g. proximity to services and markets). Floating sea cages with suspended nets are typically used in inshore areas or in estuarine waters and longlines (suspended cultivation) or post and rail infrastructure are also used for marine aquaculture. Land based facilities include earthen and lined ponds, tanks and aquaria. The fundamental aspect of any suitable aquaculture development is access to good quality water.

A recent study estimated that NSW aquaculture industry delivers gross product sales of $219.7m (2023) and contributed to 2,321 full time jobs, of which none of this revenue currently relates to farmed kelp and seaweed (Economic Contribution of Aquaculture to NSW, BDO EconSearch 2023).

2.2 Seaweed Farming Worldwide

Seaweed farming is one of the fastest growing segments in global aquaculture, driven by its diverse applications and environmental benefits. As of 2020, global seaweed production had reached over 35 million tonnes (wet weight), up from approximately 10 million tonnes in 2000, with an estimated value exceeding USD $16.7 billion (FAO, 2022; World Bank, 2023). This exponential growth reflects increasing demand for seaweed in food, agriculture, cosmetics, pharmaceuticals, biomaterials, and climate mitigation. Seaweed aquaculture now accounts for more than 30% of total marine aquaculture output by volume, with species such as *Kappaphycus*, *Eucheuma*, *Gracilaria*, *Saccharina*, and *Undaria* dominating production (FAO, 2022; World Bank, 2023).

More than 97% of seaweed farming activity is concentrated in Asia, particularly in China, Indonesia, the Philippines, and South Korea. China alone accounts for over 60% of global seaweed production, largely cultivating brown kelps *Saccharina japonica* and *Undaria pinnatifida* for human consumption and alginate extraction (FAO, 2022). In Indonesia and the Philippines, red seaweed *Kappaphycus* and *Eucheuma* are farmed for carrageenan production, an important hydrocolloid used in the food and cosmetic industries. Seaweed cultivation in these regions is primarily coastal, labour-intensive, and supports rural livelihoods. Notably, seaweed farming has provided vital income to tens of thousands of smallholder farmers, many of

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them women, contributing to food security and gender equity in coastal communities (World Bank, 2023; Ganter & Schiller, 2023).

Globally, seaweed is recognised for its multifunctional benefits that extend beyond economics. Seaweeds capture carbon dioxide from seawater more rapidly than terrestrial plants, with sequestration rates ranging from 1–10 tonnes of CO_2 equivalent per hectare per year depending on species and conditions (Duarte et al., 2017; World Bank, 2023). Their rapid growth rates and low input requirements—no freshwater, fertiliser, or arable land—make them a sustainable option for biomass production. Additionally, seaweed farms improve local water quality by absorbing excess nitrogen and phosphorus, reducing eutrophication and supporting marine biodiversity. Floating seaweed structures also provide habitat for juvenile fish and invertebrates, playing a role in marine ecosystem enhancement (Chung et al., 2021).

Beyond traditional uses, the industrial applications of seaweed are expanding rapidly. Seaweed-derived biofuels, bioplastics, textile fibres, and packaging materials are being developed to replace fossil-based products. In agriculture, seaweed extracts are used as biostimulants that improve plant resilience, reduce fertiliser use, and enhance soil health (Aitken et al., 2023). In livestock feed, particularly ruminants, certain red seaweeds such as *Asparagopsis* have shown potential to reduce methane emissions by over 80%, offering a potent tool for climate-smart agriculture (Kinley et al., 2020). These novel applications are attracting public and private investment, including venture capital and green finance, further accelerating global seaweed sector development.

Despite these advancements, challenges remain. A lack of regulatory frameworks, quality control, and standards for seaweed products—especially in emerging economies—hampers trade and innovation. International collaborations, such as those led by the Global Seaweed Coalition and various UN initiatives, are working to build sustainable governance models and market infrastructure for the sector.

The global seaweed industry stands at a pivotal point in its development. With increasing recognition of its role in climate mitigation, circular bioeconomy, and sustainable food systems, seaweed aquaculture is expected to more than double by 2030. Projections suggest the sector could reach over USD $30 billion in value by 2030, supported by policy incentives, technological innovation, and growing consumer demand for sustainable products (World Bank, 2023). If cultivated and managed responsibly, seaweed farming can contribute meaningfully to global sustainability goals—enhancing ocean health, supporting coastal livelihoods, and reducing greenhouse gas emissions on a global scale.

Figure 2: Seaweed Aquaculture Farming United Nations Sustainable Development Goals (SDGs). Source United Nations Department of Economic and Social Affairs, Sustainable Development https://sdgs.un.org/goals.

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2.3 Seaweed Farming in Australia

Seaweed farming in Australia is in the early stages of development. Currently, there are no commercial kelp farms operating in Australian waters. All ocean-based seaweed projects are either in research and development or pilot phases, primarily led by universities and early-stage startups. Despite widespread global adoption and proven environmental benefits of seaweed farming, Australia's cultivation of seaweed in ocean conditions has not yet transitioned beyond experimental trials. The supply of brown seaweed biomass in Australia is valued at approximately $4.8 million per annum (Seaweed Industry Blueprint – AgriFutures Australia., 2020), which comes from the collection and processing of storm-cast brown seaweed, and zero from cultivated biomass.

Storm-cast seaweed – kelp that is naturally washed ashore – has been the backbone of Australia's brown seaweed supply. However, reports show a declining supply of reliable storm-cast material, driven by changing ocean temperatures, seasonal shifts, and diminishing seaweed beds. This decline is jeopardising the stability of Australian industries that require brown kelp biomass. The NSW Seaweed Prospectus (2024) states that seaweed imports into Australia have risen to over A$40 million per year for biostimulants, liquid fertilisers, bioplastics inputs and other food-based uses, highlighting the opportunity to cultivate kelp domestically at a commercial scale. In addition, Australia remains heavily reliant on imported seaweed products for food-grade nori and other edible seaweeds, and critical seaweed extracts such as agar, carrageenan, fucoidan, and other cosmetics-grade elements. According to data from the Australian Seaweed Institute and verified by DAFF trade figures, Australia imports >5,000 tonnes of seaweed annually in both dried and frozen forms. These imports originate primarily from China, Ireland, Chile, South Korea, Indonesia, and the Philippines.

Red seaweed (*Asparagopsis*), has received significant financial investment in Australia over the last 8 years due to its ability to reduce methane emissions from livestock, when used as a feed additive. It is understood that more than $150 million has been raised for the research and commercialisation of red seaweed in Australia (Sea Forest, CH4, Immersion Group, Fremantle Seaweed). However, Asparagopsis cultivation projects have not yet demonstrated consistent success in open-ocean trials and production is currently constrained to onshore tank and pond systems.

Tasmania

Tasmania's giant kelp forests (*Macrocystis pyrifera*), which once thrived along the state's eastern coastline, have undergone a catastrophic decline. Since the 1940s, some areas have reported over 95% of kelp forests lost, primarily due to ocean warming and climate-induced shifts in marine conditions. A key driver of this decline is the southward intensification of the East Australian Current, which brings warmer, nutrient-poor waters into southern marine ecosystems. These altered conditions have proved inhospitable for giant kelp (Johnson et al., 2011; Edgar et al., 2021). This loss has transformed once-dense underwater forests into barren seascapes, significantly impacting biodiversity, fisheries, and coastal protection in Tasmania.

In response, Tasmania has adopted a proactive policy and industry development approach recognising both the economic and environmental opportunities presented by seaweed aquaculture. Tasmania has proactively approved 1,998 hectares kelp and seaweed aquaculture licences, signalling strong regulatory support for the sector's growth. This strategic allocation reflects Tasmania's intent to foster a regenerative marine industry capable of supporting coastal economies while contributing to ecosystem recovery and climate resilience. By enabling commercial cultivation alongside restoration initiatives, Tasmania is positioning seaweed aquaculture as a cornerstone of its emerging blue economy.

Victoria

According to the Victorian Kelp Cover Scientific Report (2024), modelling predicts a significant reduction in kelp cover across multiple regions of the Victorian coastline by 2050. The report highlights that warm-temperate kelp species such as *Ecklonia radiata*, which dominate subtidal reefs, are especially vulnerable to rising sea surface temperatures, ocean acidification, and sea urchins. Declines in canopy cover and recruitment failure have already been observed in several high-risk areas (DELWP, 2025). In response, Victoria has recognised seaweed cultivation as an emerging marine industry with both environmental and economic

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potential. State agencies and research institutions are supporting pilot seaweed aquaculture trials, reef restoration initiatives and blue economy research programs aimed at improving coastal resilience, biodiversity outcomes and regional economic diversification.

South Australia

South Australia's temperate reef ecosystems support extensive stands of *Ecklonia radiata*. While South Australian kelp systems have not experienced the catastrophic losses documented in Tasmania, long-term monitoring and regional climate projections indicate increasing vulnerability to ocean warming, marine heatwaves, and grazing pressure from range-expanding herbivores. The South Australian Government has recognised seaweed aquaculture as an emerging industry. Through Primary Industries and Regions South Australia (PIRSA) more than 50 approvals have been granted for seaweed farming activities in marine and land-based systems across regions such as Eyre Peninsula, Kangaroo Island and Yorke Peninsula. However, most approved seaweed aquaculture sites in South Australia remain in early development, pilot or pre-commercial phases, and large-scale commercial production has not yet commenced.

New South Wales

Along the New South Wales south coast, temperate reef systems dominated by *Ecklonia radiata* have shown significant and alarming declines in canopy cover in recent decades. Despite these losses, kelp aquaculture development in NSW remains very limited with no commercial kelp farms in operation and limited government support or university testing. The Auskelp 200-hectare Eden-1 kelp aquaculture project is the only known kelp farm conducting open ocean testing and the only project progressing through the State Significant Development (SSD) approval process in NSW.

2.4 Farming Ecklonia radiata

Ecklonia radiata is the dominant warm-temperate kelp species of southern-Australia and New Zealand and forms extensive subtidal kelp forests that underpin some of the most productive coastal ecosystems in the region. Despite its ecological importance and abundance in the wild, *Ecklonia radiata* has never been successfully farmed at commercial scale anywhere in the world. To date, no country has transitioned *Ecklonia radiata* aquaculture beyond small-scale field trials, largely due to the species' sensitivity to environmental conditions, and the technical challenges associated with cultivation.

Unlike many commercially farmed northern hemisphere kelps (such as *Saccharina* or *Undaria*), *Ecklonia radiata* is adapted to high-energy, wave-exposed environments, exhibits strong attachment structures, and is capable of rapid biomass accumulation under variable temperature and nutrient regimes. These traits make it uniquely suited to offshore farming systems in temperate waters. As a result, the development of *Ecklonia radiata* aquaculture requires novel approaches to seedstock propagation, deployment systems, and longline engineering, all of which are currently at the frontier of applied kelp knowledge.

From an ecological perspective, *Ecklonia radiata* is a foundation species, meaning it creates three-dimensional habitat that supports high levels of marine biodiversity, including fish and invertebrates. Its productivity, structural complexity, and capacity for carbon fixation and nutrient uptake make it one of the most ecologically valuable macroalgae in temperate Australia. These same characteristics also underpin its potential value in commercial applications, including food ingredients, biostimulants, agricultural inputs, biomaterials, and emerging bioproduct markets. Importantly, the use of *Ecklonia radiata* for aquaculture avoids many of the biosecurity and ecological risks associated with introduced or non-native seaweed species. As a locally endemic species, its cultivation aligns with NSW and national policy preferences for native species aquaculture, minimising the risk of ecological displacement, genetic contamination, or invasive spread.

The absence of any existing global commercial *Ecklonia radiata* farms underscores both the innovative nature and technical significance of the Eden-1 Kelp Aquaculture Project. The Project builds on multiple years of controlled seedstock development, laboratory propagation, and open-ocean field trials to address long-standing biological and engineering barriers that have historically prevented the farming of this species. In doing so, it positions New South Wales at the forefront of next-generation kelp aquaculture, with the potential

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to establish a new global reference model for farming warm-temperate, high-energy kelp species in offshore environments.

2.5 Risks and Hazards of Seaweed Farming

While kelp aquaculture is widely recognised as a low-impact and regenerative form of marine farming, a precautionary approach requires universal identification and management of potential risks across environmental, operational, regulatory, and social dimensions, which are outlined as follows:

1. Environmental Risks

- Marine Habitat Disturbance: Installation of longlines and screw anchors may disturb benthic habitats, especially if located over sensitive reef areas.
- Shading Effects: Kelp biomass may reduce light penetration, potentially altering photosynthetic activity and community composition of the seafloor.
- Wildlife Interaction: Risk for marine mammals, turtles, and birds entangling in ropes or interacting with infrastructure.
- Invasive Species Introduction: If non-local kelp species or spores are introduced (intentionally or accidentally), it could alter local ecosystems.
- Biofouling and Disease: Accumulation of unwanted organisms on gear can create biosecurity risks and affect productivity.
- Waste Accumulation: Organic detritus from kelp sloughing off (e.g., blades and plants) may accumulate locally, though typically minimal and biodegradable.

2. Navigational and Safety Risks

- Increased Marine Traffic: Vessel activity associated with farm installation, maintenance, monitoring, and harvesting may contribute to a modest rise in marine traffic, requiring coordination with existing maritime users.
- Navigational Hazards: Longline infrastructure may pose risks to commercial and recreational vessels if not clearly marked or charted.
- Mooring Failures: Extreme weather may dislodge infrastructure, causing debris or loose ropes that pose risks to vessels and marine life.
- Surface Equipment Hazards: Buoys and ropes could be struck by boats.
- Difficulty of Emergency Access: Remote ocean farming locations can present challenges for timely emergency response in the event of accidents, equipment failure, or medical incidents.

3. Operational and Technical Risks

- Storm Damage and Extreme Weather: High swell, strong currents or East Coast Lows may damage or displace infrastructure.
- Mechanical Failure: Anchoring systems, dropper lines or buoys may fail due to corrosion or material fatigue.
- Seasonal Variability: Ocean temperature, nutrient availability and upwelling conditions may affect kelp growth cycles, leading to variable yields.
- Harvest Timing Conflicts: Short optimal seeding or harvest windows may be missed due to poor weather or logistics.

4. Economic and Market Risks

- Price Volatility: Emerging markets for kelp-based biostimulants, nutraceuticals or bio-packaging may face early-stage price uncertainty.
- Supply Chain Limitations: Limited local processing infrastructure or processing bottlenecks may hinder post-harvest handling and product value.
- Overdependence on Single Markets: Relying heavily on a small number of product types (e.g., food or biostimulants) can increase exposure to demand shifts.

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5. Regulatory and Permitting Risks

- Permit Delays or Changes: Approval timeframes may be extended or conditions altered due to evolving environmental regulations or stakeholder concerns.
- Conflicts with Other Marine Users: Recreational fishers, abalone divers or commercial fishing operators may express concerns, even in low-use zones.
- Non-compliance Penalties: Failure to meet biosecurity, monitoring or reporting requirements could trigger fines or revocation of permits.
- Over-regulation may make the business unviable.

6. Social and Cultural Risks

- Noise During Construction and Harvesting: Elevated noise levels may occur during installation and harvesting phases due to vessel engine operation, winching, or mechanical equipment, though these are temporary and spatially limited.
- Community Opposition: Perceived impacts on visual amenity, pristine marine area use, or location of cultural sites could result in opposition.
- Stakeholder Conflicts: Perceived or actual displacement of recreational users (boating, fishing, commercial fishers, diving) may occur.
- Cultural Heritage Interference: Infrastructure could potentially intersect areas of Aboriginal cultural significance, or European heritage significance.

7. Biosecurity and Ecological Risks

- Unexplained Kelp Mortality: As with all aquacultures (land or ocean based), kelp growth rates may be variable due to unexpected fouling, disease, warming ocean temperatures, pest infestations, pollution, algal blooms, or water quality events.
- Unexpected Entanglement: Potential for whale or mammal entanglement.

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3.0 STRATEGIC CONTEXT

3.1 Industry Context

New South Wales is well positioned to develop a meaningful seaweed industry. With multiple native seaweed species, some cool nutrient-rich waters and extensive coastal access, NSW provides a suitable environment for seaweed cultivation and processing. The state boasts Australia's largest regional workforce, with enabling infrastructure such as ports, roads, and access to offshore ocean farm areas. These factors combine to support the development of large-scale, sustainable seaweed operations that not only deliver quality biomass, are potentially profitable, do not harm local flora or fauna, and the industry is also environmentally beneficial and restorative. The seaweed industry is seen as a key player in NSW's Net Zero Plan, Marine Estate Strategy, and "Blue Economy" aquaculture expansion goals (Reference: NSW's Net Zero Plan Stage 1: 2020–2030; NSW Marine Estate Management Strategy 2018–2028; NSW Seaweed Prospectus 2024).

Seaweed farming is widely recognised for its environmental benefits—it sequesters carbon, restores marine ecosystems, removes excess nutrients, and provides a regenerative alternative to more resource-intensive forms of aquaculture. It does not require fertilisers or freshwater and improves overall sustainability. For regions like the South Coast of NSW, where economic resilience is needed following the decline of industries such as forestry and fishing, plus the effects of bushfires, floods, and COVID-19 impacts, seaweed aquaculture presents an opportunity to build a low-carbon, resilient, and globally relevant industry that supports regional jobs, food security, and climate resilience.

The Eden-1 Project aligns with Australia's National Aquaculture Strategy, which seeks to double the current value of Australia's aquaculture industry, and enable the further development of Australia's blue economy. The Local Strategic Planning Statement 2040 (LSPS 2040) from Bega Valley Shire Council, states "Our natural advantage positions the Shire well for continued growth in aquaculture and the marine economy, plus the establishment of new marine and estuarine industries…" The LSPS 2040 seeks to, "Protect the aquaculture industry and support it to adapt to climate change". In the last decade, the Shire's oyster and mussel industries have faced increasing pressure, closures and losses due to multiple climate-related effects (flooding, bushfires, increased terrestrial runoff, rising ocean temperatures and estuary closures), plus the negative effects of man-made pollution. Therefore, the addition of an algae-based aquaculture industry provides diversification and the potential for increased climate-resilience.

Kelp Aquaculture farming can provide a new marine industry that can help buffer the economic, environmental and social effects of climate change. Much of the aquaculture and marine expertise, services, equipment and infrastructure for the Eden-1 Project are available locally and the Project will provide opportunities for employment and upskilling in seaweed production with the Eden-1 Project expecting to provide 30 direct jobs during construction and ongoing operations.

3.2 Project Rationale

The principal objective of the proposed Eden-1 Kelp Aquaculture Farm in Disaster Bay is to establish a scalable, environmentally sustainable seaweed farming operation that would support regional economic growth. Located in offshore waters with strong currents, low marine traffic, and minimal conflicting uses, the Project is ideally situated for the cultivation of *Ecklonia radiata* (Golden Kelp), a native brown seaweed with significant commercial and environmental value. By harnessing the clean, nutrient-rich waters in Disaster Bay, the farm aims to supply kelp biomass for food, agricultural feed, fertiliser, and bioproduct markets, while also supporting Australia's emerging blue economy strategy.

Aquaculture is a strategically important contributor to the NSW economy, delivering gross product sales of $219.7 million in 2023 and supporting more than 2,321 full-time equivalent jobs across the State (BDO EconSearch, 2023). The NSW oyster industry currently utilises 3,189 hectares of leased estuarine waters and generates $77 million annually, making it the State's largest aquaculture sector (NSW Government, Aquaculture in NSW – Facts & Figures 2024). By comparison, the proposed Eden-1 Kelp Aquaculture Farm seeks to occupy 200-hectares of offshore waters, yet introduces an entirely new production stream currently

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absent from the NSW aquaculture portfolio. At full development, the Project proposes to produce 1,500 tonnes of wet seaweed annually, valued at over $9 million, and to create 30 full-time jobs, addressing growing demand for domestically produced, sustainably sourced seaweed products. Importantly, none of NSW's current aquaculture revenue is derived from cultivated kelp or seaweed, highlighting a clear opportunity for diversification.

The Project seeks to provide a reliable and traceable domestic supply of high-quality kelp to meet the growing demands of Australian and international buyers. Wild-harvested kelp is very difficult to obtain in Australia due to sustainability concerns and ecosystem protections. Cultivated kelp offers year-round harvest schedules, uniformity in product specifications, and biosecurity assurance. By securing a controlled, large-scale farming operation in NSW, Eden-1 will position itself as a dependable supplier of high quality Australian-grown kelp, supporting downstream processors, product developers, and research institutions with a consistent and sustainable input source.

The increasing value of kelp-based products in Australia and overseas provides an additional commercial driver for the Eden-1 Project. Global kelp prices have risen steadily, driven by declining wild-stock availability and the rapid expansion of kelp's application in food, animal nutrition, biostimulants, cosmetics, and nutraceuticals. Current indicative wholesale prices for various product streams are: food-grade kelp at AU$20–$50 per kg, bio-stimulant extracts at AU$3–$7 per kg, animal feed supplements at AU$3–$5 per kg, and refined nutraceutical-grade compounds (e.g., fucoidan, alginate) ranging from AU$50 to over AU$150 per kg depending on provenance, purity and composition. As supply tightens and demand diversifies, the Project is positioned to capture premium markets with locally grown, traceable, and high-integrity kelp products.

3.3 Estimated Development Cost

In accordance with the requirements of the NSW Department of Planning, Housing and Infrastructure (DPHI), a formal Estimated Development Cost (EDC) report has been provided by an AQIS Certified Quantity Surveyor (CQS) and submitted as Appendix A14. As required, the certified EDC is addressed to DPHI, signed by the AQIS CQS and has been provided within 30 days of Planning Portal submission.

The estimated development cost (EDC) for the Eden-1 Kelp Aquaculture Farm has been calculated in accordance with the Environmental Planning and Assessment Regulation 2021 to provide a clear indication of the capital investment associated with the proposed development. The AQIS certified EDC reflects the costs of fully establishing the 200-hectare kelp farm in Disaster Bay and includes procurement of equipment, transport, installation labour, and project management required to bring the farm into staged operational readiness. Operational, maintenance, and monitoring costs are not included in this EDC, as per regulatory requirements.

3.4 Development Timing

The Eden-1 Kelp Aquaculture Farm will be delivered through a staged development program to ensure orderly expansion, environmental oversight, and adaptive management. Initial deployment will comprise of approximately 25 operational hectares, enabling baseline operational performance, growth-rate assessment, and verification of environmental interactions and commercial factors. Subsequent stages will add additional 1-hectare rigs, subject to monitoring outcomes, and other commercial factors, progressively building to the full lease capacity. Commencement dates remain contingent on SSD determination timelines and operational readiness; therefore, deployment is likely not to commence until late 2026, with commercial operations commencing in 2027. Scaled-down pilot testing programs will continue to support readiness, workforce training, infrastructure refinement, and ongoing environmental monitoring.

3.5 Disaster Bay Selection Criteria

Disaster Bay has been selected as the preferred location for the Eden-1 Kelp Aquaculture Farm for the following reasons:

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Zoning & Regulatory Alignment:

- Located within NSW State waters and outside marine parks, aquatic reserves, declared critical habitats, and other statutory exclusion areas.
- Assessed under the NSW Marine Waters Sustainable Aquaculture Strategy and not subject to high-risk exclusion constraints, indicating strategic suitability for aquaculture development.
- Outside declared military usage, defence exercise, and restricted navigation zones.

Infrastructure and logistics

- Located approximately 25 km south of Eden, providing efficient access to existing port, wharf, slipway, and industrial infrastructure at Snug Cove and Edrom, without the need for new coastal development.
- Proximity to established maritime services supports safe vessel operations, maintenance, and staged deployment.

Environmental Suitability:

- Presence of nearby locally occurring *Ecklonia radiata* kelp beds, particularly south towards the Victorian border, where healthy populations are observed.
- Moderate ocean temperature range ideal for golden kelp cultivation.
- Naturally high seasonal nutrient levels due to upwelling.
- Limited presence of man-made pollution or agricultural runoff.
- Green Cape and Nadgee headlands create current eddies and nutrient vortexes.
- Disaster Bay is not recognised or observed as a primary whale migration pathway or resting area.
- Lease area is classified as an unvegetated sandy substrate with no biological assemblages – uniform sandy benthos with low structural complexity and minimal biodiversity, reducing ecological conflict.
- No mapped threatened ecological communities, protected reef systems, or seagrass meadows.
- No significant presence of ecosystem-engineering fauna (e.g., corals), or Aboriginal or European Heritage.
- Depth of water greater than 20m ensuring minimal risk of shading and seafloor interaction.
- Prevailing swell conditions, depth, seafloor topography and ocean current systems provide consistent oceanic upwelling that provide nutrient-rich waters conducive to kelp growth.
- Sites north of Merimbula may be compromised by warming waters, lack of upwelling, and low nutrient conditions.

Buffering and Separation:

- Ocean rigs situated >1.1 km from any shoreline and >1.1 km from sensitive benthic features.
- Provides significant spatial buffer from whale migration paths and known resting zones.
- Lease avoids important fish nursery grounds and does not overlap with key biodiversity areas (KBAs).
- No recognised or frequented shipping channels, leases or moorings.
- The proposed lease area utilises a portion of Disaster Bay that is not regularly used by commercial fishers (although it can occur), including recreational line fishers (although it can occur), prawn trawlers, abalone divers, or spear-fishers.
- The location is remote, with no nearby housing or general overlooking, minimising visual impact.

Operational Advantages:

- Low marine traffic and minimal recreational use in Disaster Bay.
- Proximity to Snug Cove and Edrom Port for marine logistics.
- Existing aquaculture and fishing industries in Eden region provide supply-chain support.
- Access to Heavy Industrial zoned land suitable for aquaculture staging and processing.

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- Emergency access available from Greenglades Beach for visual inspection.
- Open-ocean kelp testing in Disaster Bay (from 2023-2025) to confirm efficacy and biomass yields for *Ecklonia radiata* using identical rig structures and processes.

Social and Visual Considerations:

- The lease area is located >1.1 km offshore.
- No residential housing, cultural heritage sites, or scenic lookouts within 5 km.
- Minimal impact on beach amenity or known tourism hotspots.
- Although there are identified detractors, general indications are of positive community support for the Project, with 75% of Bega Valley Shire residents supporting kelp aquaculture. Source: Auskelp community consultation blind survey N = 540, March 2024, completed by University of Wollongong (See attached Community Consultation Report attached as Appendix A6).

Stakeholder Alignment & Collaboration:

- >2.5 years of open-ocean testing in Disaster Bay confirm the suitability of kelp farming and predictable yields.
- Extensive engagement (>5 years) with local mussel, oyster, abalone, and marine industries.
- Partnerships with research institutions, research partners, universities, Cooperative Research Centres (BECRC and MBCRC), Australian Sustainable Seaweed Alliance (ASSA), and multiple local marine services and engineering consultants.
- Alignment with Commonwealth, State and Local government plans and priorities.

3.6 Project Alternatives

3.6.1 Alternative Sites

The Eden-1 Project location in Disaster Bay was selected following a comprehensive assessment of alternative regional sites and cultivation methods for commercial-scale kelp farming in southern New South Wales. Key factors considered included environmental suitability, infrastructure compatibility, accessibility, proximity, existing aquaculture activity, marine traffic, whale migration paths and resting areas, stakeholder acceptance, ocean testing trials, and long-term operational viability. Additionally, various cultivation system types were reviewed, including longlines, catenary rigs, circular systems, tubenets, rafts, and net-based frames commonly used in Asia.

Three primary alternative locations were evaluated:

1. Twofold Bay (existing mussel/kelp lease areas = 49.5 hectares)
2. Nearshore coastline: Beowa National Park
3. Wonboyn River and Lake System
4. South of Disaster Bay
5. North of Twofold Bay

Twofold Bay was evaluated as a potential site given its established kelp farming aquaculture leases (with 49.5 hectares of kelp approved lease areas available) and existing mussel farming infrastructure. However, three years of ocean testing in Test Location # 1 (See Figure 3) by Auskelp has shown that Twofold Bay (in comparison to Disaster Bay – Test Location #2) presents significant challenges for consistent kelp production.

Excess nutrient loading from wastewater outflows in Twofold Bay during high rainfall events, as well as agricultural runoff from the nearby Kiah River, resulted in unpredictable and often suboptimal water quality conditions for kelp cultivation from juvenile through to harvest. These nutrient pulses influence microbial dynamics, reducing light penetration and causing unpredictable physiological stress in kelp populations particularly during the juvenile phase of growth. Furthermore, the bay's underwater topography, which shifts

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rapidly from deep water to shallow nearshore zones, creates highly dynamic swell conditions and internal wave systems. These result in frequent breaking waves inside the bay, even during moderate swell periods, which dramatically increases infrastructure stress and poses safety risks for workers. While Twofold Bay offers logistical advantages in terms of existing lease areas, access, port facilities and support services, these environmental risks currently render it unsuitable for dependable kelp farming.

Figure 3: Kelp Aquaculture test locations #1 Twofold Bay and # 2 Disaster Bay assessed by Auskelp (Source: Google Maps).

The ocean area east of Beowa National Park (See Figure 4) was considered but ruled out due to the presence of extensive reef systems and rocky substrate, which are typical of exposed areas outside sheltered embayments. This area lacks the unvegetated sandy substrate with no biological assemblages that characterise Disaster Bay. In addition to these environmental constraints, this location is highly exposed to open ocean swells, strong wave refraction, and significant ocean currents due to the lack of topographical sheltering. These conditions, in addition to being a high marine traffic area, increased capital expenditure and maintenance costs, raised the risk of infrastructure failure, and limited safe access windows for servicing and harvest. Moreover, marine traffic data from MarineTraffic.com revealed that these areas intersect with known commercial shipping and fishing routes, raising safety and navigational concerns.

Wonboyn River and Lake were also assessed; however, it was concluded that kelp, particularly *Ecklonia radiata*, is unlikely to physiologically survive in estuarine systems due to variable salinity, turbidity, depth and limited water exchange. This fundamental incompatibility ruled out the Wonboyn system as a viable option for seaweed farming.

The ocean areas south of Disaster Bay (towards the NSW border) were considered but ruled out due to the presence of nearby reef systems, existing kelp stands, frequent rocky outcrops, and he aggregation of both whale and marine vessel (commercial) pathways.

It was determined that warmer ocean conditions north of Eden provide an overriding constraint for the commercial cultivation of kelp. The East Australian Current, which flows southward, brings warmer, nutrient-poor tropical waters along the New South Wales coast. These conditions are generally unsuitable for *Ecklonia*

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radiata, which relies on cooler, nutrient-rich waters for optimal growth. These thermal and nutrient barriers may rule out the establishment of reliable kelp aquaculture operations in more northerly locations.

Alternative Cultivation Systems

A range of alternative seaweed cultivation systems were evaluated during Project design, including frame, raft, net, and tubenet configurations which are commonly used for seaweed cultivation in Southeast Asia. These systems are not well suited to high-energy offshore environments, relying on intensive manual handling, and require frequent maintenance. Given the exposed nature of the site and Australia's comparatively high labour costs, such rig systems are not considered commercially viable for the proposed operation. Circular cultivation systems, while conceptually promising for open-ocean farming, have not yet reached commercial readiness and remain largely experimental. After considering cost, structural resilience, operational practicality, and environmental risk, the longline cultivation method was selected. Longline systems are already used in NSW aquaculture operations, are proven in high-energy environments, and are supported under the existing regulatory framework. Importantly, longline systems present the lowest entanglement risk for marine mammals due to the absence of netting or looped ropes. Importantly, they exhibit low-drag characteristics, making it well suited to withstand the dynamic wave and current conditions of Disaster Bay without compromising structural integrity.

Figure 4: Alternative Kelp Aquaculture Farm locations assessed east of Beowa National Park. (Source: Google Maps).

It is acknowledged that areas such as Jervis Bay and Port Stephens in NSW exhibit environmental characteristics similar to Disaster Bay, including wind-driven upwelling. These locations could theoretically support kelp farming under specific seasonal conditions, however, they were not formally explored due to the overriding benefits of the chosen Project site and the logistical, environmental, and operational efficiencies offered by the selected site.

3.6.2 No-Project (Do-nothing) Option

While the intention of this Environmental Impact Statement (EIS) is to rigorously evaluate the environmental and social implications of the proposed Project, it is important to consider the consequences of non-implementation. This section outlines the ecological, economic, social, and regional development impacts associated with a decision not to proceed with the Project. The analysis draws from recent national and

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regional challenges, as well as global trends that underscore the increasing importance of kelp aquaculture in creating resilient, sustainable coastal economies.

1. Climate-Resilient Diversification

The Eden region has faced compounding environmental pressures over the last decade. These include repeated bushfire events—most notably the 2019–2020 Black Summer bushfires—which devastated local forestry assets, impacted aquaculture operations through sediment and nutrient runoff, and disrupted critical supply chains. Concurrently, the region has experienced repeated flooding events and coastal storms, increasing the vulnerability of land-based agricultural operations. Traditional industries such as fishing and shellfish have been disrupted by altered environmental patterns and reduced catch limits contributed to a contraction in commercial fishing operations in Eden, particularly impacting the region's once-thriving abalone and rock lobster sectors, and diminishing overall mussel spatting in Twofold Bay, which is critical to sustainable operations.

Kelp aquaculture, particularly the cultivation of *Ecklonia radiata*, represents an environmentally sustainable and climate-resilient alternative that would diversify local economic activity and improve economic resilience. The no-project option would prevent the introduction of a low-emission, regenerative marine industry that does not rely on feed inputs, freshwater, or land-based clearing and is not affected by flooding or fire. Kelp farming supports carbon drawdown, improves marine biodiversity, and offers a new industry that will drive local employment. For regions like Eden, which is susceptible to climate volatility, the failure to diversify into resilient aquaculture ventures would leave communities increasingly exposed to future disruptions.

2. Economics and Employment

The Eden-1 Project has the potential to create a multi-layered economic stimulus for the Bega Valley Shire and the South Coast. Local kelp production would catalyse the development of a new supply chain, including hatchery operations, processing, packaging, transport, and product innovation in food, nutraceuticals, bio-stimulants and animal feed. The Project leverages existing maritime infrastructure at the Port of Eden and Edrom and as well as local processing capacity, thereby maximising the use of underutilised assets and improving economic resilience. Without the Project, the region would miss a significant opportunity to create full-time, skilled jobs in marine operations, laboratory work, environmental monitoring, vessel management, and product manufacturing. It would also limit the opportunity to retain and reskill younger workers and offer employment pathways for residents who have lost jobs in forestry and fishing.

The no-project scenario also eliminates future potential for business development in allied industries such as engineering, ocean infrastructure, equipment repair, marine services, and environmental consultancy. Research collaborations with universities and innovation clusters in sustainable agriculture and marine biotechnology would be significantly less likely to emerge in the absence of a cornerstone project such as Eden-1 Kelp Aquaculture Farm.

3. National and Global Goals

Australia's Blue Economy CRC, Marine Bioproducts CRC and the National Marine Science Plan (2025) highlight the importance of expanding marine industries that promote sustainability and resilience. Kelp farming is specifically mentioned as a priority growth area given its environmental benefits and product versatility. Globally, seaweed aquaculture is recognised by the United Nations Food and Agriculture Organization (UNFAO) and the High Level Panel for a Sustainable Ocean Economy as a key lever for climate adaptation, food security, and rural employment. Failure to proceed with the Eden-1 Project would undermine regional alignment with these national and international sustainability strategies. Moreover, Australia's commitments under the Paris Agreement and the UN Sustainable Development Goals (SDGs)—particularly SDG 13 (Climate Action), SDG 14 (Life Below Water), and SDG 8 (Decent Work and Economic Growth)—are strengthened by the development of marine-based carbon sinks and alternative low-impact farming systems.

At the state level, the NSW Marine Estate Management Strategy (2018–2028) identifies seaweed farming as a promising frontier in sustainable ocean use, supporting biodiversity, Indigenous engagement, and regional development. The Bega Valley Shire Council has articulated a clear vision for the revitalisation of Eden's

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foreshore and working harbour precincts, including Snug Cove, with the objective of strengthening marine-based industries, improving port functionality, and supporting economic diversification. Council-led planning initiatives for Snug Cove emphasise the retention and enhancement of maritime infrastructure, including wharf access, vessel servicing, logistics, and marine-related commercial uses. This strategic direction aligns with the requirements of emerging aquaculture and seafood industries, including kelp farming, by supporting cold-chain logistics, vessel operations, and value-added processing within an established marine precinct.

Across Australia, similar projects are emerging—including the commercial operations of Sea Forest in Tasmania and CH4 Global in South Australia, both focused on the methane-reducing red seaweed *Asparagopsis*. Internationally, countries such as Norway, South Korea, China and Indonesia have already established multi-billion-dollar seaweed industries, demonstrating the commercial viability and environmental significance of large-scale seaweed aquaculture. The Eden-1 Project aligns directly with these global trends, and in its absence, the region risks falling behind in one of the world's fastest-growing sectors in ocean innovation.

4. Restoration and Biodiversity

Ecklonia radiata forests have declined in multiple parts of Australia due to warming sea temperatures, pollution, and habitat degradation. Kelp farming, especially if designed with restoration principles in mind, can serve as a form of habitat regeneration. Farms provide vertical structure, improve local water quality by absorbing nutrients, and serve as fish aggregation zones. The no-project scenario prevents Disaster Bay from serving as a benchmark for these positive ecosystem services.

In contrast, kelp cultivation infrastructure—particularly longline systems—have low risk of marine mammal entanglement, minimal seabed shading due to vertical design, and minimal hydrodynamic disturbance when located in deeper waters. The no-project alternative forgoes the chance to pilot best-practice ecological integration and monitoring in an area otherwise underutilised.

5. Markets and Export

The global seaweed market is forecast to reach over USD $30 billion by 2030, driven by rising demand for sustainable ingredients in cosmetics, functional foods, feed, and organic agriculture applications (biostimulants). Australia has the environmental, scientific, and logistical capacity benefit from this significant environmentally-friendly opportunity. Eden, with its access to the Tasman Sea, is strategically located for sea freight to Asia-Pacific markets. By not pursuing the Eden-1 Project, the region forfeits its first-mover advantage in NSW for kelp aquaculture. This could leave Australia increasingly reliant on imported seaweed products, despite having optimal growing conditions for *Ecklonia radiata* and a coastline capable of supporting domestic production. The no-project scenario thereby limits both import replacement opportunities and regional branding initiatives that could build on Eden's emerging reputation in regenerative aquaculture.

Australia currently imports thousands of tonnes of seaweed and seaweed-derived products annually, including food-grade kelp, thickeners, fertilisers, and nutraceutical extracts. This volume is rising in parallel with global trends in demand. Domestically, there is a well-documented and widening gap between the demand for natural, non-synthetic biostimulants and the supply available from Australian sources. Products derived from kelp such as *Ecklonia radiata* are increasingly used in viticulture, broadacre cropping, and horticulture for their proven role in improving drought resilience, enhancing nutrient uptake, and promoting soil microbial activity. These nature-based inputs offer a sustainable alternative to synthetic fertilisers and growth regulators. Additionally, seaweed-derived compounds are being explored as feedstocks for biodegradable packaging and bioplastics, furthering the shift away from petrochemical inputs. Without domestic production scaling up, Australia will continue to miss out on export opportunities in high-value sectors, while ceding innovation and environmental leadership to more developed seaweed economies. Eden-1 presents a rare chance to align local economic development with national ambitions for nature-based climate solutions and sovereign bioeconomy growth.

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6. Existing Synergies

Eden has an established wharf infrastructure, marine engineering capability, vessel operators, and a workforce experienced in fishing, aquaculture, and offshore operations. The Eden-1 Project builds directly on this foundation by integrating kelp aquaculture into the region's existing marine industry cluster and linking it with emerging marine agritech and circular economy initiatives. In particular, the Project aligns strongly with the objectives of Bega Circular Valley, a regional strategy that seeks to reduce waste, retain value locally, and transition the Bega Valley economy toward regenerative, low-emissions production systems.

Kelp biomass and post-harvest by-products can be processed into bio-stimulants, soil conditioners, and liquid fertilisers that directly support local organic and regenerative agriculture (required in the Bega Valley), reducing reliance on imported synthetic inputs and closing nutrient loops between land and sea. Partnerships with local processors and EPA-approved composting facilities further reinforce this circular model by ensuring marine biofouling and residual biomass are recycled rather than disposed of. In this context, Eden-1 represents a practical, place-based implementation of regional circular economy policy, leveraging existing infrastructure while catalysing new value chains.

7. Summary

The "No-Project" option represents a lost opportunity to diversify Eden's economy, enhance local environmental outcomes, and support Australia's transition to a climate-resilient blue economy. It exposes the region to higher ecological and economic risk, suppresses job creation, and limits innovation in an area poised for leadership in sustainable marine farming.

3.7 Agreements to Mitigate or Offset Impact

The applicant has not entered into any formal agreements with external parties to mitigate or offset impacts associated with the Eden-1 Project. This is because the environmental investigations to date—including marine habitat surveys, nutrient modelling, hydrodynamic assessments, and ecological risk evaluations—indicate that the proposed kelp longline farm is unlikely to generate significant adverse impacts requiring formal offset arrangements or mitigation partnerships. All identified risks can be effectively managed and reviewed via the Project's Environmental Management framework and commitments for mitigation measures (Section 10) and through compliance with existing regulatory conditions under NSW DPIRD Fisheries. Should future monitoring identify a need for targeted mitigation measures, the proponent remains prepared to collaborate with relevant agencies or stakeholders.

3.8 Justification of Preferred Option

Sustainable kelp production is a key focus of the New South Wales Government Seaweed Prospectus 2024, the ASSA Seaweed Industry Economic Impact Report 2024, and the South East and Tablelands Regional Plan 2036, which seek to support future demands of kelp biomass, food security, and provide alternate regional employment for remote coastal communities. The justification for the preferred option to deploy a kelp aquaculture farm in Disaster Bay is built on sound research and up-to-date ocean testing, which underpin the opportunities for regional economies of New South Wales. The delivery of dependable, high-quality kelp biomass is critical to the future of many regenerative industries and aligns with both state and Commonwealth objectives for climate resilience, bioeconomy diversification, and coastal community development.

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4.0 PROJECT DESCRIPTION

4.1 Description of the Development (SSD Consent Sought)

The proposed development (the Eden-1 Kelp Aquaculture Farm) seeks State Significant Development (SSD) consent for the construction, operation, maintenance and eventual decommissioning of a 200-hectare offshore kelp aquaculture development within Aquaculture Lease AL21/004 in Disaster Bay, off Wonboyn, NSW. The development is a non-intensive aquaculture farm that will cultivate the native brown kelp *Ecklonia radiata* using standard offshore longline infrastructure. The proposal involves no addition of feed, fertiliser, pesticides, antibiotics, or chemicals to the marine environment, and no dredging or seabed excavation. The farm will be located approximately 1.1 km offshore at the nearest point, with longlines deployed in waters generally 20–25 m depth over unconsolidated sandy sediments, with infrastructure positioned to avoid mapped reef and sensitive habitats.

Consent is sought for the following key components:

(a) Offshore farm footprint and layout

- Development within the approved lease boundary AL21/004 (200 ha), with active longline infrastructure expected to occupy up to ~100 ha of that area to allow for operational vessel access, hydrodynamic spacing, navigation safety, and open-water corridors.
- Deployment of modular longline "rigs" (nominally ~1 ha units) arranged in rows aligned broadly parallel to the dominant swell direction, subject to final detailed design and maritime safety requirements.

(b) Offshore infrastructure (capital works)

Installation of longline aquaculture infrastructure consisting of:

- Helical screw anchors installed into the seabed (typically 3–6 m embedment, subject to engineering design and installation verification) to secure mooring points;
- Mooring and backbone ropes (marine-grade) spanning between anchor points;
- Dropper lines / culture lines suspended from backbone lines to support seeded kelp growth;
- Buoyancy floats (e.g., ~55 L and/or ~85 L floats) distributed along longlines to maintain tension and support biomass loads;
- Lease boundary markers and navigation aids, including corner markers/buoys and identification in accordance with relevant NSW DPI Fisheries and maritime requirements (e.g., IALA-aligned markers and lights where required).
- The infrastructure is designed as tensioned, fixed-position longlines to minimise slack line entanglement risks and to improve operational stability in exposed sea states.

(c) Construction and installation activities

- Mobilisation of vessels and equipment from existing port/wharf facilities (Eden/Twofold Bay area facilities and/or other existing industrial wharf locations as required).

Offshore installation activities including:

- Anchor placement and installation (screw anchor installation using appropriate hydraulic drive equipment);
- Deployment and tensioning of mooring/backbone lines, floats, and droppers;
- Installation of boundary markers and safety signage/identification.

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- Construction will occur within suitable weather windows and maritime safety constraints, with vessel movements and activity frequency varying by stage.

(d) Operational activities

The approved development includes ongoing operation of the farm, comprising:

- Routine inspection and maintenance of anchors, moorings, floats, droppers and markers;
- Cleaning and management of biofouling on infrastructure where required;
- Cultivation operations including deployment of seeded droppers, monitoring of growth, and adaptive farm management based on seasonal conditions (nutrients, temperature, sea state);
- Harvesting of kelp biomass (manual and/or mechanical stripping/collection methods) and temporary onboard handling (e.g., containment and transfer) prior to transport to existing shore-based facilities.

(e) Hatchery and seedstock (supporting activity)

- The farm will be supplied with locally sourced Ecklonia radiata seedstock propagated in an existing Auskelp hatchery facility. Hatchery activity supports the offshore operation but does not involve new land-use development as part of this SSD approval (no new buildings are proposed under this application).

(f) Onshore support and logistics (no new onshore development)

- The proposal relies on existing industrial and port infrastructure (e.g., wharf access, laydown areas, storage and handling) in the Eden/Edrom region.
- No new permanent land-based infrastructure, buildings, utilities upgrades, or new access roads are proposed as part of this SSD application. If future land-based development is required, it would be subject to separate planning approvals.

(g) Decommissioning

Consent is also sought for eventual decommissioning, including:

- Removal of longlines, floats, droppers, boundary markers and associated infrastructure;
- Removal of anchors and mooring components where feasible, or management in accordance with lease conditions and decommissioning requirements; and
- Rehabilitation of the site to ensure no ongoing navigational or environmental hazard, supported by the statutory lease security/bond requirements.

4.2 Project Background

Seaweed is a global industry of over USD $16.5 billion and is growing rapidly. Development of a seaweed industry is aligned to the National Aquaculture Strategy, to double the current value of Australia's aquaculture industry, and the National Marine Science Plan 2015-2025 (2018) to drive the development of Australia's blue economy.

AgriFutures Australia's Seaweed Industry Blueprint highlighted the opportunity for a seaweed industry in Southern NSW (Jervis Bay to Eden) that could generate $50M annual gross value of production, 500 jobs in this region, improve water quality and provide habitat for marine life (Kelly, 2020). However, this is dependent on ocean leases being approved for seaweed cultivation in a timely manner.

The proposed 200-hectare seaweed farm is categorised as non-intensive aquaculture and has no addition of feed, fertiliser or pesticides. The proposed infrastructure is standard longline aquaculture from which the native seaweed, *Ecklonia radiata* is grown from locally sourced seedstock. The Project is focused on growing *Ecklonia radiata* which naturally occurs in vast numbers in southern-Australian waters from the intertidal area

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to a depth of 25m. The proposed aquaculture 1-hectare rigs will be located at between depths of 20m-25m deep over soft sediment and is not located over any significant habitat based on the desktop information available and local knowledge of the area.

Seaweed farming plays an important role in the blue economy and the achievement of Sustainable Development Goals (SDGs) including contributing to climate change mitigation and adaptation (Duarte et al., 2017; Ahmed and Thompson, 2019; Hossain et al., 2021). Seaweed is one of the fastest growing plants on the planet and absorbs significant amounts of carbon dioxide and nitrogen from the oceans, which provides a unique opportunity to bioremediate and de-acidify oceans while producing a sustainable crop. By sustainably using the marine resources for sustainable aquaculture we contribute to the UN's Sustainable Development Goals – 1, 2, 3, 5, 8, 9, 10, 11, 12, 13, 14 and 17 (Figure 2). Because ocean farms require no freshwater, no deforestation and no fertiliser it is more sustainable than any land-based farming approach. Additionally, the Australian coastline including southern NSW has ideal growing conditions for high value, native seaweeds.

Whilst *Ecklonia radiata* has not been farmed commercially before in any region globally, kelp seaweed production technologies are not experimental. Seaweed farming is well established in many countries and the focus of substantial publications (e.g. Buschmann et al., 2017; Torres et al., 2020). Markets for kelp seaweed products are highly diverse and rapidly expanding (Nayar and Bott, 2014; Birch et al., 2019). Development of an Australian based seaweed industry is consistent with the national requirement to enhance domestic food and feed production and improve inputs to ensure greater self-sufficiency in an increasingly uncertain global climate. The development and expansion of seaweed farming in Australia is also underpinned by substantial research investment by the Commonwealth Government and research partners (Blue Economy CRC, Marine Bioproducts CRC and others), and various State Government programs designed to assist this emerging industry.

4.3 Local and Regional Community

The proposed Kelp Aquaculture Farm is located approximately 4.4 km East-South-East of Wonboyn village and 23 km South-South-West of Eden. Wonboyn is a small and remote coastal town on the South Coast on NSW in the Bega Valley Shire approximately 20 km south of Eden. At the 2021 Census Wonboyn had a population of 130 people – Australian Bureau of Statistics. Wonboyn village is a popular coastal holiday destination with a caravan park and public boat ramp providing access to Wonboyn Lake and the associated estuary system. To the north of Wonboyn Lake, accessed via Edrom Road, is the Wonboyn Resort which provides various forms of holiday accommodation. The area's natural setting, outdoor activities (particularly recreational fishing) and relative isolation being integral to the area's tourism appeal.

There is a significant oyster farming industry on Wonboyn Lake and within the Wonboyn River. Wonboyn Lake is the most southerly oyster-producing estuary in NSW, with an estimated 45.7 hectares of oyster leases, comprising 47 leases held by approximately 13 aquaculture permit holders (BVSC, 2004). The oyster industry in Wonboyn is well regarded for its quality oysters and this forms an important part of the village's economy. Some reviews indicate that Wonboyn is home to the highest quality Sydney Rock Oysters (*Saccostrea glomerata*) available in Australia. Wonboyn Lake has a surface area of 4.2 km2, a catchment of 335.4 km2 largely encompassed by protected natural reserves, such as Beowa National Park and the Nadgee Nature Reserve. The Wonboyn Lake estuarine system was historically classified as a Wave-Dominated Barrier Estuary (Roy et al 2001), characterised by a permanent connection to the ocean and a stable tidal exchange. However, due to changes in coastal processes and catchment dynamics, Wonboyn Lake has been reclassified as a Barrier River with an Intermittently Closed and Open Lake or Lagoon (ICOLL) in 2011. This shift reflects the estuary's current hydrological behaviour, where the entrance can remain closed for extended periods due to sandbar formation, with openings typically driven by high rainfall or artificial (excavator) intervention.

These environmental changes in the Wonboyn estuarine system can significantly influence estuarine ecology, water quality, and the management of oyster aquaculture operations within the system. The lakebed is deeper than most other ICOLLs in NSW, with an average bed depth of approximately 2.7m (Roper et al., 2011) and a maximum depth of approximately 6 m (WBM, 2004). The Wonboyn River and Stevens Creek provides

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freshwater and flows to the lake with 90% of the lake's catchment within the Beowa, Nadgee and Timbillica State Forests, with a further 5% of the catchment in the Nadgee Nature Reserve and Mount Imlay National Park. To the south of Disaster Bay, the Merrica River also flows into Disaster Bay from within the Nadgee Nature Reserve with a catchment area of 60.5 km. This river system is also characterised as an ICOLL and has limited inflows into the bay with the exception of high rainfall events.

The town of Eden is the most southerly town in New South Wales and is located approximately 25 km to the north of Disaster Bay. Eden is located within Twofold Bay which is reported as the third-deepest natural harbour in the southern hemisphere. At the 2021 census, Eden had a population of 3,350 people. Twofold Bay has 49.5 hectares of aquaculture (predominantly mussel) farming leases. These leases are also licensed for *Ecklonia radiata* farming, but no seaweed is commercially grown there. Eden is a historically significant port town, formerly home to a thriving whaling industry famous for the unique cooperation between humans and local orcas who assisted whalers to hunt humpback whales in the late 1800 and early 1900s. The deep, sheltered waters of Twofold Bay continue to support multiple marine industries, including commercial fishing, mussel aquaculture, abalone collection, recreational fishing and general port operations. The Port of Eden regularly accommodates large cruise liners, forestry ships and large naval vessels. The town's natural assets—its dramatic coastline, whale watching opportunities, cruise shipping visits, and access to Beowa National Park—have made tourism a growing economic contributor. In recent years, Eden has been earmarked by the NSW government as a strategic location for increased marine development including the development of a new marina and expanded berthing capacity.

4.4 Disaster Bay

The Project site is located in Disaster Bay which is situated on the far south coast of New South Wales, approximately 25 km south of Eden and around 530 km south of Sydney. This bay is bounded to the southwest by Nadgee Nature Reserve and to the north by Beowa National Park (formerly Ben Boyd National Park), both of which are designated Crown Land managed under the Crown Land Management Act 2016 NSW (NSW Government, 2016).

According to the NSW Department of Primary Industries (NSW DPI, 2022), the majority of Disaster Bay is classified as "Available to Aquaculture," with the exception of exclusion zones adjacent to natural reef systems and river mouths. The bay currently has no existing aquaculture leases, no designated shipping channels and no established moorings. Nearby access to Disaster Bay is limited due to the shallow and periodically closed Wonboyn bar, which poses significant navigational hazards and is unsuitable for routine vessel entry (DPI, 2020; BVSC, 2018). Other than via Wonboyn Lake, Disaster Bay is inaccessible from the south towards the Victorian border. Recreational boating activity in the bay is infrequent and typically originates from Wonboyn (when conditions allow) and more likely from Eden's Twofold Bay, as there are no boat entry points south to Mallacoota, approximately 35 km away (Jörissen, 2015; NPWS, 2021).

Disaster Bay includes two prominent beaches separated by a rocky central headland known as Baycliff. To the north lies Wonboyn Beach (also referred to as Disaster Bay Beach in some literature), a 2.2 km long, gently curved beach stretching between Green Cape and the entrance to Wonboyn Lake. It is backed by an approximately 500 m wide Holocene sand barrier system with no development. The beach typically features a single bar morphology, interspersed with rip channels at intervals of 200–300 m (Short, 2007). This area forms a key part of the coastal processes that influence the sediment dynamics and ecological function of the bay, with evidence of increased erosion and dynamic change in recent decades (Jörissen, 2015).

Greenglades Beach, located to the south of Baycliff, is a 4.0 km long, slightly curved beach fronting the ocean side of the Wonboyn Lake barrier. The beach is backed by a similarly intact Holocene sand barrier system and borders the Nadgee Nature Reserve to the south. There is no development along Greenglades, and the beach's only access points are via dirt roads (approximately 4 -7 km in length) through Nadgee Nature Reserve from the locality of Wonboyn (NPWS, 2021). Two ephemeral creeks are located at the southern end of Greenglades and drain to the ocean during heavy rainfall events but otherwise remain dry (Jörissen, 2015).

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4.5 Site Description

The proposed kelp aquaculture farm is located within the open marine embayment of Disaster Bay. The proposed aquaculture farm site lies offshore in relatively deep, exposed waters characterised by strong seasonal currents. There are no existing leases or conflicting marine tenures in the immediate vicinity. There are no established moorings, shipping lanes, or commercial port infrastructure within the designated lease area, and marine traffic is limited due to the difficulty of access to the bay. The surrounding environment includes sandy beaches, rocky headlands, and subtidal reef systems which support native kelp forests, primarily *Ecklonia radiata*, the species proposed for cultivation.

The proposed Kelp Aquaculture Farm designated AL21/004 occupies an area of 200 hectares within Disaster Bay off Wonboyn, NSW (see Figure 5).

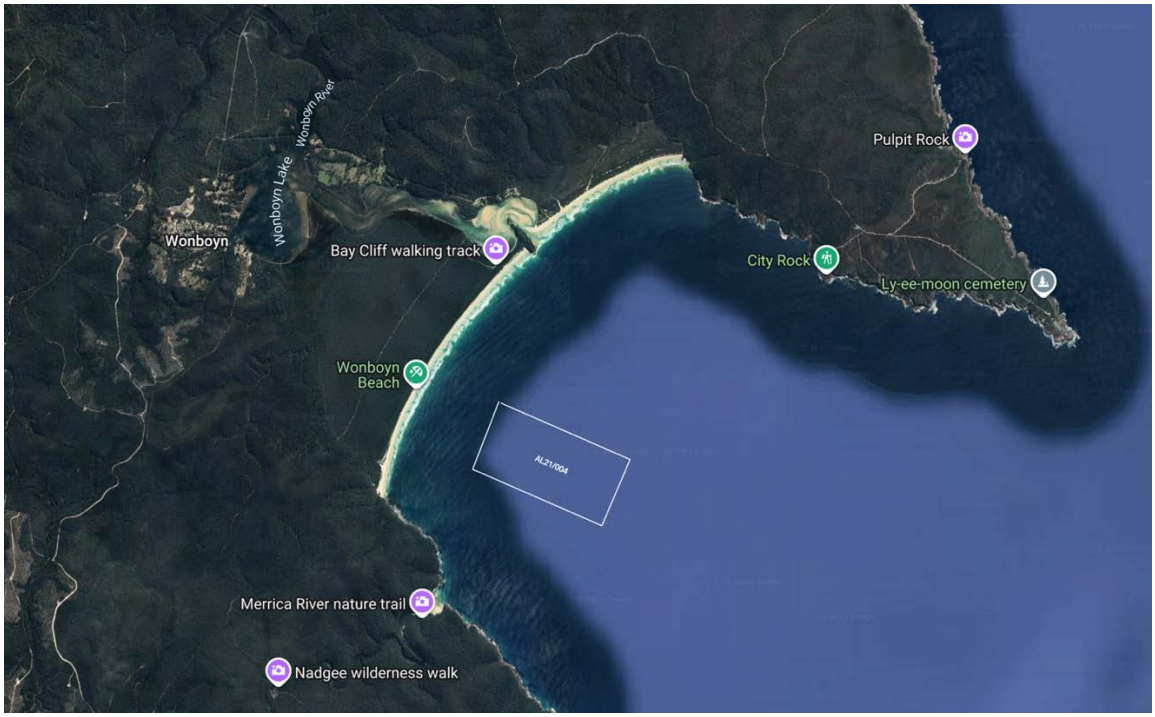

Figure 5: Regional map of Wonboyn with proposed 200Ha farm (AL21/004) indicated by the white rectangle at a distance of 1.1 km from the beachfront at the closest corner (Source: Google Maps).

The seabed of Disaster Bay is predominantly composed of unconsolidated sandy sediments. Swath mapping has confirmed the presence of these loose sediments, indicating a dynamic marine environment conducive to sediment movement and deposition. The bay functions as a sediment trap, bounded by Green Cape to the north—a prominent headland of Late Devonian rocks—and Jane Spiers Beach Head to the south, which marks a change in the orientation of the rocky coastline. This geomorphological configuration ensures that the compartment is unlikely to leak sediment to the north, effectively trapping sediments within the bay (NSW Government, 2024).

4.6 Lease AL21/004

In 2021, Auskelp Pty Ltd successfully bid for Aquaculture Lease AL21/004 following an open and competitive tender process administered by the NSW Department of Primary Industries (NSW DPI) under the Fisheries Management Act 1994. The 200-hectare offshore lease in Disaster Bay was publicly advertised and available to any qualified proponent able to demonstrate capability in marine aquaculture. As part of the NSW DPI Aquaculture Lease Allocation Program, applicants were required to provide detailed evidence of operational experience, technical competence, financial capacity, and robust environmental risk management systems, consistent with the NSW Marine Waters Sustainable Aquaculture Strategy (MWSAS).

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Auskelp's tender was assessed against criteria including demonstrated innovation in offshore kelp cultivation, commitment to ecological sustainability, regional economic development outcomes, and alignment with government priorities such as regenerative aquaculture, climate adaptation, and coastal employment generation. Following a thorough evaluation, NSW DPI determined Auskelp to be the preferred proponent and issued a provisional lease offer on 18 May 2021. This offer is subject to securing NSW Crown Lands Owner's Consent and obtaining State Significant Development approval—supported by this Environmental Impact Statement—before the lease can be fully activated.

If State Significant Development (SSD) consent is granted, Aquaculture Lease AL21/004 will be issued to the proponent on a fixed-term basis by NSW DPIRD Fisheries. The lease is not perpetual and is subject to ongoing performance and compliance requirements under the Fisheries Management Act 1994 and the NSW Marine Waters Sustainable Aquaculture Strategy. Should the kelp farm be demonstrated—through monitoring, compliance reporting, or community impact assessments—to have unacceptable environmental effects, to be operationally unviable, or to pose unreasonable impacts on the residents of Wonboyn or the broader NSW community, NSW DPIRD Fisheries may choose not to renew the lease at the end of its term. In such circumstances, the proponent would be required to decommission the site, including the removal of farm infrastructure and screw anchors, and the associated Class 2 aquaculture licence could be cancelled.

4.7 Lease Location

The Project would occupy a total area of 200 ha within the following coordinates (see attached Figure 6):

- NW Corner: -37.2705407, 149.9608763
- SW Corner: -37.2789707, 149.9566118
- SE Corner: -37.2860090, 149.9770965
- NE Corner: -37.2776992, 149.9815512

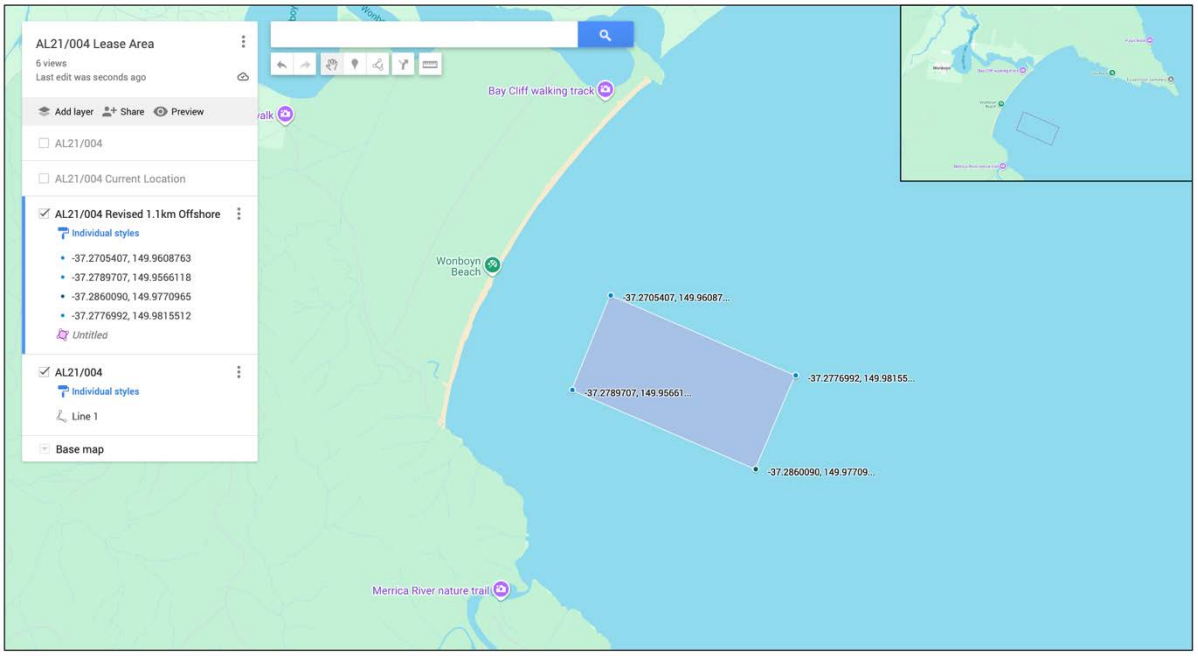

Figure 6: AL21/004 Lease Coordinates, Disaster Bay, NSW (Credit: Google).

Based on current designs, kelp longline infrastructure will cover up to 100 ha of the above 200 ha allocation to allow for vessel movements and hydrodynamic openings towards Greenglades Beach. The designated lease area located 1.1 km from Greenglades Beach, at the nearest point, Nadgee Nature Reserve closest viewing point is 1.1 km, Baycliff and Merrica 1.6 km, Wonboyn Entrance/Beach 2.6 km and Greencape Lighthouse 6.2 km (See Figure 7).

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Disaster Bay is not located within a declared Marine Park or Aquatic Reserve. While the surrounding coastline adjoins terrestrial conservation areas, including Nadgee Nature Reserve and Beowa National Park, the proposed offshore lease area does not overlap with any mapped marine protected areas or statutory exclusion zones under New South Wales legislation. The site is also not located within, nor does it directly affect, any Matters of National Environmental Significance (MNES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and does not intersect with any Commonwealth-declared marine protected areas or other EPBC-listed conservation overlays.

Figure 7: AL21/004 Lease, Disaster Bay, NSW, with minimum distances to key viewing areas (Credit: Google and Auskelp).

4.8 Ecklonia radiata (Golden Kelp)

The species of brown kelp known as *Ecklonia radiata* (Golden Kelp) is the predominant seaweed found in Disaster Bay and on the south coast of New South Wales (see image Figure 8). This native macroalga can grow on temperate reefs from southern Queensland to Tasmania and around the southern coast of Australia to Western Australia (Wernberg et al., 2003; NSW DPI, 2021). In the Disaster Bay region, *Ecklonia radiata* is a key habitat-forming species, occurring primarily on rocky reef substrates at depths ranging from 2 to over 25 metres, depending on water clarity and light availability.

Figure 8: ***Ecklonia radiata*** wild kelp stand, southern Disaster Bay, NSW, depth 10m (Credit: Auskelp 2022).

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Ecklonia radiata is a fast-growing, canopy-forming brown alga in the family *Lessoniaceae*. Morphologically, it is well-adapted to high-energy coastal environments. The kelp has a holdfast that anchors to hard substrates, a long, flexible stipe (stem), and a central blade that branches into flat, strap-like laminae or fronds (see Figure 9). This structure allows the kelp to remain neutrally buoyant in the water column, where the length and flexibility of the stipe enables it to sway with ocean currents and resist physical damage from wave action. The upward growth of the stipe positions the broad blade surfaces toward the water's surface, maximising sunlight absorption for photosynthesis while allowing water flow beneath the canopy. These traits enable *Ecklonia radiata* to thrive in dynamic coastal systems with minimal hydrological impact, while providing a complex three-dimensional structure to support marine life (Coleman & Wernberg, 2017; Kirkman, 1981).

Ecklonia radiata belongs to the family *Lessoniaceae*, which includes several commercially farmed kelp species widely cultivated in the Northern Hemisphere. These include *Saccharina latissima* (commonly known as sugar kelp), *Laminaria digitata*, and *Macrocystis pyrifera*, all of which are used in large-scale aquaculture operations across Europe, North America, and Asia. Despite being geographically and morphologically distinct, these kelps share a similar life cycle and reproductive biology with *Ecklonia radiata*, including an alternation of generations between a macroscopic sporophyte (the leafy kelp form) and a microscopic gametophyte stage.

The laboratory breeding process for *Ecklonia radiata* is similar to that of its Northern Hemisphere relatives: mature plants release spores (from sori), which under the appropriate light, temperature and nutrient conditions develop into gametophytes. These gametophytes are grown under specific light, temperature and nutrient regimes to encourage fertilisation, resulting in juvenile sporophytes that can be settled onto string or directly to rope substrates for out-planting into ocean farms. This similar breeding method within the *Lessoniaceae* family allows techniques and infrastructure to be locally adapted from overseas operations for local cultivation of *Ecklonia radiata* in Australian waters.

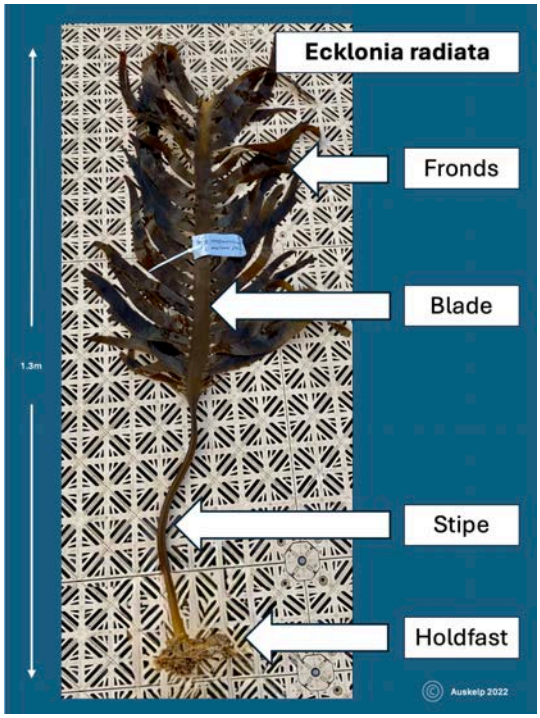

Figure 9: Mature *Ecklonia radiata* (Stage 3) macroalgae kelp from southern Disaster Bay, NSW, depth 10m (Credit: Auskelp 2022).

In Australia, wild *Ecklonia radiata* serves as a foundational species in subtidal ecosystems, playing a vital ecological role in structuring marine communities. Its constantly shifting cover provides shelter, foraging grounds, and breeding habitat for a diverse array of fish, invertebrates, and epiphytic organisms. These kelp beds also help to buffer wave energy, creating more stable and protected habitats within dynamic coastal environments. Notably, *Ecklonia radiata* forests are highly productive, with estimated annual primary

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production ranging from 700 to 1,200 grams of carbon sequestered per square metre per year in southeastern Australia (Kirkman, 1981).

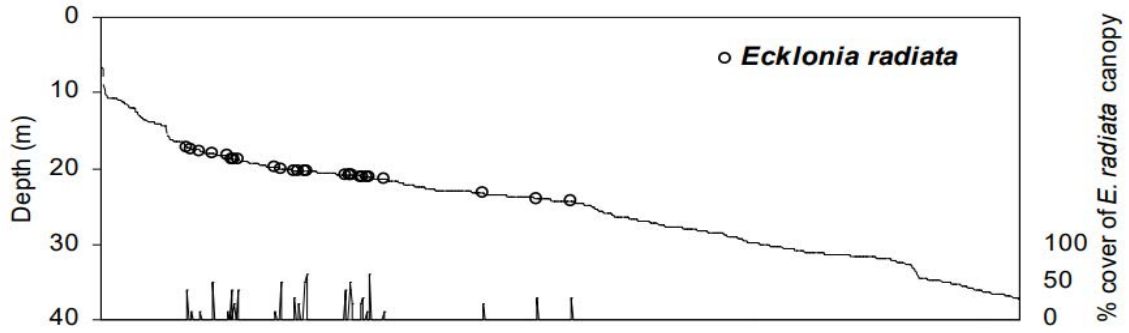

Figure 10: Presence of *Ecklonia radiata* along video transects near Twofold Bay. Sightings are indicated by circles with the % coverage indicated oscillations at the base of the graph. Source Jordan et al., 2010.

In Disaster Bay, *Ecklonia radiata* is typically found at depths from 5 m to 25 m on subtidal rocky reefs located near Green Cape and along the rocky submerged coastal margins to the south of Disaster Bay. Surveys conducted along the southern NSW coast, including Jervis Bay, Batemans Marine Park, and adjacent areas, suggest that these kelp beds are relatively stable but subject to fluctuations due to ocean warming, storm damage, and grazing pressures from sea urchins and fish (Smale & Wernberg, 2009; NSW DPI, 2021). These pressures are expected to intensify with climate change, highlighting the importance of kelp aquaculture both as a climate mitigation tool and a conservation strategy.

Significant declines in *Ecklonia radiata* forests have been documented in Australia. Following a marine heatwave in 2011, more than 100 km^2 of *Ecklonia radiata* kelp forest was lost along the west coast of Australia, particularly between Kalbarri and Jurien Bay, resulting in the functional extinction of *Ecklonia radiata* in some regions (Wernberg et al., 2016). These losses highlight the species' vulnerability to rapid and prolonged ocean warming. New South Wales has also experienced an increase in the frequency, duration, and intensity of marine heatwaves, particularly since 2015, with projections indicating that such events will become more common under current climate trajectories (Oliver et al., 2018; IMOS, 2022). In Victoria, modelling by the Department of Environment, Land, Water and Planning (DELWP, 2020) has forecast a significant reduction in the distribution and biomass of *Ecklonia radiata* kelp forests by 2050, due to combined stressors of rising sea temperatures and ocean acidification. These trends underscore the urgency and importance of kelp conservation and adaptive aquaculture initiatives in locations such as Disaster Bay.

Other Seaweeds are also found in the Disaster Bay area, contributing to the ecological diversity of the subtidal and intertidal zones. Crayweed, scientifically known as *Phyllospora comosa*, is another brown kelp found along the southern coast of New South Wales; however, it occurs in much lower abundance than *Ecklonia radiata* and is typically restricted to more exposed coastal headlands and reef systems. Red algae (*Rhodophyta*) such as *Corallina officinalis*, *Pterocladia capillacea*, and *Gelidium pristoides* are commonly found in tidepools and shallow reefs, particularly in areas where *Ecklonia radiata* canopy cover is less dense (Millar, 1990). These red algae support a complex assemblage of invertebrates and are used as spawning and feeding grounds by numerous small fish species. Green algae (Chlorophyta), while less dominant, are also present and include genera such as Ulva (commonly known as sea lettuce), *Codium fragile*, and Cladophora. These opportunistic species typically colonise disturbed or high-nutrient environments and are often the first to appear after storm events or sediment disturbances (Glasby & Underwood, 1998). While not habitat-forming in the same sense as *Ecklonia radiata*, green algae contribute to local productivity and nutrient cycling.

A key consideration for environmental planning is the functional role of *Ecklonia radiata* as a 'foundation species', as it forms structurally complex kelp forests that underpin biodiversity, productivity, and ecosystem function. It has been recognised for its capacity to sequester carbon and mitigate ocean acidification through the uptake of dissolved CO_2 and buffering of local seawater chemistry (Krause-Jensen & Duarte, 2016). In areas such as Disaster Bay, which are relatively undisturbed and have low nutrient pollution, these

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natural kelp forests act as blue carbon sinks, enhancing biodiversity while also offering potential for sustainable aquaculture expansion (Chung et al., 2011). In conclusion, *Ecklonia radiata* is the dominant and ecologically most significant seaweed in the Disaster Bay region. It supports a diverse marine ecosystem and provides multiple ecosystem services, including carbon sequestration, habitat formation, and biodiversity support.

Brown kelp, including *Ecklonia radiata*, is considered a low-risk species from a biosecurity perspective due to its biological characteristics and the nature of its marine environment. Unlike finfish or bivalve aquaculture species, kelp does not rely on active feeding or filtration of waterborne particles and thus does not bioaccumulate pathogens or contaminants in the same way filter-feeders such as oysters or mussels do (FAO, 2021). Kelp is an autotrophic organism that obtains its nutrients and energy through photosynthesis, using dissolved inorganic nutrients like nitrate and phosphate, rather than consuming living or organic material. This significantly reduces the potential for disease transmission or the amplification of pathogens within a kelp farm environment (Campbell et al., 2019).

Brown kelp does not suffer from the range of viral, bacterial, or parasitic diseases that are commonly associated with animal aquaculture. While some forms of epiphytic fouling or tissue necrosis can occur in extreme environmental stress events—such as warm water anomalies or nutrient imbalances—there is no record of infectious disease outbreaks in Australian kelp species, nor any evidence that *Ecklonia radiata* acts as a host or vector for pathogens affecting other marine life (NSW DPI, 2021; Buschmann et al., 2017). Internationally, where species in the same family (*Lessoniaceae*) such as *Saccharina latissima* and *Macrocystis pyrifera* are widely farmed, kelp aquaculture has been consistently rated as low impact with minimal biosecurity concern (FAO, 2021; Kim et al., 2017).

In addition, kelp cultivation involves minimal handling and no use of antibiotics, hormones, or veterinary inputs (Campbell et al., 2019). The entire life cycle from gametophyte to harvestable sporophyte is conducted without the introduction of non-native species or genetically modified organisms. In New South Wales, the cultivation of native kelp species such as *Ecklonia radiata* within their natural range ensures genetic and ecological compatibility, further lowering risk (NSW DPI, 2021). For these reasons, kelp farming is considered bio-secure, environmentally sustainable, and one of the safest forms of marine aquaculture currently available.

4.9 Beach-cast Kelp

There is expected to be a minimal loss of kelp from the proposed kelp lines, based on ocean testing results in Disaster Bay between 2023 and 2025. Deep ocean rigs of *Ecklonia radiata* do not suffer the same wave-driven dislodgment rates as subtidal reefs.

Beach-cast deposits of *Ecklonia radiata* on Greenglades Beach are a natural and regular occurrence following storm events, forming part of the normal coastal nutrient cycling process. These accumulations result from wave-driven dislodgement of kelp from subtidal reefs during high-energy weather conditions, a process well documented in temperate marine systems across southern Australia (Kirkman & Kendrick, 1997; Orr et al., 2005). The presence of such wrack poses no biosecurity or disease risk to terrestrial or marine environments. Kelp species, including *Ecklonia radiata*, are non-pathogenic, do not act as vectors for diseases affecting land-based ecosystems, and lack the biological mechanisms to carry or transmit infectious agents (Campbell et al., 2019; FAO, 2021). In fact, these deposits may provide ecological benefits by contributing organic matter that supports dune stability and nutrient enrichment, while also serving as habitat and food sources for a variety of coastal invertebrates and shorebirds (Ince et al., 2007; Dugan et al., 2003; MacMillan & Quijón, 2012). Consequently, the accumulation of kelp wrack on beaches such as Greenglades should be understood as an ecologically significant and benign natural phenomenon that supports broader coastal ecosystem functioning.

High levels of kelp accumulation can, in sheltered or low-energy environments, result in temporary smothering of sandy substrates and localised decomposition that may generate odour; however, such effects are considered unlikely in highly dynamic offshore settings such as Disaster Bay, where strong wave action, twice-daily tidal exchange, and high flushing currents limit prolonged accumulation and promote rapid dispersal of

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detached biomass. Local accounts indicate that prior to the 1990s very high volumes of naturally occurring kelp (were periodically deposited on Disaster Bay beaches, with large accumulations observed following significant storm events (crayweed - *Phyllospora comosa* and *Ecklonia radiata*), but dispersing rapidly, supporting the conclusion that persistent build-up below the high-water mark is unlikely in the present-day coastal environment.

Due to the decline in *Ecklonia radiata* populations along the east coast of Australia, driven by rising ocean temperatures and urchin overgrazing (Vergés et al., 2016; Ling et al., 2015), kelp farming may provide a beneficial substitute source of beach-cast deposits; these wrack accumulations deliver ecological services by contributing organic matter that enhances dune stability and nutrient enrichment, while also serving as habitat and food for coastal invertebrates and shorebirds (Kirkman & Kendrick, 1997; Orr et al., 2005; Ince et al., 2007; Dugan et al., 2003; MacMillan & Quijón, 2012). Accordingly, in the context of naturally declining wild kelp cover, the supplementary wrack generated by aquaculture may represent an ecological gain rather than a burden, supporting coastal processes and biodiversity resilience.

There is not expected to be any overlap or interaction between kelp farming activities and terrestrial areas, as all operations will occur offshore within the designated lease area, with no land-based infrastructure, discharge, or access requirements; the surrounding terrestrial zones, including Beowa National Park and Nadgee Nature Reserve, are separated from the farm site by more than 1.1 km of open water and are unaffected by the submerged and low-impact nature of kelp cultivation.

Auskelp will maintain an annual log of significant beach-cast deposits of *Ecklonia radiata* to determine if the kelp is from farming operations (which can be determined by species, kelp age and the presence of holdfasts adapted to ropes or rocky substrates) – findings will be reported annually to NSW Fisheries.

4.10 Land Based Site

This proposal does not include the development of new land-based sites. Permanent land-based activities will be supported by existing infrastructure in the Eden and Edrom regions, with no requirement for new building construction or upgrades to public facilities. The Eden-1 Kelp Aquaculture Farm Project has been developed to leverage underutilised infrastructure originally established for the region's historic fishing and forestry sectors. These include existing facilities located in Eden, Snug Cove Wharf, and industrial facilities located at Edrom which may include the government-owned Multi-purpose Wharf. These assets provide wharf access, staging areas, storage, grid electricity, and rainwater supplies sufficient to meet the operational demands of the Eden-1 operation. All kelp deployment, processing, and vessel support activities will occur within existing industrial zones, and longlines, floats, screw anchors, and biomass will be handled without additional building construction. In the unlikely event that future land-based development is required, it would be subject to a separate development assessment and approval process under Part 4 of the Environmental Planning and Assessment Act 1979 (NSW), as administered by the relevant consent authority.

4.11 Infrastructure Design

The Eden-1 Kelp Aquaculture Farm will utilise longline infrastructure tailored for the high-energy marine environment. Each longline unit consists of a pair of screw anchors driven 3-6 metres into the seafloor, connected via heavy-duty polypropylene mooring ropes (25–35 mm) and pivot lay-flat ropes covered in a heavy-duty plastic sleeve, where the rope meets the sand layer to reduce sand chaffing. These moorings support a tensioned backbone line from which *Ecklonia radiata* droppers are suspended. Buoyancy floats are spaced along the backbone to accommodate the biomass while ensuring load distribution. The cultivated species, *Ecklonia radiata*, exhibits low drag, neutral buoyancy, and high residual strength.

Disaster Bay is characterised by a predominant swell direction from the south to southeast, with a mean wave height of approximately 0.75 m under ambient conditions. According to BMT's calibrated spectral wave ray tracing (SWRT) model, the 100-year return period significant wave height (Hs) is 7.15 m, with a peak wave period of 12.22 seconds and mean wave period of 10.79 seconds. These values were used to calculate the engineering specifications of all infrastructure.

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The Eden-1 Kelp Aquaculture Farm longline infrastructure will be aligned parallel to the predominant south to southeast swell direction, as determined by wave climate modelling and empirical observations and ocean rig testing in Disaster Bay. This orientation minimises drag and lateral loading on the system by allowing swell energy to pass along the length of the lines rather than perpendicularly across them. Each longline backbone will be secured by one screw anchor connection point on the ocean-facing (seaward) side, and a screw anchor connection point on the shoreward side. The standard longline configuration will be approximately 100 m in length at the surface. This anchoring configuration is well suited to the gradual increase in depth away from shore and the wave energy gradient across the lease area. Each anchor is installed to a depth of approximately 4 metres and is rated to resist peak loads exceeding 35 kN in sandy sediments like Disaster Bay.

Attached along each longline are modular polyethylene buoyancy floats, spaced at regular intervals and tied ~1 m above the main backbone using flexible rope loops and slip knots that allow for easy adjustment and reconfiguration. This system enables the repositioning of floats for cleaning, maintenance, or adjustment of buoyancy if kelp biomass accumulates and increases the load on the backbone. The floats are designed to maintain optimal tension in the backbone, while their streamlined, low-drag profile ensures minimal hydrodynamic resistance. This float configuration allows for the integration of additional buoyancy if needed during peak kelp growth periods, ensuring system stability and resilience throughout seasonal cycles. The infrastructure is designed to meet or exceed international standards for mooring systems in high energy, open-ocean aquaculture use.

The screw anchors are developed to eliminate need for chain, making the infrastructure quieter and less likely to fail due to corrosion. The longline rope is bolted through a polymer thimble to the lay-flat (with plastic shield) which is bolted to the screw anchor through a polymer thimble. Because the screw anchor is turned 3-6m into seafloor, the metal helix has reduced corrosion due to lower oxygen levels. The blue plastic shield surrounding the lay-flat rope prevents chafing, and the screw anchor design has an expected 30-year lifespan if installed and maintained correctly.

- Screw Anchors: The minimum sized helical screw anchors proposed for Eden-1 are rated for static load capacity of 25t and torque verification of 35 kN in fine grain sand, embedment depth of 4 m, and helix diameter 450-650 mm. Larger screw anchors can be utilised, and depth can be increased to 6m if required. In fine sandy substrates typical of Disaster Bay, BMT assessment confirms that anchors installed at 3.5–4 m depth can achieve theoretical holding capacities of 80–100 kN (Brown, D.A., 2013).
- Polypropylene Rope (25–35 mm): The minimum breaking strength (MBS) of marine-grade 3-strand polypropylene rope ranges from ~58 kN (25 mm) to ~106 kN (35 mm), as per standards reported by Cordage Institute (CI-1303-04). The working load limit (WLL) with a standard safety factor of 5:1 equates to ~11.6 kN (25 mm) and ~21.2 kN (35 mm) respectively (Cordage Institute, 2004; Samson Rope Technologies, 2019).
- Floats are either 55 litre or 85 litre impact-resistant, non-crushing, polypropene marine floats in carbon black capable of operating at working depths of up to 45 m, which may be interspersed with orange floats for navigation purposes.
- Specified load margins are sufficient to resist anticipated dynamic and static loads even under peak swell and maximum drag/weight conditions. Dynamic wave loading, including drag from kelp biomass and vertical surge, was incorporated into the mooring design using conservative assumptions for biomass load (~30 kg/m dropper line), buoyancy-induced uplift, and wave/current drag. It is expected that kelp will be harvested at 5kg/m, therefore well under load limits.

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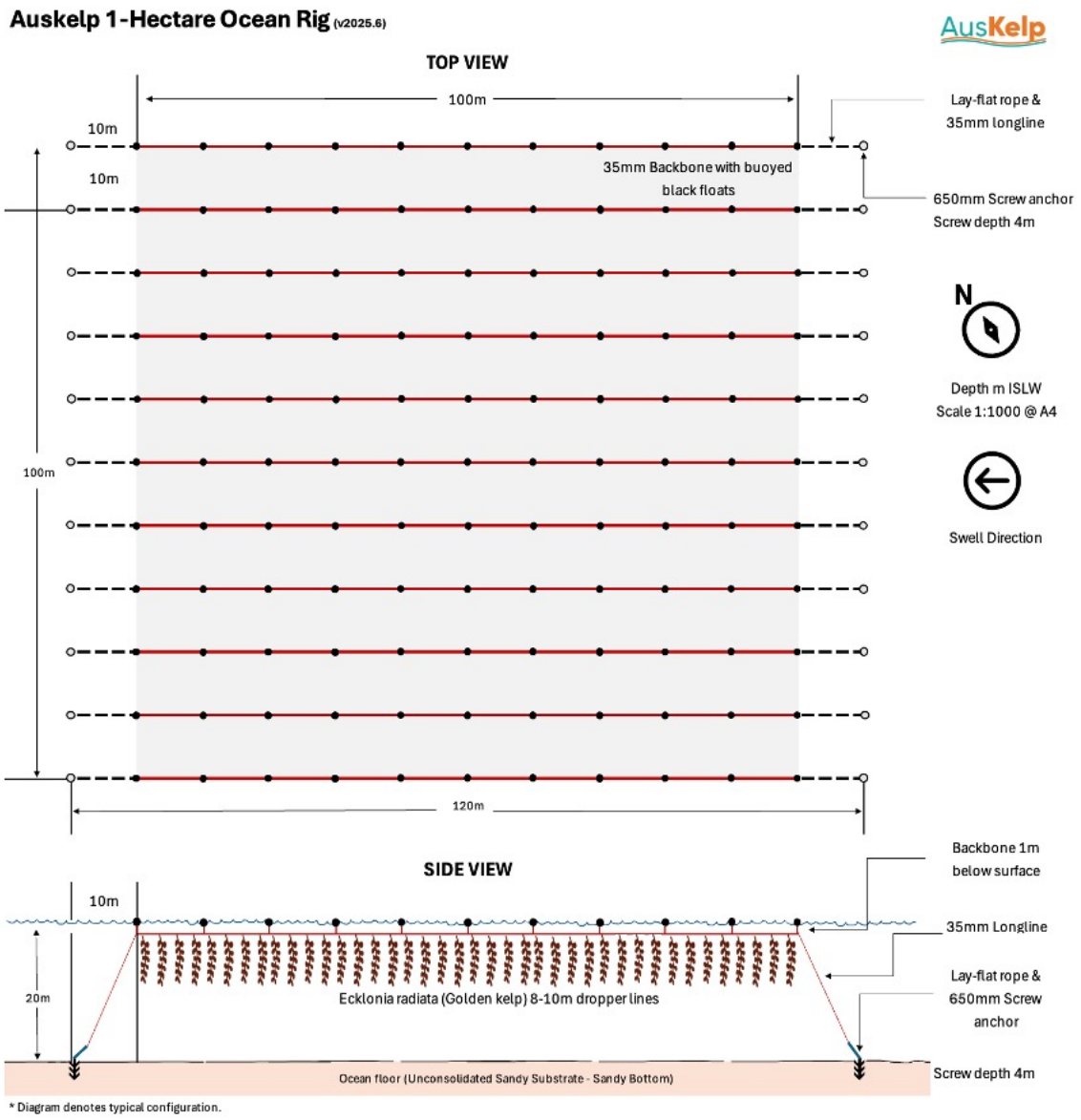

Figure 11: Auskelp 1-Hectare Ocean Rig (Credit: Auskelp 2025).

Each 1-hectare kelp rig requires approximately 120 x black marine-grade floats. These floats provide essential buoyancy for the longline infrastructure, maintaining consistent tension and supporting the growth structure under variable ocean conditions. They also serve a maritime safety function, marking the longline location ensuring clear visibility for navigation and compliance with marine regulations. Because Ecklonia radiata is relatively neutral buoyant, the load on the float system is minimal. Float design and configuration are carefully balanced to minimise visual impact, ensuring whale safety (by keeping the rig under tension), and maintaining operational durability in high-energy marine environments.

The standard length of longlines used in offshore aquaculture varies depending on environmental exposure and the species being cultivated. In Western Australia's pearl oyster farming industry, where infrastructure must withstand cyclonic storms and tidal ranges of up to 10 metres, longline lengths typically range between 100 and 500 metres to accommodate site-specific conditions (Smith et al., 2023). Similarly, mussel farming operations in Twofold Bay, New South Wales, utilise longlines commonly around 150 metres in length, with flexibility depending on lease layout and hydrodynamics (NSW DPI, 2000).

Longlines are generally spaced 10 to 30 metres apart, a configuration that allows for optimal water flow, efficient feeding, and vessel access across the lease area (NSW DPI, 2000). This spacing also helps prevent

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entanglement and mitigates excessive mechanical loading caused by currents and wave action. To reduce structural fatigue and interference with natural coastal processes, longlines are aligned parallel to the predominant wave direction—a method proven to reduce lateral forces and extend infrastructure longevity in high-energy environments (Wang et al., 2023). From certain angles, such as side-on or end-on perspectives, the systems appear as neat rows of buoys, though visual uniformity may vary when viewed from other orientations due to wave dynamics and ocean motion.

Lease Boundary Marking and Identification

In accordance with the Fisheries Management (Aquaculture) Regulation 2024, the NSW Marine Waters Sustainable Aquaculture Strategy, Transport for NSW (TFNSW) requirements and International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) standards, the extremities of the Eden-1 lease will be marked by appropriately designed navigational buoys positioned at the corners of the lease area. Light visibility will be set to a nominal range of 1 nautical mile (approximately 1.8 km), consistent with maritime safety requirements for offshore aquaculture infrastructure. Each of the four cardinal markers will incorporate the prescribed buoy colour combinations, day shapes, and light flash characteristics in accordance with NSW Maritime and IALA standards.

Corner markers will be equipped with radar reflectors to enhance detectability by vessels in reduced visibility conditions. Lease and permit identification numbers will be clearly displayed in contrasting colours to ensure legibility and regulatory compliance. Together, these measures ensure that the lease area is identifiable to commercial, recreational, and government maritime users while maintaining alignment with established navigational safety protocols.

Figure 12: Navigation corner marker (Source: Adortech, 2025).

4.12 Construction and Operation of the Project

4.12.1 Transportation

During the construction stage the movement of vessels between the proposed Kelp Aquaculture Farm and shore facilities may range from 0-6 return trips per day per lease to install the proposed infrastructure. Once the infrastructure is established the movement of vessels would be in the range of 0-3 return trips per day per lease to undertake activities such as inspections, repairs, maintenance, cleaning and harvesting. Vehicular movements to provide goods and services to the vessels would again be highest during the construction stage. This would include trucks to supply the required components of the infrastructure and equipment required to carry out the installation. It is expected the number of vehicular movements to be within the range of 0-6 movements per day to the Pentarch facilities in Edrom. Once the infrastructure is established the number of vehicular movements would largely be reduced to the movements of staff travelling from the land-based site/s to the wharf and boat ramp facilities to service the leases.

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4.12.2 Construction and Operation Hours

The offshore construction phase of the Eden-1 Kelp Aquaculture Farm will seek to adhere, wherever practical, to the standard construction hours recommended by the NSW Environment Protection Authority (EPA) and the Department of Planning and Environment. These guidelines specify allowable working hours from 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm on Saturdays, excluding Sundays and public holidays, under the NSW Noise Policy for Industry (NSW EPA, 2017). However, given the offshore nature of the Project and the reliance on ocean conditions, there will be a necessary degree of flexibility. Construction and deployment activities are heavily dependent on sea state, prevailing swell and wind directions, tidal variation, and the availability of safe weather windows. Additionally, work hours must be adaptable to seasonal daylight patterns and biological timing relevant to kelp cultivation cycles. For example, early morning deployments during summer months may be required to avoid the afternoon onset of northeasterly sea breezes or southerly busters, which are characteristic of this region. Therefore, while best efforts will be made to comply with onshore noise regulations, the inherently dynamic and marine-based conditions of the site necessitate a more responsive operational approach.

Due to the size, remoteness, and offshore positioning of the Eden-1 lease area in Disaster Bay, the construction and operational activities of the Project are not expected to be materially affected by standard EPA noise or construction regulations typically applied to urban or nearshore environments. The proposed site lies approximately 25 km south of the town of Eden and is entirely marine based, located more than 1.1 km offshore in open ocean waters, with an average distance of 2.1 km offshore. The lease area is not within acoustic proximity to any residential or sensitive land-based receptors with the nearest North Wonboyn residents being >2.5 km away and Wonboyn residents 4.4km away. The surrounding coastline is dominated by uninhabited conservation land, including Beowa National Park to the north and Nadgee Nature Reserve to the south, both of which are managed primarily for biodiversity conservation and do not contain residential settlements or tourism accommodation. There are no roads, facilities, or populated zones adjacent to the site. This isolation substantially reduces the risk of any noise or construction-related amenity impacts, and thus the lease area should reasonably be considered outside the scope of typical construction hour restrictions as intended by the NSW EPA guidelines, which are designed to protect human amenity in populated or sensitive areas.

Operational and maintenance activities during routine farm operation will remain flexible, as they are dependent on ocean conditions, wind direction, swell height, seasonal daylight hours, and biological requirements associated with kelp cultivation cycles. In summer months, work may begin earlier in the day—typically between 5:30 am and 6:30 am—to avoid afternoon wind events, such as prevailing northeasterlies and southerlies which are common in Disaster Bay.

Scheduled operational activities will generally occur between Monday and Friday, with no routine activities planned for weekends. However, emergency call-outs—such as to address infrastructure damage following storms, marine entanglement risks, or reports of navigational hazards—may occur at any time, including during evenings or weekends, in accordance with maritime safety obligations and regulatory permits under the NSW Fisheries Management Act 1994.

4.13 Cultivation

The Eden-1 Kelp Aquaculture Farm utilises an integrated cultivation cycle for locally sourced *Ecklonia radiata*, grown to the specific oceanographic and biological characteristics of Disaster Bay. The cultivation process begins with the propagation of kelp at the purpose-built Auskelp hatchery facility. This hatchery supports the farm with a stable supply of high-quality juvenile sporophytes grown from locally sourced *Ecklonia radiata* seed stock, ensuring environmental compatibility and genetic integrity.

The breeding cycle begins by collecting fertile sori tissue from wild *Ecklonia radiata* plants located within 10 km of Disaster Bay, usually during the reproductive season from late summer to early autumn. The sori are cleaned and treated under sterile laboratory conditions to remove epiphytes, contaminants, and unwanted microorganisms. Spores are released from the sori by desiccation and immersion in filtered seawater.

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Germination proceeds through the microscopic gametophyte stage, where male and female gametes form and fuse to create juvenile sporophytes. These sporophytes are nurtured in the hatchery for several weeks until they reach 2–5 mm in length.

Cultivation in the marine lease area begins during late autumn or early winter (typically March to June) when sea temperatures begin to cool and ocean nutrient levels rise. This period promotes optimal juvenile growth rates and minimises biofouling. Dropper lines, approximately 10 m metres in length, are suspended vertically from horizontally moored longlines, with seeded twine secured along the dropper line. The droppers are deployed at a depth of 1 to 10 metres below the surface, optimising light availability while avoiding surface turbulence. Growth continues throughout the winter months, with mature fronds typically ready for harvest between October and November, depending on seasonal conditions and target biomass.

4.14 Harvesting

Harvesting is carried out manually or via mechanical stripping equipment. Mature kelp is detached from the drop lines by sliding harvesting sleeves or rollers along the line, which remove the entire biomass while leaving the rope intact for reseeding. Once harvested, kelp is sorted, shredded and stabilised for post-harvest processing.

The following post cultivation product pathways are available, which are dependent upon the age of the kelp, the prevalence of biofouling, and the volumes available:

- Fresh kelp (washed and chilled) – sold into food and functional ingredient markets, particularly in the premium culinary and health food sectors.
- Sun-dried or air-dried kelp – packaged as food supplements or raw material for nutraceuticals.
- Liquid fertiliser extract – produced via aqueous extraction (e.g. cold fermentation or enzymatic digestion) to be sold as organic-certified biostimulant for crop enhancement.
- Direct nutraceutical extract (fucoidan, laminarin, alginates) – processed using targeted extraction technologies and sold for use in immune support, anti-inflammatory, and gut health products.
- Animal feed supplement – dried and milled kelp added to livestock or aquaculture feed formulations to support growth, immunity, and gut microbiota health.
- Soil conditioner – waste kelp may be processed via pyrolysis or composting into carbon-rich soil amendments.

Each product stream is aligned with circular economy principles, ensuring full biomass utilisation and minimal environmental waste. Post-cultivation residues are used for composting in partnership with Ocean2Earth (a Pentarch Group Company located at Edrom) or processed under their existing EPA Order and Exemption framework which has existing provisions to process seaweed and other marine waste. This integrated cultivation and processing system positions the Eden-1 Project as a scalable, environmentally sustainable seaweed farming operation.

4.15 Decommissioning

In accordance with the provisions of the Fisheries Management Act 1994 (NSW), the operator of the proposed commercial kelp aquaculture leases will be authorised to carry out their activities under a valid aquaculture permit and lease issued by Fisheries NSW, a division of the NSW Department of Primary Industries (NSW DPI). As part of these statutory provisions, permit holder(s) of NSW Class A Permit(s) s and Class 2 lease(s) are required to enter an Aquaculture Lease Security Arrangement (Bond) with Fisheries NSW. This bond serves as a financial guarantee to ensure that lease areas are responsibly managed throughout the duration of the operation and suitably decommissioned at the end of the lease term, or in the event of cessation of activity. It is an expected condition of the Class A Permit and Class 2 aquaculture lease that aquaculture infrastructure, including longlines, buoys, anchors, and other associated equipment is removed from the lease area should operations cease. If a permit holder is unable or unwilling to carry out the required decommissioning works, Fisheries NSW will activate the bond to fund the removal of infrastructure, ensuring the lease area is returned to its original condition and does not pose any ongoing environmental or navigational hazard.

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5.0 STATUTORY FRAMEWORK

5.1 Strategic Context

The environmental risk assessment (ERA) for the Eden-1 Kelp Aquaculture Farm uses best-practice methodologies that are scientifically robust and align with both Commonwealth and State regulatory expectations for marine aquaculture. While foundational frameworks such as Fletcher et al. (2004, revised 2020) and Vom Berg (2008) continue to inform baseline assessment structures, the Eden-1 proposal incorporates more recent developments that better reflect the unique ecological characteristics of kelp aquaculture and its relative risk profile.

In particular, the Ecosystem-Based Fisheries Management (EBFM) framework developed by Fletcher et al. (2012) and further refined in 2018 and 2020 has been adopted to guide the assessment of ecosystem-level risks, pressures, and responses. This framework is widely applied across Australian jurisdictions and is consistent with approaches recognised and supported by the Australian Government Department of Agriculture, Water and the Environment (DAWE) for assessing cumulative and ecosystem-scale impacts in marine and fisheries contexts. The EBFM model supports holistic planning through the integration of ecological, social, and economic factors and is particularly well suited to regenerative aquaculture systems such as kelp farming, which operate without artificial feed inputs or waste discharge and therefore exhibit fundamentally different risk pathways compared to finfish or bivalve shellfish operations.

The Department of Agriculture, Water and the Environment and Fisheries Research and Development Corporation (FRDC) have released updated environmental risk assessment guidance specific to aquaculture activities (DAWE, 2020). This guidance includes pressure-stressor-response linkages, standardised risk matrices, and a commitment to transparency and stakeholder engagement. The Eden-1 risk assessment has been structured in accordance with this national framework, providing a consistent and defensible approach to consequence and likelihood ratings, management thresholds, and residual risk analysis.

From an international perspective, the Project also draws on the Food and Agricultural organisation (FAO) and United Nations Environmental Plan 2021 (UNEP) Guidelines for Sustainable Seaweed Aquaculture, which outline key environmental and social sustainability criteria for seaweed cultivation systems. These guidelines provide global benchmarks for habitat interaction, biodiversity preservation, nutrient cycling, and infrastructure decommissioning, all of which have been directly considered in the Eden-1 Project design and operational protocols. Importantly, the kelp species proposed (*Ecklonia radiata*) shares ecological and reproductive characteristics with species farmed in Europe and Scandinavia (e.g. *Saccharina latissima*, *Laminaria digitata*), where multiple studies have found minimal benthic impacts and rapid ecological recovery post-decommissioning (Visch et al., 2020; Hancke et al., 2021; Carranza et al., 2024).

At the state level, the Eden-1 risk framework is consistent with the NSW Department of Primary Industries (DPI) Aquaculture Strategy (2023) and associated Environmental Assessment and Management Plans (EAMPs). These require proponents to demonstrate appropriate site selection, sustainable stocking densities, and infrastructure removal strategies. The Project also complies with the Fisheries Management Act 1994 provisions, including the requirement for an Aquaculture Lease Security Arrangement (Bond) as a component of the Class 2 lease approval. Taken together, these contemporary and kelp-specific frameworks provide a scientifically validated, regulator-aligned, and environmentally responsible foundation for assessing the risks associated with the Eden-1 Kelp Aquaculture Farm. The Project's inherently low-impact design—characterised by the absence of nutrient input, minimal benthic disturbance, and post-use restoration—supports a conclusion of low residual environmental risk, consistent with national and international ERA benchmarks for seaweed aquaculture.

5.2 Permissibility

The Eden-1 kelp aquaculture project is permissible at the proposed location, based on land-use zoning, environmental overlays, and strategic planning instruments:

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- The Project site lies within areas designated as "Available for Aquaculture" under the NSW DPI Marine Waters Strategy, confirming its strategic suitability for sea-based cultivation activities.
- The site is outside all NSW marine parks, aquatic reserves, biodiversity sanctuaries, and other no-go environmental protection zones, meaning no statutory exclusions apply.
- The site is outside all Department of Defence and military use areas, with no conflict with Defence training, navigation, or exclusion zones.
- Must comply with the assessment requirements of all applicable NSW legislation, the Marine Waters Aquaculture Strategy (MWAS), and the relevant State Environmental Planning Policies (SEPPs), as outlined in Section 5.3.
- Must comply with all applicable Commonwealth legislation and policy frameworks relevant to the Project, including the Environment Protection and Biodiversity Conservation Act 1999, the Underwater Cultural Heritage Act 2018, the Native Title Act 1993, and the principles of Ecologically Sustainable Development (ESD), as detailed in Section 5.5.
- Must comply with all applicable local planning controls, strategic frameworks, and operational guidelines relevant to the Project, as detailed in Section 5.6.

5.2.1 Pre-condition to Exercising the Power to Grant Approval

Before development consent may be granted for SSD, the consent authority must be satisfied that the application has been made and assessed in accordance with the Environmental Planning and Assessment Act 1979 (NSW) and the Environmental Planning and Assessment Regulation, including that the Environmental Impact Statement has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) and is adequate to enable informed assessment, public exhibition and consideration of submissions. In addition, the consent authority must consider whether any other approvals, licences, permits or authorisations are required for the Project to be carried out. Where such approvals are required under other legislation (including marine tenure and aquaculture authorisations administered by NSW DPIRD Fisheries, Crown Lands and relevant maritime regulators), these do not generally operate as "planning preconditions" to the grant of consent, but may be addressed through:

(a) demonstrated pathway and feasibility within this EIS; and/or

(b) conditions of consent requiring evidence of those authorisations prior to construction, deployment, operation and/or commissioning, as applicable.

A summary of the statutory requirements that must be considered prior to the determination of the SSDA is detailed in tables 2-8 in Section **5.7 Power to Grant Approval**.

The proposal must be assessed for potential impacts on Matters of National Environmental Significance under the Environment Protection and Biodiversity Conservation Act 1999, including whether referral to the Commonwealth is required and whether the action is a controlled action. NSW Crown Lands must also confirm tenure and access arrangements for the occupation of public waters and ensure consistency with State coastal management, navigation safety, biosecurity, native title, and cultural heritage requirements. Only once these statutory pre-conditions are satisfied can the consent authority exercise its power to grant approval.

5.2.2 Mandatory Matters for Consideration

In determining the development application, the consent authority must consider all mandatory matters required under the EP&A Act, SEPPs, and agency-specific assessment frameworks. These include the environmental impacts of the Project, the suitability of the site, compatibility with surrounding marine uses, potential risks to biodiversity and water quality, and measures proposed to avoid, minimise, or mitigate impacts. Consideration must also be given to public submissions, regional planning strategies, community and stakeholder engagement outcomes, and the overall public interest.

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5.3 Relevant State (NSW) Legislation and Regulations

This section of the EIS provides an overview of the key statutory requirements relevant to the site and the project, including:

- Environmental Planning and Assessment Act 1979 (NSW)
- Environmental Planning and Assessment Regulation 2021 (NSW)
- Biodiversity Conservation Act 2016 (NSW)
- Fisheries Management Act 1994 (NSW)
- State Environmental Planning Policy (Biodiversity and Conservation) 2021
- State Environmental Planning Policy (Planning Systems) 2021
- State Environmental Planning Policy (Primary Production) 2021
- State Environmental Planning Policy (Resilience and Hazards) 2021
- State Environmental Planning Policy (Transport and Infrastructure) 2021
- National Parks and Wildlife Act 1974 (NSW)
- Roads Act 1993 (NSW)
- Heritage Act 1977 (NSW)
- Aboriginal Land Rights Act 1983 (NSW)
- Protection of the Environment Operations Act 1997 (NSW)
- Environmentally Hazardous Chemicals Act 1985 (NSW)
- Food Act 2003 (NSW)
- Coastal Management Act 2016 (NSW)
- Marine Estate Management Act 2014 (NSW)
- Marine Safety Act 1998 (NSW)
- Ports and Maritime Administration Act 1995 (NSW)
- Biosecurity Act 2015 (NSW)
- Crown Land Management Act 2016 (NSW)
- Work Health and Safety Act 2011 (NSW)
- Dangerous Goods (Road and Rail Transport) Act 2008 (NSW)
- Water Management Act 2000 (NSW)

5.3.1 Environmental Planning and Assessment Act 1979 (NSW)

The Environmental Planning and Assessment Act 1979 (EP&A Act) ensures that developments with potential environmental impacts, including marine aquaculture, are subject to appropriate assessment and oversight. The Act is administered by the NSW Department of Planning, Housing and Infrastructure (DPHI) and establishes a framework that includes State Environmental Planning Policies (SEPPs), Local Environmental Plans (LEPs), and procedures for Environmental Impact Statements (EISs). Key objectives of the EP&A Act include:

- The proper management, development and conservation of natural and artificial resources, including marine and coastal ecosystems, for the benefit of current and future generations.
- The protection and conservation of the environment, including biodiversity and ecological communities.
- The promotion of ecologically sustainable development (ESD), integrating environmental protection with economic and social outcomes.

The Project has undertaken extensive studies, community consultation, and statutory referrals to address these requirements. Approval under the EP&A Act is mandatory before NSW DPIRD Fisheries can finalise the aquaculture lease and allow the Project to proceed.

5.3.2 Environmental Planning and Assessment Regulation 2021 (NSW)

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The Eden-1 Kelp Aquaculture Project complies with the Environmental Planning and Assessment Regulation 2021 (NSW) by ensuring that the Environmental Impact Statement (EIS) meets the prescribed form and content requirements set out in Part 8 of the Regulation for State Significant Development. The EIS includes a clear description of the development, its site and surrounding environment, an assessment of environmental, social and economic impacts, identification of mitigation and management measures, consideration of cumulative impacts, and a consolidated summary of proposed environmental management and monitoring commitments. The document has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) and is structured to enable informed agency review, public exhibition, and consideration of submissions. The application is accompanied by the required declarations, technical reports, and supporting documentation, including an Estimated Development Cost prepared in accordance with the Regulation. Collectively, the documentation satisfies the procedural, evidentiary and exhibition requirements of the Regulation, enabling lawful determination of the SSD application.

5.3.3 Biodiversity Conservation Act 2016 (NSW)

The Biodiversity Conservation Act 2016 (BC Act), administered by DCCEEW, establishes the statutory framework for conserving biodiversity in NSW, including the protection of threatened species, populations, and ecological communities listed under the Biodiversity Conservation Regulation 2017. As part of this EIS, all marine birds, mammals, reptiles, and benthic communities potentially interacting with the proposed kelp aquaculture farm were assessed against BC Act requirements. Baseline ecological surveys confirm that the lease area consists of unvegetated sandy substrate and does not contain any listed threatened ecological communities or critical habitat. The suspended longline design avoids significant seabed disturbance and does not introduce feed, chemicals or harmful by-products. Marine fauna interactions —including with seals, dolphins, and whales — have been evaluated through established mitigation measures.

The Eden-1 Kelp Aquaculture Farm is subject to an Assessment of Significance under section 7 of the Biodiversity Conservation Act 2016 (BC Act) to determine whether the proposal is likely to significantly affect threatened species, populations, ecological communities, or their habitats. Baseline studies confirm that the lease area does not contain listed ecological communities or critical habitat and that risks to mobile marine fauna are low. The Project incorporates precautionary and adaptive management measures consistent with BC Act objectives, including infrastructure designs that minimise entanglement risk for marine mammals and turtles, alignment of structures to avoid significant shading or seabed disturbance, and routine inspection and maintenance programs to protect marine biodiversity throughout the Project's lifecycle.

On 5 December 2025, the Eden-1 Kelp Aquaculture Farm received a formal Biodiversity Development Assessment Report (BDAR) waiver (see appendix A10) from the NSW Department of Planning, Housing and Infrastructure. Both the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and the Planning Secretary's delegate determined that the proposed offshore kelp farm is not likely to have any significant impact on biodiversity values, as outlined under section 7.9(2) of the Biodiversity Conservation Act 2016, however biodiversity impacts must still be assessed within the EIS in accordance with the SEARs.

5.3.4 Fisheries Management Act 1994 (NSW)

The Fisheries Management Act 1994 (NSW) regulates the protection of aquatic habitats, sustainable use of fisheries resources, and the allocation and management of aquaculture leases in NSW waters. The Eden-1 Kelp Aquaculture Project operates wholly within this legislative framework. Aquaculture Lease AL21/004 was issued through an open competitive process administered by NSW DPIRD Fisheries and is contingent on ongoing environmental compliance, monitoring, and best-practice operations. The Project does not involve feeding, chemicals, dredging, or activities that disturb fish habitat beyond small screw-anchor footprints on sandy substrate. Baseline ecological surveys demonstrate no impacts on key fish habitat, threatened species, or essential fish communities. The proposal complies with the Act's objectives by supporting sustainable aquaculture while protecting aquatic ecosystems.

- Under the FM Act, marine species and ecological communities identified as Endangered, Critically Endangered, and Vulnerable are listed in Section 7.14 Threatened and Protected Species List [Table].

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The Act also designates Key Threatening Processes (KTPs) under Section 220F, including practices that may jeopardise the survival of listed species and their habitats—such as habitat degradation, pollution, and disease introduction. Part 2 (Section 19) also allows for the declaration of protected species, which, though not currently threatened, require protection to prevent future decline.

- Part 7 of the FM Act outlines measures for the protection of aquatic habitats, including seagrass beds, mangroves, and saltmarshes, as well as designated aquatic reserves. Division 3 of Part 7A provides mechanisms for identifying and protecting habitat deemed critical to the survival of listed aquatic species and communities.
- Permit and lease conditions also require adherence to health and disease management protocols. These include mandatory reporting of notifiable diseases and pests listed under Schedule 6B of the FM Act, as well as any unexplained or unusual mortality events.

5.3.4.1 Fisheries Management Act 1994 – Permits Required

NSW Department of Primary Industries and Regional Development Fisheries (Fisheries NSW) requires the holder of a marine algae aquaculture lease to operate under a Class A Aquaculture Permit in conjunction with a designated lease area, which for seaweed and macroalgae cultivation is awarded as a Class 2 Aquaculture Lease – with a minimum lease term of 15 years. A Class A Aquaculture Permit is the highest-level operational permit under the Fisheries Management Act 1994 and authorises commercial-scale aquaculture activities, subject to strict conditions relating to environmental management, biosecurity, reporting, and compliance.

The permit framework exists to ensure that aquaculture operations are undertaken in a manner that protects marine ecosystems, maintains biosecurity integrity, and enables effective regulatory oversight. A Class 2 Lease area is specifically intended for the cultivation of algae and other non-fed species and reflects the low-risk, low-impact nature of seaweed farming, as it involves no feed inputs, no waste discharge, and no chemical use.

Together, the Class A Permit and Class 2 Lease establish a clear separation between operational authority and spatial occupation of public waters, requiring the proponent to demonstrate suitability of the site, technical competence, adherence to environmental conditions, and ongoing compliance with monitoring, record-keeping, and audit requirements. This regulatory structure ensures that marine algae aquaculture in NSW is appropriately controlled, environmentally responsible, and consistent with the objectives of sustainable use of the marine estate.

5.3.5 State Environmental Planning Policies (NSW)

State Environmental Planning Policies (SEPPs) are statutory planning instruments made under the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act). SEPPs establish consistent planning controls and development assessment criteria across New South Wales for matters of State or regional significance. They are administered by the NSW Department of Planning, Housing and Infrastructure (DPHI) and operate alongside other planning instruments (including relevant SEPP chapters and, where applicable, Local Environmental Plans) within the broader NSW planning framework.

Kelp aquaculture in Disaster Bay is assessed under the EP&A Act framework, which governs environmental assessment, public consultation and determination—particularly for proposals that may have the potential to significantly affect the environment. Under the State Environmental Planning Policy (Primary Production) 2021, aquaculture development is treated as a form of primary production and is assessable development where consent is required, with assessment focusing on environmental protection, biosecurity, operational safeguards and compatibility with surrounding marine uses. Consistent with the SEPP approach to aquaculture, the Eden-1 Project has been designed and assessed against relevant marine aquaculture policy settings, including the **NSW Marine Waters Sustainable Aquaculture Strategy (MWSAS)** as the applicable strategic framework. The Project demonstrates compliance with applicable MWAS constraint criteria, site selection principles and risk controls (see Table 1).

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The Project is also subject to the State Environmental Planning Policy (Planning Systems) 2021, which establishes the State-level planning pathways for certain classes of development, including the framework for identifying and assessing State Significant Development (SSD). In this context, Eden-1 is assessed through the SSD pathway as declared, requiring preparation of an Environmental Impact Statement (EIS) scoped by the Secretary's Environmental Assessment Requirements (SEARs) and supported by specialist technical studies and agency consultation. In accordance with this process, Auskelp requested and received SEARs, prepared the EIS to address the required matters (including cumulative impacts, mitigation and monitoring), and submitted documentation suitable for whole-of-government assessment, public exhibition and consideration of submissions prior to determination.

In addition to the primary planning pathways outlined above, the Eden-1 Project interfaces with several related chapters of the State Environmental Planning Policy framework (2021), which are addressed in detail later in this chapter. Local Environmental Plans (LEPs) apply primarily to any onshore or ancillary components of the Project (such as staging areas, laydown sites, hatchery or processing facilities within the Bega Valley Shire LGA), while the offshore aquaculture lease area is assessed through the SSD pathway and relevant marine regulatory frameworks.

MWSAS Constraints Criteria for the Eden-1 Kelp Aquaculture Farm AL21/004:

CRITERIA	CONSTRAINT	SPECIFIC TO LOCATION
1. Conservation exclusion zones	Must not be within land reserved or acquired under the National Parks and Wildlife Act 1974, nature reserves, Aboriginal or European historic sites.	Site complies: Not within conservation area, and no Aboriginal or European Heritage sites detected.
2. Marine conservation areas	Must not be within marine park Sanctuary Zones (or equivalent) or aquatic reserves.	Site complies: Not within or adjacent to a marine park or sanctuary zone.
3. Pipelines and cables	Must not be within 1 km of sewage outfall pipelines or protection zones for submarine communication cables.	Site complies: No sewerage, pipelines or submarine communication cables.
4. Navigation channels and shipping port approaches	Must not be within 1 km of navigation channels and established shipping port approaches.	Site complies: No navigation or shipping port approaches.
5. Department of Defence operational areas	Must not be within Department of Defence operational areas (for example, Naval Trace area at Jervis Bay).	Site complies: No Defence overlap.
6. Substrate type	Must not be located over rocky reefs (as defined by NSW DPI).	Site complies: No rocky reefs, confirmed by benthic mapping.
7. Seagrass beds	Must not be located over seagrass beds (as defined by NSW DPI).	Site complies: No Seagrass areas.

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8. Marine heritage items	Must not be within 1 km of maritime heritage items (for example, historic plane or shipwrecks)	Site complies: No heritage items detected.
9. Artificial reefs	Must not be within 1 km of purposefully constructed artificial reefs.	Site complies: No artificial reefs.
10. Marine infrastructure	Must not be within 1 km of marine and monitoring infrastructure (for example, moorings, equipment boat ramps, and marinas) and monitoring equipment (for example, Wave rider buoys).	Site complies: No maritime or marine infrastructure.
11. Species	Culture species must be spawned from the endemic population or from broodstock originating from the east coast of Australia. Culture species must not be genetically modified through the addition of any foreign genetic material (DNA) into an organism.	Complies: All seedstock is sourced locally, no genetic modification.
12. Distance between aquaculture leases	Must address biosecurity separation distances between farm operations.	Site complies: No conflict with other lease areas.

Table 1. MWSAS Constraints Criteria for the Eden-1 Kelp Aquaculture Farm AL21/004.

5.3.5.1 SEPP (Biodiversity and Conservation) 2021

The Project complies with SEPP (Biodiversity and Conservation) 2021 by demonstrating that the proposed offshore site avoids sensitive habitats, protects marine and terrestrial biodiversity, and maintains ecological integrity. Comprehensive studies – including benthic habitat surveys, fish assemblage assessments, marine mammal considerations, and ongoing water-quality monitoring – show no significant impacts on threatened species or communities. The farm's design uses high-tension lines to prevent entanglement risks, minimises seabed disturbance, and operates >1.1 km offshore in a sandy, low-complexity environment. The Project contributes positively to ecosystem function through nutrient uptake, habitat provision, and climate-change mitigation, aligning with the SEPP's objectives for conservation-led sustainable development.

5.3.5.2 SEPP (Planning Systems) 2021

The Project is classified as State Significant Development (SSD) under Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021 as it constitutes aquaculture development within environmentally sensitive coastal waters of New South Wales. Accordingly, the proposal is required to be assessed and determined under the State Significant Development provisions of the Environmental Planning and Assessment Act 1979. An Environmental Impact Statement (EIS) has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) issued for the Project. The EIS provides an assessment of the potential environmental, social and economic impacts of the development, supported by specialist technical studies and consultation with relevant government agencies and stakeholders. The EIS will be placed on public exhibition, and submissions received during the exhibition period will be considered by the Minister for Planning or their delegate prior to determination of the development application.

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5.3.5.3 SEPP (Primary Production) 2021

The Project complies with SEPP (Primary Production) 2021 by supporting sustainable marine primary production within a permissible aquaculture zone and meeting all environmental protection and biosecurity requirements. The Project enhances NSW's primary industries through the cultivation of a native species, *Ecklonia radiata*, using low-impact, non-feed, non-polluting methods consistent with the SEPP's objectives for environmentally responsible production. Extensive baseline studies—including benthic surveys, hydrodynamic assessment, marine ecology surveys, and navigation analysis—ensure risks are minimised and ecosystem values can be monitored. The Project also advances regional employment, diversification of marine industries, and long-term food, fertiliser, and bioproduct innovation in line with SEPP priorities.

5.3.5.4 SEPP (Resilience and Hazards) 2021

The Eden-1 Kelp Aquaculture Project complies with SEPP (Resilience and Hazards) 2021 by demonstrating that the site, infrastructure, and operational systems are designed to withstand coastal hazards and operate safely in a high-energy marine environment. Extensive wave-climate analysis, oceanographic modelling, and three years of field testing informed the selection of a stable offshore location with suitable depth and minimal coastal erosion risk. The high-tension longline system is engineered to endure storm events, minimise debris generation, and prevent navigation hazards. Operational protocols address maritime safety, emergency response, and severe-weather contingencies, ensuring the Project maintains resilience while safeguarding users, vessels, and the surrounding environment in accordance with the SEPP's objectives.

5.3.5.5 SEPP (Transport and Infrastructure) 2021

The Project aligns with SEPP (Transport and Infrastructure) 2021 by ensuring that marine operations, vessel activities, and navigation considerations are compatible with existing transport and port infrastructure in the Eden and Disaster Bay region. The Project has undergone maritime risk assessment, including consultation with AMSA, NSW Maritime, the Port Authority of NSW, local commercial maritime operations, and local marine users to consider coexistence with commercial, recreational, and port-related vessel movements. The farm layout incorporates appropriate navigation buffers, marker buoys, and AIS mapping to avoid interference with shipping routes and port operations. Construction and servicing activities rely on existing port infrastructure at Snug Cove and Edrom without requiring new public works. The Project meets the SEPP's intent to safeguard transport safety, protect infrastructure efficiency, and ensure that new developments do not adversely impact existing maritime networks.

While the lease area is situated offshore and does not trigger development within road or rail corridors, vessel traffic safety and navigational impacts have been considered. The lease location was selected to avoid any interference with shipping channels and high traffic areas, and the Project is not located within high-use recreational fishing or commercial vessel traffic zones, as confirmed via MarineTraffic.com analysis.

5.3.6 Biodiversity Conservation Act 2016 and associated regulation

The Project complies with the Biodiversity Conservation Act 2016 by undertaking detailed marine ecological assessments to ensure no significant impacts on threatened species, populations, or marine habitats. Comprehensive surveys of benthic communities, fish assemblages, megafauna use, and seabird activity were conducted within and around the proposed lease area, confirming the absence of sensitive or protected ecological features. The Project footprint is located over a low-complexity sandy seafloor, avoiding key habitat areas such as reefs, seagrass beds, or nursery grounds. Risk assessments for threatened species—including whales, seals, sharks, and listed marine birds—identified low likelihood of interaction due to the high-tension longline design, minimal entanglement risk, and offshore location. Adaptive monitoring commitments ensure ongoing compliance with the Act and its regulations.

5.3.7 National Parks and Wildlife Act 1974 (NSW) and National Parks and Wildlife Regulation 2009 (NSW)

The National Parks and Wildlife Act 1974 (NPW Act) and associated Regulation 2009 provide for the conservation of biodiversity, management of national parks and nature reserves, and protection of Aboriginal

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cultural heritage across New South Wales. The Project is located offshore in Disaster Bay and does not fall within the legal boundaries of any national park or nature reserve. However, it is directly adjacent to Beowa National Park (to the north) and the Nadgee Nature Reserve (to the southwest), both of which are managed under the NPW Act.

There is no expected overlap between the proposed aquaculture footprint and the terrestrial or marine estate managed under the Act, and no activities will occur within park boundaries (except for access to Greenglades beach for possible inspection activities). The suspended longline infrastructure is located entirely in offshore marine waters over sandy substrate, well outside sensitive coastal habitats, intertidal zones, or protected ecological communities. Baseline surveys undertaken for this EIS confirm that no threatened species, heritage items, or culturally sensitive sites recognised under the NPW Act will be affected, and ongoing monitoring commitments ensure continued protection of adjacent conservation areas.

5.3.8 Roads Act 1993 (NSW)

The Roads Act 1993 is only marginally relevant to the Project, as the activities occur offshore and do not require the construction, alteration, or occupation of public roads. The Project complies with the Act by ensuring that all transport movements associated with hatchery operations, vessel loading, maintenance, and harvesting activities use existing approved road infrastructure within Snug Cove, Edrom and the Port of Eden. No new roadworks, closures, or modifications are proposed, and the Project does not impede public access or road safety. Any oversized or restricted-load transport movements—should they be required—will be undertaken in accordance with RMS/Transport for NSW permitting requirements, ensuring full compliance with the Act.

5.3.9 Coastal Management Act 1979 (NSW)

The Project is consistent with the intent of the Coastal Protection Act 1979 (NSW), which seeks to safeguard coastal environments, ensure sustainable use, and prevent adverse impacts on coastal processes. The Project is located offshore in deep water, avoiding sensitive coastal landforms, dune systems, and intertidal habitats. Environmental surveys confirm no expected effect on erosion, sediment transport, or public access to the coast. The Project incorporates best-practice design and monitoring to protect water quality and marine ecosystems, thereby supporting the Act's overarching objective of enabling responsible coastal development with minimal environmental risk.

5.3.10 Heritage Act 1977 (NSW)

The proposed Eden-1 Kelp Aquaculture Project in Disaster Bay is consistent with the provisions and objectives of the Heritage Act 1977 (NSW). Comprehensive desktop assessments, field-based reviews have been undertaken across the entire Project area, including seabed mapping, bathymetric analysis, and cross-referencing of state and Commonwealth heritage registers. These assessments confirm that no heritage items, historic shipwrecks, or underwater cultural heritage features are present within or adjacent to the proposed aquaculture lease. The nearest recorded heritage sites are well outside the Project footprint and are not at risk from installation, anchoring, or farm operations.

5.3.11 Aboriginal Land Rights Act 1983 (NSW)

The Eden-1 Kelp Aquaculture Project complies with the Aboriginal Land Rights Act 1983 (NSW) by ensuring that no part of the Project overlaps with land or waters subject to an Aboriginal land claim, and by maintaining transparent, ongoing engagement with Traditional Owners and Local Aboriginal Land Councils. Auskelp has conducted a detailed Aboriginal Cultural Heritage Assessment Report (ACHAR), which confirmed no Aboriginal cultural heritage constraints relevant to the proposed marine operations. The Project occurs entirely in offshore waters with no identified Aboriginal land tenure implications or claims in place. All consultation, assessment, and planning activities remain consistent with the Act's objectives for cultural protection, recognition, and community benefit.

5.3.12 Protection of the Environment Operations Act 1997 (NSW)

The Project complies with the Protection of the Environment Operations Act 1997 (POEO Act), which regulates pollution, environmental harm, and marine water quality in NSW. Kelp aquaculture is a passive, non-fed form

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of farming that requires no chemicals, fertilisers, antibiotics, or supplementary feed, and therefore generates no effluent, nutrient discharge, or contaminants that would trigger pollution controls under the Act. As a result, long-line kelp farming is not classified as a Scheduled Activity and does not require an Environment Protection Licence (EPL). Nevertheless, Auskelp will implement best-practice environmental management measures—including marine debris prevention, infrastructure inspection, waste-handling protocols, and storm-event contingencies—to ensure operations remain fully compliant with POEO requirements and maintain high standards of environmental protection.

5.3.13 Environmentally Hazardous Chemicals Act 1985 (NSW)

The Environmentally Hazardous Chemicals Act 1985 (EHC Act), administered by NSW OEH, governs the use and disposal of potentially hazardous chemicals and waste material. Any use and/or removal of hazardous chemicals and material defined under the EHC Act require licensing and must be appropriately declared. No hazardous chemicals will be used related to the Eden-1 Kelp Aquaculture Farm.

5.3.14 Food Act 2003 (NSW)

The Food Act 2003 (NSW), administered by the NSW Food Authority, establishes the regulatory framework for ensuring that food sold in New South Wales is safe and suitable for human consumption. The Act regulates food handling, processing, storage, transport and sale, and applies to seaweed products intended for human consumption. The Act does not regulate aquaculture site development or marine cultivation activities and is therefore not a matter for assessment under this State Significant Development (SSD) application. However, should harvested kelp be processed and supplied for human consumption, compliance obligations will apply to the downstream food business responsible for processing, packaging or sale.

5.3.15 Coastal Management Act 2016 (NSW)

The Coastal Management Act 2016 (NSW) provides the overarching framework for protecting and managing the NSW coastal environment, including coastal wetlands, coastal vulnerability areas, and the broader coastal zone. The Eden-1 Kelp Aquaculture Project is located 1.1–3.1 km offshore in deep, high-energy marine waters and does not occur within any mapped coastal wetlands, littoral rainforests, or coastal vulnerability areas defined under the Act. The Project avoids impacts on coastal processes, sediment transport, dune systems, and land-based coastal environments. Comprehensive site selection, benthic surveys, and hydrodynamic assessments confirm that the suspended longline infrastructure will not alter coastal geomorphology or coastal areas. The Project therefore complies with the objectives of the Act by protecting coastal environmental values while supporting sustainable economic use of NSW's marine estate.

5.3.16 Marine Estate Management Act 2014 (NSW)

The Marine Safety Act 1998 (NSW) establishes the legislative framework for the safe operation of vessels and the protection of persons, property and infrastructure within NSW navigable waters. The Act provides for the regulation of marine safety risks, the marking and management of navigation hazards, oversight of marine works that may affect navigation, and enforcement powers to ensure safe maritime operations. The Project complies with the Marine Safety Act 1998 by ensuring that the offshore aquaculture infrastructure does not create unreasonable navigational risks and is appropriately designed, marked and managed in consultation with Transport for NSW – Maritime and relevant authorities. The lease boundaries will be marked in accordance with IALA standards and NSW maritime requirements, including illuminated buoys, radar reflectors and appropriate charting. A maritime risk assessment has been undertaken to evaluate vessel interaction risks, and the farm layout avoids established navigation routes and port approaches. Operational procedures include vessel traffic management, severe weather protocols, and ongoing liaison with maritime regulators to ensure continued compliance and safe use of navigable waters.

5.3.17 Marine Safety Act 1998 (NSW)

The Marine Safety Act 1998 (NSW) provides the statutory framework for ensuring the safe navigation of vessels and the protection of persons, property and the marine environment within NSW navigable waters. The Act regulates marine safety risks, marine works that may affect navigation, the marking of hazards and

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obstructions, and the responsibilities of vessel operators and infrastructure proponents. It empowers Transport for NSW – Maritime to oversee activities that could influence navigational safety and to impose requirements necessary to maintain safe waterways. The Project complies with the Marine Safety Act 1998 by ensuring that all offshore infrastructure and operational activities are designed and managed to maintain navigational safety within Disaster Bay. The lease area has been located outside established navigation routes and shipping approaches, and a maritime risk assessment has been undertaken to assess potential vessel interaction risks. The farm extremities will be marked with appropriately lit and charted navigation buoys in accordance with IALA standards and Transport for NSW requirements, including radar reflectors and compliant light characteristics. Operational procedures include consultation with maritime authorities, implementation of severe weather protocols, and adherence to marine incident reporting obligations, ensuring the Project does not pose an unacceptable risk to marine users or navigational safety.

5.3.18 Ports and Maritime Administration Act 1995 (NSW)

The Ports and Maritime Administration Act 1995 (NSW) establishes the framework for the management and control of ports and certain navigable waters in NSW, including oversight of port operations, maritime infrastructure, and activities that may affect navigation or port safety. The Project complies with this Act by locating the offshore lease outside formal port limits and established shipping channels, ensuring no interference with port operations at Eden. The Project has considered vessel movements, consulted with relevant maritime authorities, and incorporated appropriate navigation marking and safety measures to avoid impacts on port management and maritime operations.

5.3.19 Biosecurity Act 2015 (NSW)

The Biosecurity Act 2015 (NSW) establishes a risk-based framework to prevent, eliminate and manage biosecurity threats, including pests, diseases and contaminants that may impact primary industries, the environment and the community. The Act imposes a General Biosecurity Duty requiring all persons to take reasonable and practical measures to minimise biosecurity risks. The Project complies with the Biosecurity Act 2015 by operating under a Class A Aquaculture Permit with mandatory biosecurity conditions, including disease reporting, pest monitoring and record-keeping. All seedstock of *Ecklonia radiata* will be locally sourced from endemic east coast populations, with no genetically modified material used. Operational procedures include equipment hygiene, monitoring for marine pests and pathogens, and immediate notification of any unusual mortality or notifiable disease events, ensuring that biosecurity risks to the NSW marine estate are appropriately managed.

5.3.20 Crown Land Management Act 2016 (NSW)

The Crown Land Management Act 2016 (NSW) provides the legislative framework for the administration, use and occupation of Crown land, including Crown land below the mean high-water mark and public marine waters. The Act requires that Crown land be managed in the public interest and used in a manner that is environmentally sustainable and consistent with applicable tenure arrangements. The Project complies with the Crown Land Management Act 2016 by occupying public marine waters under a lawful aquaculture lease granted under the Fisheries Management Act 1994, with tenure arrangements coordinated through the responsible Crown land authority. The Project does not confer exclusive possession, does not extinguish public access rights, and has been assessed to ensure consistency with coastal management, native title, heritage and environmental obligations applicable to Crown land.

5.3.21 Work Health and Safety Act 2011 (NSW)

The Work Health and Safety Act 2011 (NSW) establishes the primary duty of care for persons conducting a business or undertaking to ensure, so far as is reasonably practicable, the health and safety of workers and others who may be affected by work activities. The Act requires the identification of hazards, implementation of control measures, risk management processes, training, safe systems of work, and incident reporting. The Project complies with the Work Health and Safety Act 2011 by implementing a structured safety management system covering offshore vessel operations, marine works, equipment handling, weather exposure and emergency response. Risk assessments have been undertaken for installation, maintenance and harvesting

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activities, with controls including safe vessel procedures, exclusion zones, communication protocols and severe-weather contingencies. All contractors and personnel will operate under documented WHS procedures to ensure that marine operations are conducted safely and in accordance with statutory obligations.

5.3.22 Dangerous Goods (Road and Rail Transport) Act 2008 (NSW)

The Dangerous Goods (Road and Rail Transport) Act 2008 (NSW) regulates the safe transport of dangerous goods by road and rail in order to minimise risks to public safety, property and the environment. The Act adopts nationally consistent standards for classification, packaging, labelling, handling and transport documentation of dangerous goods. The Project complies with this Act as routine operations do not involve the transport of dangerous goods.

5.3.23 Water Management Act 2000 (NSW)

The Water Management Act 2000 (NSW) establishes the framework for the sustainable management, allocation and protection of the State's water resources, including surface water and groundwater extraction, water access licences and approvals for controlled activities affecting watercourses. The Project complies with the Water Management Act 2000 as it does not involve the extraction, diversion or impoundment of surface water or groundwater, nor does it undertake works within inland watercourses or waterfront land.

5.4 Relevant Plans and Guidelines

5.4.1 NSW Marine Estate Statewide Threat and Risk Assessment 2017

The Project aligns with the findings of the Statewide TARA by avoiding high-risk ecological areas and minimising threats to biodiversity, water quality, and social values. Kelp farming is identified as a low-risk activity compared with fishing, catchment runoff, pollution, and habitat disturbance. The offshore location reduces interactions with sensitive estuarine habitats, threatened species, and key fisheries. The structured monitoring and adaptive management planned for Eden-1 directly address TARA priorities, including reducing cumulative impacts, improving environmental condition, and ensuring sustainable marine industries. The Project contributes positively by adding habitat structure and supporting climate resilience with negligible identified risks under current TARA frameworks.

5.4.2 National Conservation Management Plan for the Southern Right Whale 2011-2021

Although the Southern Right Whale Plan has expired, its principles remain relevant. The Project complies with the Plan's objectives by avoiding critical habitat, minimising underwater risks, and ensuring no entanglement pathways. Globally, there are no recorded negative interactions between whales and kelp farms, and the Eden-1 high-tension longline system is specifically designed to remain taut and avoid slack loops that could entangle whales. Seasonal whale migration patterns have been considered, and navigation and AIS measures ensure vessel-strike risk remains extremely low. The Project supports the Plan's broader goals of protecting migratory pathways and ensuring safe co-existence between marine industries and cetaceans.

5.5 Relevant Commonwealth Legislation

5.5.1 Environmental Protection and Biodiversity Conservation Act 1999 (Cth)

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) provide for the protection of matters of national environmental significance, including Commonwealth marine Areas. If an activity has the potential to impact on one or more matters of national environmental significance, an assessment process in accordance with the EPBC Act and Guidelines (Environment Australia 2000) is required. If the assessment concludes that a significant impact is likely, then the activity will be deemed a controlled action and approval for the activity is required from the Commonwealth Department of Environment and Heritage via a detailed referral process, including public exhibition.

The EPBC Act aims to:

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- provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance (MNES);
- promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources;
- promote the conservation of biodiversity; and
- provide for the protection and conservation of heritage.

In the aquatic environment, the EPBC Act lists the following matters of MNES:

- nationally threatened species, ecological communities, critical habitats and key threatening processes (including marine species);
- migratory species;
- Ramsar wetlands of international importance; and
- Commonwealth marine areas (extends between 3-200 nautical miles from the coast).

Threatened fauna and flora are listed in any one of the following categories as defined in Section 179 of the EPBC Act as:

- extinct;
- extinct in the wild;
- critically endangered;
- endangered;
- vulnerable; or
- conservation dependent.

Species listed as 'extinct' or 'conservation dependent' are not considered matters of national environmental significance (protected matters). The proposed development is required to be assessed according to the EPBC Act, the EPBC Act Policy Statement 1.1 (Significant Impacts Guideline: SIG 1.1) and the EPBC Act Policy Statement 2.2 (Offshore Aquaculture). Auskelp Pty Ltd submitted a Referral of Proposed Action form to DCCEEW for assessment under the EPBC Act.

On 20 June 2025, the Department of Climate Change, Energy, the Environment and Water (DCCEEW) issued a decision confirming that the proposed Eden-1 Kelp Aquaculture Farm (EPBC 2025/10149), submitted by Auskelp Pty Ltd, is not a controlled action under the Environment Protection and Biodiversity Conservation Act 1999 (see Appendix A1).

5.5.2 Underwater Cultural Heritage Act 2018 (Cth)

The Underwater Cultural Heritage Act 2018 (Cth) protects shipwrecks, submerged aircraft, and other underwater cultural heritage located in Commonwealth waters and, in some cases, within State waters through cooperative arrangements. A review of national databases, including the Australian National Shipwreck Database (ANSD), confirms that no recorded shipwrecks, submerged relics, or protected underwater cultural heritage sites occur within or near the proposed Eden-1 kelp aquaculture lease area in Disaster Bay. The site comprises deep, sandy substrate with no evidence of historical maritime material. The Project will avoid seabed disturbance except for small screw-anchor footprints, and all works will follow discovery protocols. Should any unexpected underwater artefacts be encountered, activities will cease, and the appropriate Commonwealth and NSW authorities will be notified in accordance with the Act as per the approved Cultural Heritage Response Plan.

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5.5.3 Native Title Act 1993 (Cth)

The Native Title Act 1993 (NTA) is the principal Commonwealth legislation governing the recognition and protection of native title in Australia. Native title recognises the traditional rights and interests to land and waters held by Aboriginal and Torres Strait Islander peoples under traditional laws and customs. Native title may exist in marine environments, including coastal waters, beaches, and submerged lands, where these areas are not subject to extinguishing tenures (e.g., freehold title or certain public infrastructure).

The Act provides a framework for validating certain past and future acts of government, ensuring that Aboriginal peoples who have registered native title claims or established determinations are afforded procedural rights. These include the right to be notified of and to comment on proposed 'future acts', such as the grant of leases, licences, or permits that may affect native title rights. The Eden-1 Kelp Aquaculture Farm is located in offshore Crown Land waters within Disaster Bay, an area where native title may exist. However, the proposed aquaculture lease does not grant exclusive possession, nor does it involve activities that would extinguish native title. The operations will be conducted under an extensive aquaculture model with minimal physical footprint and no permanent structures. As such, the proposal does not interfere with public access or customary marine use, and native title rights, if determined to exist, would remain intact.

As part of the Project's approvals pathway, notification and consultation obligations under the NTA are addressed in coordination with NSW Crown Lands (Department of Planning, Housing and Infrastructure) and relevant Native Title Representative Bodies. Any necessary notifications under the future acts regime are managed through this process to ensure legal compliance and respect for Aboriginal interests in the marine estate. In line with best practice and the precautionary principle, Auskelp acknowledges the significance of native title rights and maintains a commitment to ongoing engagement with relevant Traditional Owner groups to ensure that aquaculture development aligns with cultural and legal expectations. Auskelp has undertaken ongoing engagement with Traditional Owners and Aboriginal community representatives as part of the Project's cultural consultation obligations. Should any cultural heritage or native title–related matters arise during the Project's lifecycle, Auskelp will follow appropriate notification, consultation, and management protocols in accordance with the Act.

5.5.4 Policy on Ecologically Sustainable Development (ESD)

The National Strategy for Ecologically Sustainable Development (1992) defines ESD as "using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased." This foundational policy continues to underpin environmental decision-making frameworks at both state and federal levels, including the Environmental Planning and Assessment Act 1979 (NSW) and the Environment Protection and Biodiversity Conservation Act 1999 (Cth).

The Eden-1 Kelp Aquaculture Project aligns closely with the objectives and principles of ESD. The Project promotes a regenerative form of ocean farming that enhances marine ecosystem function while delivering measurable social and economic benefits to remote regional communities. The cultivation of Ecklonia radiata in open water contributes to ecological resilience by sequestering carbon, improving water quality, and providing habitat for juvenile marine species, thus protecting biodiversity and maintaining essential ecological processes.

The main objectives of ESD relevant to this Project include:

- Enhancing individual and community wellbeing through the creation of resilient coastal employment, new economic opportunities, and food security solutions in response to climate challenges.
- Safeguarding the welfare of future generations by reducing dependence on extractive or high-impact industries, and supporting the transition to nature-based solutions.
- Providing intergenerational equity through the establishment of low-impact, long-term sustainable marine industries.

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- to protect biological diversity and maintain essential ecological processes and life-support systems.

The main principles of ESD state that:

- decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations;
- where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- the global dimension of environmental impacts of actions and policies should be recognised and considered;
- the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised;
- the need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised;
- cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms; and
- decisions and actions should provide for broad community involvement on issues which affect them."

5.6 Local Planning Instruments and Plans

5.6.1 Bega Valley Local Environmental Plan (LEP) 2013

The Bega Valley Local Environmental Plan 2013 (LEP) provides the statutory planning framework for land-based development within the Bega Valley Shire. While the Eden-1 Kelp Aquaculture Project is located entirely offshore and therefore outside the mapped land-use zones of the LEP, the Plan remains relevant in guiding any ancillary onshore activities associated with the Project, including the use of existing facilities at Snug Cove and the Edrom industrial precinct for vessel operations, storage, logistics, and hatchery support functions. These ancillary activities are proposed to occur within land zoned for industrial and port-related uses under the LEP, where marine servicing, warehousing, and maritime support operations are already permissible and established. The proposal is consistent with the LEP's core objectives to promote sustainable economic development, protect environmental values, and support the ongoing operation and diversification of marine-based industries. No new land-based works requiring development consent under the LEP are proposed as part of this application. Should any future onshore components be required, they would be confined to appropriately zoned industrial land and would be designed and assessed in full compliance with LEP provisions, including environmental protection, coastal character, and amenity objectives of the Bega Valley Shire.

5.6.2 South East and Tablelands Regional Plan 2036.

The Eden-1 Project strongly aligns with the Regional Plan by supporting economic diversification, creating sustainable coastal employment, and strengthening Eden as a strategic maritime hub. The Plan identifies aquaculture as a key growth industry for the region, and the Project directly advances this priority through the establishment of a hatchery, offshore farms, and associated processing streams. The Project reinforces regional resilience by creating new climate-positive industries and reducing reliance on declining traditional sectors. Its location adjacent to the Port of Eden aligns with the Plan's infrastructure goals, while community engagement and environmental stewardship support long-term regional sustainability.

5.6.3 Bega Valley Shire Community Strategic Plan 2042

The Eden-1 Kelp Aquaculture Project aligns strongly with the Bega Valley Shire Community Strategic Plan 2042, which emphasises sustainable economic growth, environmental protection, and community resilience. The Project supports the Plan's objectives by establishing a new low-impact marine industry that creates local employment, promotes regional skills development, and strengthens the economic base of Eden and

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surrounding communities. It contributes to environmental stewardship by fostering regenerative ocean practices, enhancing biodiversity, and reducing reliance on carbon-intensive agricultural inputs. The Project also activates the Port of Eden and surrounding marine infrastructure in a manner consistent with the Plan's vision for a thriving, innovative, and environmentally responsible coastal economy. Through continued engagement with community, industry, and First Nations groups, the Project supports inclusive decision-making and long-term regional wellbeing.

5.6.4 Far South Coast Regional Economic Development Strategy (REDS) 2023 Update

The Eden-1 Kelp Aquaculture Project aligns with the Far South Coast REDS 2023 Update, which identifies aquaculture, marine industries, and value-added food production as key growth sectors for the region. REDS emphasises the need to diversify the local economy, strengthen year-round employment, and attract sustainable investment that supports resilience in coastal communities. The Project contributes directly to these objectives by establishing a new marine industry, creating skilled jobs in hatchery operations, offshore farming, processing, logistics, and scientific research. The Project makes strategic use of existing regional assets such as Snug Cove and the Port of Eden, consistent with REDS priorities for activating marine infrastructure and supporting industry clusters. The Project advances the core aims of the Far South Coast REDS framework.

5.6.5 Bega Valley Coastal Management Program (CMP)

The Eden-1 Kelp Aquaculture Project is consistent with the objectives of the Bega Valley Coastal Management Program (CMP), which seeks to protect coastal ecosystem health, enhance water quality, support sustainable coastal industries, and strengthen community resilience to environmental change. The Project aligns with the CMP by establishing a low-impact, non-pollutive aquaculture operation that extracts nutrients from the marine environment, contributes to improved water quality, and supports biodiversity outcomes. Its offshore siting avoids sensitive coastal habitats and maintains public access, scenic values, and recreational use of the shoreline. The Project also contributes to CMP goals by supporting evidence-based coastal management through long-term environmental monitoring of benthic habitats, water quality, and marine species interactions. By promoting regenerative ocean practices and providing new economic opportunities aligned with coastal sustainability, the Project supports the CMP's vision for a healthy, productive, and climate-resilient coastline in the Bega Valley.

5.6.6 Port Authority of NSW Operational Guidelines

The Project has been designed to comply with the Port Authority of NSW operational guidelines, which address safe navigation, maritime risk management, and protection of the marine environment. Although the Project is located outside formal port limits, Auskelp has consulted with both the Port Authority of NSW and Transport for NSW – Maritime to ensure that the proposed farm layout, infrastructure, and vessel activities do not interfere with established or future navigation routes connected to Eden Port. These consultations confirmed the Project must incorporate appropriate surface markers, high-visibility buoys, and marine safety measures. Auskelp will continue working with these agencies throughout development and operations to ensure ongoing compliance with guidelines relating to marine works, lighting and buoyancy standards, vessel movements, and incident reporting.

5.7 Power to Grant Approval

This section of the EIS outlines the key statutory requirements that must be considered prior to the determination of this SSDA and where those requirements have been addressed in the EIS broken down as follows:

- **TABLE 2: Declaration of State Significant Development (SSD):** Summarises relevant requirements in accordance with the SSD Guidelines
- **TABLE 3: Consent Authority:** Summarises the relevant consent considerations in accordance with the SSD Guidelines.

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- **TABLE 4: Preconditions to Exercising Power to Grant Consent:** Summarises the preconditions required to grant consent in accordance with the SSD Guidelines.
- **TABLE 5: Permissibility:** Summarises the permissibility in accordance with the SSD Guidelines.
- **TABLE 6: Approvals required**: Summarises approvals required in accordance with the SSD Guidelines.
- **TABLE 7: Preconditions:** Identifies the matters that the consent authority must consider in deciding to grant consent to this SSDA. It also identifies the section(s) of this EIS and the appended documents that address these mandatory matters. [Table 7]
- **TABLE 8: Considerations Under Other Legislation:** Summarises considerations under other legislation that should be considered in accordance with the SSD Guidelines.

TABLE 2: Summarises relevant requirements in accordance with the SSD Guidelines.

Declaration of State Significant Development (SSD)	
Matter	**Consideration**
Classification as SSD	The Project is declared State Significant Development pursuant to Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021, as it constitutes aquaculture development located within environmentally sensitive coastal waters in New South Wales.
Requirement for EIS	As the Project is declared State Significant Development (SSD), an Environmental Impact Statement (EIS) is required under the Environmental Planning and Assessment Act 1979 (NSW). This EIS has been prepared in accordance with the Environmental Planning and Assessment Regulation 2021 and the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning, Housing and Infrastructure.
Secretary's Environmental Assessment Requirements (SEARs)	SEARs were issued by the Department of Planning, Housing and Infrastructure and the EIS has been prepared in accordance with those requirements
Public Exhibition	The EIS must be publicly exhibited for a minimum of 28 days and submissions considered prior to determination, in accordance with the statutory exhibition requirements for State Significant Development under the Environmental Planning and Assessment Act 1979 (NSW) and the Environmental Planning and Assessment Regulation 2021.

TABLE 3: Summarises the relevant consent considerations in accordance with the SSD Guidelines.

Consent Authority	
Matter	**Consideration**
Consent Authority	Under section 4.5 of the Environmental Planning and Assessment Act 1979 (EP&A Act), the Minister for Planning (or delegate) is the consent authority for State Significant Development. The Eden-1 Kelp Aquaculture Farm has been correctly identified and assessed as SSD, and is therefore capable of determination by the Minister (or delegate) in accordance with the EP&A Act.
Power to Grant Consent	The consent authority has the power to grant development consent under Part 4, Division 4.7 of the EP&A Act, subject to consideration of the Environmental Impact Statement, public submissions received during exhibition, advice from relevant government agencies, and all mandatory matters for consideration under section 4.15 of the EP&A Act. This EIS has been prepared to support the lawful exercise of that power.
Mandatory Matters for Consideration	In determining the application, the consent authority must consider the likely environmental, social and economic impacts of the Project, the suitability of the site for the proposed development, any submissions made in accordance with the EP&A Act or Regulation, relevant environmental planning instruments, and the public interest. These mandatory matters are addressed throughout this EIS, including in the assessment of key issues (Chapter 9), risk evaluation (Section 8.9), and the consideration of strategic, environmental and social outcomes.

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Consent Authority (continued)	
Matter	**Consideration**
Preconditions and Other Approvals	The Project requires additional approvals under other legislation, including a Class A Aquaculture Permit and a Class 2 Aquaculture Lease under the Fisheries Management Act 1994, Crown land tenure arrangements, and relevant maritime approvals. These approvals do not preclude the granting of development consent under the EP&A Act and may be obtained sequentially and, where appropriate, addressed through conditions of consent.
Ecologically Sustainable Development	In exercising the power to grant consent, the consent authority must consider the objects of the EP&A Act, including the principles of ecologically sustainable development (ESD). The Project has been assessed having regard to ESD principles, including the precautionary principle, intergenerational equity, conservation of biological diversity and ecological integrity, and improved valuation and pricing of environmental resources, as demonstrated through the impact assessment, mitigation measures and adaptive management framework outlined in this EIS.

TABLE 4: Summarises the preconditions required to grant consent in accordance with the SSD Guidelines.

Preconditions to Exercising Power to Grant Consent	
Matter	**Consideration**
Adequacy of EIS	Prior to determining the application, the consent authority must be satisfied that the Environmental Impact Statement has been prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) and is adequate to enable an informed assessment of the Project and its potential impacts. The EIS has been prepared having regard to the SEARs issued by the Department and provides sufficient information to support assessment and determination of the SSD application.
Compliance with Planning Instruments	The consent authority must be satisfied that the Project is permissible and has been assessed in accordance with all applicable environmental planning instruments, including relevant State Environmental Planning Policies and statutory instruments. The statutory permissibility and consistency of the Project are addressed in this chapter, with detailed assessment of applicable planning provisions and constraints provided throughout the EIS.
Consideration of Other Approvals	The Project requires additional approvals under other legislation, including a Class A Aquaculture Permit and a Class 2 Aquaculture Lease under the Fisheries Management Act 1994, Crown land tenure arrangements, and relevant maritime approvals. These approvals are separate to, and do not preclude, the granting of development consent under the EP&A Act. Where appropriate, these matters may be addressed through conditions of consent and obtained sequentially prior to construction and operation.
EPBC Act Status	The Project has been referred under the Environment Protection and Biodiversity Conservation Act 1999 (Cth) and determined to be a Not Controlled Action. Accordingly, no further approval is required under the EPBC Act, and Commonwealth assessment requirements do not prevent the consent authority from determining the SSD application.
Public Interest	In determining the application, the consent authority must be satisfied that the Project is in the public interest, having regard to environmental protection, economic benefits, social considerations, and alignment with relevant strategic objectives. Consideration of the public interest is informed by the assessment of environmental impacts, mitigation measures, economic and employment outcomes, and consistency with State and regional planning priorities as documented throughout this EIS.

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TABLE 5: Summarises the permissibility in accordance with the SSD Guidelines.

Permissibility	
Matter	**Consideration**
Nature of Development	The Project comprises marine algae aquaculture, specifically the cultivation of Ecklonia radiata, within offshore coastal waters of New South Wales. The development involves the establishment and operation of a commercial kelp aquaculture farm and associated marine infrastructure within public waters.
State Significant Development Trigger	The Project is classified as State Significant Development (SSD) under Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021, as it constitutes aquaculture development within environmentally sensitive coastal waters of New South Wales. As such, the Project is required to be assessed and determined under the SSD provisions of the Environmental Planning and Assessment Act 1979 (NSW).
Requirement for Development Consent	As State Significant Development, the Project requires development consent under Part 4, Division 4.7 of the Environmental Planning and Assessment Act 1979 prior to the commencement of any works or operations.
Complies with AIDP (MWSAS)	The proposed lease area has been assessed against the constraints and suitability criteria contained within the NSW Marine Waters Sustainable Aquaculture Strategy. This assessment considers the avoidance of marine parks and sanctuary zones, navigation channels, submarine cables, rocky reefs, seagrass beds and known maritime heritage items.
Environmental Sensitivity	The site is not located within a marine park sanctuary zone, aquatic reserve, conservation exclusion zone, or mapped coastal wetland or littoral rainforest area. These matters are relevant to confirming that the Project is not located in areas where marine aquaculture is prohibited under applicable planning instruments.
Strategic Marine Allocation	The lease area is located within waters identified through State marine planning processes as available for aquaculture and has been provisionally approved as Aquaculture Lease AL21/004 by NSW DPIRD Fisheries. This reflects consistency with the strategic allocation framework for marine aquaculture.
Prohibited Development	The Project is not identified as prohibited development under any applicable State Environmental Planning Policy or other environmental planning instrument. No statutory prohibition has been identified that would prevent consideration of the Project under the EP&A Act.
Other Legislative Pathways	The Project is subject to additional permits and tenure requirements under other legislation, including a Class A Aquaculture Permit and a Class 2 Aquaculture Lease under the Fisheries Management Act 1994. An application for these permits would be made following receipt of development consent.
Conclusion on Permissibility	Having regard to the applicable planning instruments and strategic marine aquaculture framework, the Project is capable of being considered for development consent as State Significant Development under the EP&A Act, subject to assessment of impacts and consideration of mandatory matters.

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TABLE 6: Summarises approvals required in accordance with the SSD Guidelines.

Approvals Required	
Matter	**Consideration**
Class A Aquaculture Permit	A Class A Aquaculture Permit under Section 144 of the Fisheries Management Act 1994 is required to authorise the commercial cultivation of marine algae. This permit regulates operational, environmental, biosecurity and reporting requirements for aquaculture activities and is administered separately to the planning approval process. An application for this permit would be made following receipt of development consent.
Class 2 Aquaculture Lease (AL21/004)	A Class 2 Aquaculture Lease is required under Section 163 of the Fisheries Management Act 1994 to authorise occupation of public waters for marine aquaculture purposes. The lease area has been provisionally approved as AL21/004 by NSW DPIRD Fisheries. Finalisation and execution of the lease must occur prior to commencement of aquaculture operations.
Crown Land Tenure	Occupation of public marine waters requires appropriate tenure arrangements under the Crown Land Management Act 2016. Crown land tenure for the Project is coordinated through the aquaculture leasing framework and does not prevent the consent authority from granting development consent under the EP&A Act.
Maritime Safety Approvals	Consultation and approval from Transport for NSW – Maritime may be required in relation to navigational marking, marine works, lighting, buoyage and hazard management under relevant maritime legislation, including the Marine Safety Act 1998. These requirements are addressed through detailed design and operational controls and do not preclude the granting of development consent.
EPBC Act Referral	The Project has been referred under the Environment Protection and Biodiversity Conservation Act 1999 (Cth) and determined to be a Not Controlled Action. As a result, no further approval is required under the EPBC Act and Commonwealth assessment requirements do not affect the ability of the consent authority to determine the SSD application
Food Authority Requirements	Where harvested kelp is intended for human consumption, the downstream processor or food business may be required to notify or obtain licensing under the Food Act 2003 (NSW) prior to commercial sale. These requirements relate to food safety, processing and supply chain regulation and do not form part of the matters to be resolved for determination of this SSD application.
Biosecurity Compliance	Ongoing compliance with the Biosecurity Act 2015 is required, including adherence to the General Biosecurity Duty and any applicable biosecurity management measures. These obligations apply independently of the planning approval process and do not prevent the granting of development consent. Biosecurity risks associated with the project will be managed through the Environmental Management Plan (EMP), which will include procedures for vessel and equipment hygiene, monitoring of cultured kelp and infrastructure, management of marine pests and biofouling, and protocols for stock handling, waste management and staff training.
Work Health and Safety	Compliance with the Work Health and Safety Act 2011 is required for all marine and port-based operations associated with the Project. WHS obligations are addressed through operational management systems and do not preclude the granting of development consent under the EP&A Act.
Pollution Control	Compliance with the Protection of the Environment Operations Act 1997 is required. The Project does not constitute a scheduled activity under that Act and does not require an Environment Protection Licence. Pollution prevention obligations apply independently of the planning approval process.

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TABLE 7: Identifies the matters that the consent authority must consider in deciding to grant consent to this SSDA. It also identifies the section(s) of this EIS and the appended documents that address these mandatory matters.

Statutory Considerations			
Statutory Reference	**Mandatory Matter**	**Consideration**	**Section in EIS**
Environmental Planning and Assessment Act 1979 (NSW)			
EP&A Act s4.38	Project declared State Significant Development	The Project has been declared State Significant Development (SSD) under section 4.38 of the EP&A Act, establishing the Minister for Planning (or delegate) as the consent authority and enabling assessment and determination under the SSD provisions of the Act.	5.0 Statutory Framework
EP&A Act s4.12	Development application properly made	Section 4.12 of the EP&A Act requires that a development application be validly made prior to determination. The SSD application for the Project has been properly lodged in accordance with the EP&A Act and relevant procedural requirements.	5.0 Statutory Framework
EP&A Act s4.15	Mandatory matters for consideration	Section 4.15 requires the consent authority to consider the likely environmental, social and economic impacts of the Project, the suitability of the site, submissions received, applicable planning instruments and the public interest. These matters are addressed through the assessment of key issues in the EIS.	8.9 Summary of Risk Evaluation 9.0 Assessment of Key Issues
EP&A Act s4.38–4.42	EIS required for SSD	Sections 4.38 to 4.42 of the EP&A Act require that an Environmental Impact Statement accompany an SSD application and be publicly exhibited prior to determination. This EIS has been prepared to satisfy those requirements.	5.0 Statutory Framework
EP&A Regulation 2021 Part 8	EIS form and content requirements	Part 8 of the Environmental Planning and Assessment Regulation 2021 prescribes the form and content requirements for an EIS. The EIS has been prepared in accordance with these requirements, as confirmed through the REAP declaration process.	REAP Declaration

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Statutory Considerations (continued)			
Statutory Reference	**Mandatory Matter**	**Consideration**	**Section in EIS**
SEARs (issued 23 May 2022)	EIS prepared in accordance with SEARs	Preparation of the EIS in accordance with the Secretary's Environmental Assessment Requirements is a mandatory prerequisite to determination of the SSD application. The EIS has been prepared having regard to the SEARs issued on 23 May 2022.	REAP Declaration
Biodiversity Conservation Act 2016 (NSW)			
BC Act s7.9	Assessment of biodiversity impacts	Section 7.9 of the Biodiversity Conservation Act 2016 requires biodiversity impacts of State Significant Development to be considered as part of determination. Potential impacts on marine habitats and species have been assessed in the EIS to inform the consent authority's decision.	9.4 Environment
BC Act	BDAR (if required)	A Biodiversity Development Assessment Report is required for SSD unless a waiver is granted. A BDAR waiver has been obtained from the Department, confirming a BDAR is not required for the Project. Biodiversity impacts are nonetheless assessed within the EIS.	5.3 Relevant State (NSW) Legislation and Regulations -5.3.3 Appendix A10
BC Act s7.3	Assess whether it is likely to significantly affect threatened species or their habitats	Section 7.3 requires consideration of whether the Project is likely to significantly affect threatened species or their habitats. Listed marine species, including whales, have been considered and assessed in the EIS.	7.11 Protected and Threatened Species, Populations and Communities (State Legislation) 7.14 Threatened and Protected Species List 9.4 Environment
FM Act Part 6	Grant of Class 2 Aquaculture Lease	Part 6 of the Fisheries Management Act 1994 provides for the grant of a Class 2 Aquaculture Lease to authorise occupation of public waters for aquaculture purposes. The Project requires a Class 2 Aquaculture Lease to occupy offshore marine waters.	5.3 Relevant State (NSW) Legislation and Regulations -5.3.4.1
FM Act s144 / relevant provisions	Class A Aquaculture Permit	Section 144 of the Fisheries Management Act 1994 requires a Class A Aquaculture Permit to authorise the operation of commercial marine algae aquaculture. The Project will be required to operate under this permit.	5.3 Relevant State (NSW) Legislation and Regulations -5.3.4.1

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Statutory Considerations (continued)			
Statutory Reference	**Mandatory Matter**	**Consideration**	**Section in EIS**
Fisheries Management Act 1994 (NSW)			
FM Act Lease Security Arrangement s163	Bond for decommissioning	Section 163 of the Fisheries Management Act 1994 requires a lease security arrangement to be provided as financial security for decommissioning of aquaculture infrastructure prior to lease activation. This requirement has been addressed through the Project's infrastructure and decommissioning framework.	9.2.3 Structural Integrity and Stability – Longline Infrastructure
FM Act Part 7	Protection of aquatic habitat and threatened species	Part 7 of the Fisheries Management Act 1994 requires consideration of potential harm to key aquatic habitats and impacts on protected or threatened species. These matters have been assessed as part of the EIS to inform the consent authority's determination.	9.0 Assessment of Key Issues
State Environmental Planning Policy (Biodiversity and Conservation) 2021			
SEPP (Biodiversity and Conservation) 2021 – biodiversity/environmental protection provisions	Avoidance and minimisation of impacts on biodiversity values	The biodiversity and environmental protection provisions of the SEPP require consideration of measures to avoid and minimise impacts on biodiversity values. An evidence-based assessment of biodiversity impacts and mitigation measures has been undertaken and documented in the EIS, including where a BDAR waiver has been granted. Ongoing management is supported through the project's Environmental Management Plan (EMP) and other associated management plans.	9.0 Assessment of Key Issues Appendix B7
SEPP (Biodiversity and Conservation) 2021 – coastal/environmental overlays where applicable Chapter 2	Avoidance of prohibited overlap with mapped sensitive features	The coastal and environmental overlay provisions of the SEPP require confirmation that development does not occur within prohibited or highly constrained areas, where applicable. Site suitability and constraints screening has been undertaken to confirm no overlap with mapped sensitive features, including protected areas and sensitive habitats.	9.0 Assessment of Key Issues

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Statutory Considerations (continued)			
Statutory Reference	**Mandatory Matter**	**Consideration**	**Section in EIS**
State Environmental Planning Policy (Planning Systems) 2021			
SEPP (Planning Systems) 2021 – planning administration/procedural settings Part 2	Application and assessment in accordance with NSW planning system requirements	The planning administration and procedural provisions of the SEPP require that SSD applications be lodged, exhibited, assessed and reported in accordance with the NSW planning system. The Project has been progressed through the SSD pathway in accordance with these procedural requirements.	5.0 Statutory Framework 12.0 SEARs – Cross reference table
State Environmental Planning Policy (Primary Production) 2021			
SEPP (Primary Production) 2021 – Aquaculture development provisions Clause 2.6	Development must be permissible with development consent	Clause 2.6 of the SEPP requires that aquaculture development be permissible with development consent. Marine waters aquaculture is an allowable form of development subject to assessment and determination under the EP&A Act.	5.0 Statutory Framework
SEPP (Primary Production) 2021 – AIDP consideration Clause 2.10	Consideration of relevant Aquaculture Industry Development Plan	Clause 2.10 requires the consent authority to consider the relevant Aquaculture Industry Development Plan. The Project has been assessed against the NSW Marine Waters Sustainable Aquaculture Strategy, including applicable constraints and guidelines.	5.3 Relevant State (NSW) Legislation and Regulations -5.3.5
State Environmental Planning Policy (Resilience and Hazards) 2021			
SEPP (Resilience and Hazards) 2021 – hazard risk considerations Chapter 2	Consideration of natural hazards and risk-managed design	The hazard risk provisions of the SEPP require consideration of natural hazards and demonstration of a risk-managed design. Coastal hazards, storm and severe weather conditions, and associated infrastructure risk controls have been assessed as part of the Project.	9.2.3 Structural Integrity and Stability – Longline Infrastructure Appendix B3 Appendix B6 Appendix B7
SEPP (Resilience and Hazards) 2021 – safety and emergency response (where relevant)	Contingency and emergency response planning	The SEPP requires consideration of appropriate contingency and emergency response planning where relevant. Emergency procedures, including severe weather and breakaway response measures, have been addressed in the EIS.	9.2.3 Structural Integrity and Stability – Longline Infrastructure Appendix B3 Appendix B6 Appendix B7 Appendix B8

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Statutory Considerations (continued)			
Statutory Reference	**Mandatory Matter**	**Consideration**	**Section in EIS**
State Environmental Planning Policy (Planning Systems) 2021			
SEPP (Planning Systems) 2021 – State Significant Development classification	Correct classification as State Significant Development	The Project falls within a class of development identified as State Significant Development under Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021. Accordingly, the development is required to be assessed and determined under the State Significant Development provisions of the Environmental Planning and Assessment Act 1979 (NSW).	5.0 Statutory Framework
SEPP (Planning Systems) 2021 – Schedule 1 State Significant Development	Development in environmentally sensitive areas	Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021 identifies classes of development declared to be State Significant Development. The Project constitutes aquaculture development within environmentally sensitive coastal waters and is therefore classified as SSD and assessed under the provisions of the Environmental Planning and Assessment Act 1979 (NSW).	5.0 Statutory Framework
State Environmental Planning Policy (Transport and Infrastructure) 2021			
SEPP (Transport and Infrastructure) 2021 – protection of transport/port functions Part 2	Compatibility with transport and port infrastructure and operations	The SEPP requires consideration of the compatibility of development with existing transport and port infrastructure and operations. Potential impacts on onshore transport, port operations, maritime traffic and safe navigation have been assessed as part of the EIS.	9.3.2 Marine Vessel and Vehicular Transport Appendix B4
SEPP (Transport and Infrastructure) 2021 – consultation/consideration of relevant agencies	Consideration of relevant transport authorities and requirements	The SEPP requires consideration of relevant transport authorities and their requirements. Consultation with Transport for NSW – Maritime and the Port Authority, including matters relating to navigation marking and Notice to Mariners, has informed the assessment of the Project.	9.3.2 Marine Vessel and Vehicular Transport Appendix B4

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Statutory Considerations (continued)			
Statutory Reference	**Mandatory Matter**	**Consideration**	**Section in EIS**
National Parks and Wildlife Act 1974 (NSW)			
NPW Act Part 6	Protection of aboriginal objects	Part 6 of the National Parks and Wildlife Act 1974 requires consideration of potential impacts on Aboriginal objects and places, and preparation of an Aboriginal Cultural Heritage Assessment Report where impacts may occur. Aboriginal cultural heritage has been assessed in accordance with this requirement, an ACHAR (Appendix A5) has been completed and a Cultural Heritage Response Plan (Appendix B2).	9.3.3.1 Aboriginal Heritage in Disaster Bay Appendix B2 Appendix A5
Roads Act 1993 (NSW)			
Roads Act 1993	Approval for works in road reserve	The Roads Act requires approval for works carried out within a public road reserve. The Project does not involve works within a road reserve and this requirement is not triggered.	N/A
Heritage Act 1977 (NSW)			
Heritage Act (State Heritage Register) Part 3	Protection of State heritage items and heritage conservation areas	The Heritage Act requires that listed State Heritage Register items, archaeological relics, and declared heritage conservation areas are not disturbed, damaged or altered without approval. The Project does not affect any listed State heritage items or heritage conservation areas and this requirement is not triggered.	N/A
Heritage Act Part 6	Discovery of relics	Part 6 of the Heritage Act requires works to cease and Heritage NSW to be notified if archaeological relics are discovered. Protocols for managing unexpected heritage finds have been identified for the Project and are attached as Appendix B2: Cultural Heritage Response Plan.	9.3.3 Aboriginal, European and Environmental Heritage Appendix B2
Aboriginal Land Rights Act 1983 (NSW)			
Aboriginal Land Rights Act 1983 (NSW) Part 4 (Land Claims) s 36	Aboriginal land claims	Section 36 of the Aboriginal Land Rights Act requires that development does not affect land subject to a registered Aboriginal land claim without lawful process. The Project site is located within offshore Crown waters that is not affected by any registered Aboriginal land (or ocean) claim.	9.3.3.1 Aboriginal Heritage in Disaster Bay Appendix A5

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Statutory Considerations (continued)			
Statutory Reference	**Mandatory Matter**	**Consideration**	**Section in EIS**
Protection of the Environment Operations Act 1997 (NSW)			
Protection of the Environment Operations Act 1997 (NSW) s 48 (Scheduled activities) s 120 (Water pollution) s 122 (Pollution of waters)	Scheduled activities and pollution of waters	The Act requires that scheduled activities hold an Environment Protection Licence and that pollution of waters is prevented. Seaweed aquaculture is not a scheduled activity under the Act and does not involve discharge, feed or effluent. Pollution prevention measures have been addressed in the EIS.	4.1 Description of the Development (SSD Consent Sought) 8.7 Risk Assessment Method 9.4.1 Marine Habitat, Water Quality and Sedimentation
Environmentally Hazardous Chemicals Act 1985 (NSW)			
Environmentally Hazardous Chemicals Act 1985 (NSW) s 6 (Declarations) s 9 (Licensing for declared chemicals)	Use or disposal of declared hazardous chemicals	The Act requires a licence where declared hazardous chemicals are used or disposed of. The Project does not involve the use or disposal of declared hazardous chemicals and this requirement is not triggered.	N/A
Food Act 2003 (NSW)			
Food Act 2003 (NSW) s 8 (Unsafe food offence) s 100 (Food business notification/licensing)	Food safety and food business notification or licensing	The Food Act 2003 (NSW) requires food businesses to comply with the Australia New Zealand Food Standards Code and applicable notification or licensing requirements. Any approvals relating to the processing or sale of kelp for human consumption relate to downstream food regulation and are not assessed as part of this SSD application.	N/A
Coastal Management Act 2016 (NSW)			
Coastal Management Act 2016 (NSW) s 3 (Objects) s 27 (Coastal management areas)	Consistency with coastal management objectives and mapped coastal areas	The Coastal Management Act requires development to be consistent with coastal management objectives and to consider mapped coastal management areas. The Project is not located within mapped coastal wetlands or protected coastal areas.	9.4.6 Threatened/Protected Species and MNES
Marine Estate Management Act 2014 (NSW)			
Marine Estate Management Act 2014 (NSW) s 3 (Objects) s 4 (Management principles)	Marine estate objectives and management principles	The Act requires consideration of the marine estate objectives and risk-based management principles. The Project has been assessed having regard to these objectives, including alignment with the Statewide Threat and Risk Assessment and marine estate sustainability principles.	9.4.6 Threatened/Protected Species and MNES

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Statutory Considerations (continued)			
Statutory Reference	**Mandatory Matter**	**Consideration**	**Section in EIS**
Marine Safety Act 1998 (NSW)			
Marine Safety Act 1998 (NSW) s 8 (General safety duties) s 9 (General safety obligations) s 11 (Navigation rules)	Vessel safety and navigation rules	The Act requires vessel operators to operate safely and comply with navigation rules. Vessel safety measures, including speed management and whale lookout protocols, have been addressed in the EIS in accordance with applicable maritime safety requirements.	9.4.5 Vessel Strike and Acoustic Pollution Appendix B1
MSA Part 2	Navigation safety compliance	The Act requires navigation safety measures for structures and activities in navigable waters. Buoyage, lighting, AIS and hazard management measures have been considered as part of the Project.	9.2.4 Navigation and Interactions with Other Waterway Users Appendix B9
Ports and Maritime Administration Act 1995 (NSW)			
Ports and Maritime Administration Act 1995 (NSW) s 11 (Functions of Port Authority) s 79 (Port safety powers)	Protection of port operations and maritime safety	The Act requires that development does not interfere with port operations or maritime safety. The Project is located outside port limits and does not affect port operations; accordingly, these provisions are not triggered.	9.3.2 Marine Vessel and Vehicular Transport Appendix B4
Biosecurity Act 2015 (NSW)			
Biosecurity Act 2015 (NSW) s 22 (Biosecurity Duty) s 23 (Biosecurity risk)	General biosecurity duty and management of biosecurity risks	The Biosecurity Act imposes a general duty to prevent, eliminate or minimise biosecurity risks. Biosecurity risks associated with the Project have been considered and are addressed through biosecurity plans and protocols.	9.4.2 Genetics, Disease and Introduced Pests Appendix B5 Appendix B8
Crown Land Management Act 2016 (NSW)			
Crown Land Management Act 2016 (NSW) s 2.20 (Authorisation for use of Crown land) s 3.13 (Leases and licences)	Authorisation for occupation of Crown land	The Act requires authorisation for the use and occupation of submerged Crown land, including through leases or licences. Occupation of public waters for the Project is facilitated through the Class 2 Aquaculture Lease and associated Crown land tenure arrangements.	5.0 Statutory Framework Appendix A2

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Statutory Considerations (continued)			
Statutory Reference	**Mandatory Matter**	**Consideration**	**Section in EIS**
Work Health and Safety Act 2011 (NSW)			
Work Health and Safety Act 2011 (NSW) s 19 (Primary duty of care)	Primary duty of care	Section 19 of the Act requires persons conducting a business or undertaking to ensure, so far as is reasonably practicable, the health and safety of workers. Offshore works, vessel operations and marine activities associated with the Project are subject to Work Health and Safety management systems, as addressed in the EIS.	9.3.5 Work Health and Safety
Dangerous Goods (Road and Rail Transport) Act 2008 (NSW)			
Dangerous Goods (Road and Rail Transport) Act 2008 (NSW) • s 11 (Compliance with ADG Code)	Transport of dangerous goods	The Act requires the transport of dangerous goods to comply with the Australian Dangerous Goods Code and licensing requirements. The Project does not involve the transport of dangerous goods and this requirement is not triggered.	N/A
Water Management Act 2000 (NSW)			
Water Management Act 2000 (NSW) • s 60A (Water access licence required) • s 91E (Controlled activity approvals)	Water access licences and controlled activity approvals	The Act requires a water access licence for water extraction and approvals for controlled activities on waterfront land. The Project does not involve water extraction or controlled activities on waterfront land and these requirements are not triggered.	N/A

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TABLE 8: Summarises considerations under other legislation that should be considered in accordance with the SSD Guidelines.

Other Relevant Planning Instruments, Policies and Strategic Plans			
Statutory Reference	**Mandatory Matter**	**Consideration**	**Section in EIS**
Commonwealth Legislation			
Environmental Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)	Matters of National Environmental Significance	The Project was referred under the EPBC Act. A determination has been issued that the Project is a not controlled action and no further Commonwealth approval is required prior to the Project proceeding.	7.13 EPBC – Not A Controlled Action Appendix A1
Underwater Cultural Heritage Act 2018 (Cth)	Protection of underwater cultural heritage	The Act requires protection of underwater cultural heritage and compliance with stop-work and notification obligations if protected items are discovered. No known underwater cultural heritage items are located near the lease area. A chance-find procedure has been adopted for the Project.	7.18 Heritage 9.3 Impact On Community Appendix A9
Native Title Act 1993 (Cth)	Native title rights and interests	Native title rights may exist in offshore Crown waters. The aquaculture lease is non-exclusive and does not confer possession or extinguish native title rights. Native title considerations have been addressed in the EIS.	7.18 Heritage 9.3.3.1 Aboriginal Heritage in Disaster Bay Appendix A5
Other Policies and Plans			
Policy on Ecologically Sustainable Development (ESD) (1992) / ESD principles applied under NSW planning law	Consideration of ESD principles	The EP&A Act requires consideration of ecologically sustainable development principles, including the precautionary principle, intergenerational equity, conservation of biodiversity and ecological integrity, and internalisation of environmental costs. These principles have informed the assessment of impacts, mitigation measures and monitoring approach for the Project.	10.0 Environmental Management
Bega Valley Local Environmental Plan (LEP) 2013	Applicability of local planning controls	The Project is offshore State Significant Development and is not subject to zoning controls under the LEP. The LEP is relevant to confirm that ancillary onshore activities utilise existing port and industrial facilities and that no new onshore development is proposed as part of this SSD application.	9.2.2 Land Based Infrastructure 9.3.6 Social and Economic
South East and Tablelands Regional Plan 2036	Strategic regional consistency	The Regional Plan provides a strategic framework for regional growth and diversification. The Project has been considered in the context of regional priorities, including sustainable primary industries, economic diversification and employment.	9.2.2 Land Based Infrastructure 9.3.6 Social and Economic

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Other Relevant Planning Instruments, Policies and Strategic Plans (continued)			
Statutory Reference	**Mandatory Matter**	**Consideration**	**Section in EIS**
Bega Valley Shire Community Strategic Plan 2042	Local strategic alignment	The Community Strategic Plan provides local context for long-term community outcomes. The Project has been considered with regard to local objectives relating to employment, resilience, sustainable industry and environmental stewardship.	3.8 Justification of Preferred Option 9.3.6 Social and Economic
Far South Coast Regional Economic Development Strategy (REDS) 2023 Update	Economic development alignment	The Strategy identifies priorities for economic growth, diversification and year-round employment. The Project has been considered in the context of regional economic development objectives, including aquaculture and blue-economy opportunities.	3.8 Justification of Preferred Option 9.3.6 Social and Economic
Bega Valley Coastal Management Program	Coastal management consistency	The Coastal Management Program provides guidance on coastal hazards, environmental values and management actions. The Project has been considered with regard to these objectives and does not overlap with identified coastal hazards or sensitive coastal environments.	3.8 Justification of Preferred Option 9.3.6 Social and Economic
Port Authority of NSW Operational Guidelines	Port and marine operational requirements	Port Authority operational guidelines may apply to vessel movements, navigation safety and incident reporting. These requirements are relevant to marine logistics and ongoing coordination but are not a planning pre-condition for SSD determination.	9.2.4 Navigation and Interactions with Other Waterway Users Appendix B9

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6.0 CONSULTATION

6.1 Community Consultation

The Eden-1 Kelp Aquaculture Farm, developed by Auskelp under Aquaculture Lease AL21/004, has undergoing an ongoing community consultation process aligned with industry best practice and SEARs regulatory requirements. This process was initially informed by the Business and Community Engagement Framework of the Blue Economy Cooperative Research Centre (BECRC) and independently administered by the University of Wollongong (UOW), which outlines the social licence and stakeholder engagement principles for ocean-based industries in NSW. Further, engagement with Representative Aboriginal Parties was undertaken by Biosis who completed a detailed Aboriginal Heritage Assessment Report on the proponent's behalf. In addition, the Proponent has continued ongoing community consultation as detailed below. Overall, the community consultation has been designed to ensure inclusive, transparent, and culturally appropriate engagement with key community, industry, and Aboriginal stakeholders. Particular attention has been placed on the Wonboyn Community which is adjacent to the proposed aquaculture site in Disaster Bay, which has a reported total of 130 residents (2021 Australian Census).

The goal of the consultation was to gather local and regional sentiment, address knowledge gaps, and integrate feedback into the planning and operation of the Eden-1 Project in Disaster Bay, ensuring it aligns with the interests and values of the surrounding community and traditional custodians.

The community engagement process began in 2020 and is currently ongoing.

Key milestones and data include:

- **December 2020**: Website set up and relevant Project information published.
- **March 2021**: Discussions with various Wonboyn and Eden residents, oyster farmers, and Wonboyn Lake Ratepayer's Association.
- **December 2021**: Project briefing to Russell Fitzpatrick, Bega Valley Shire Mayor (plus ongoing briefings).
- **August 2022:** Project briefing to Kristy McBain MP, Federal Member for Eden Monaro (plus ongoing briefings).
- **March 2023**: Community engagement strategy development in consultation with BECRC/UOW/Biosis.
- **May – August 2023**: Stakeholder identification and notification letters distributed.
- **June – October 2023**: Online and physical surveys across the Bega Valley region, 302 participants.
- **October 2023**: Community Information Session (Eden, 49 participants) and drop-in session (Wonboyn, 10 participants). Written surveys and interviews completed.
- **December 2023 – March 2024**: Targeted workshops with maritime operators, aquaculture industry, recreational fishers, and educators.
- **January – March 2024**: Interviews with First Nations stakeholders and finalisation of the Aboriginal Cultural Heritage Assessment Report (ACHAR).
- **March 2023 to Present**: Ongoing engagement with relevant government departments.
- **Project Reporting:** Ongoing Project reporting to Registered Aboriginal Parties (RAPs).
- **November 2022 – October 2025**: Annual Reports published and sent to Interested Parties FY22, FY23, FY24, FY25.
- **August 2025**: Frequently Asked Questions (FAQ-1) document sent to Interested Parties.
- **November 2025**: Frequently Asked Questions (FAQ-2) document sent to Interested Parties.

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- **October 2025**: Wonboyn Community Session held at the Wonboyn Fire Shed, approximately 65 attendees and livestreamed with 57 online groups attending. Full and unedited video of the Wonboyn Information Session is also available online at www.auskelp.net.
- **December 2025**: Project briefing to Dr Michael Holland MP, State Member for Bega.
- **January 2026**: Wonboyn Ratepayer's Association meeting, with approximately 35 attendees. Project update provided and expected process and timing of EIS were presented. Detailed options for opposing the Project were independently provided.
- **Interested Parties:** A list of 503 Interested Parties has been developed which includes email addresses of all known Wonboyn Residents, registered RAPs, relevant Government Departments, Council and Government officials, Industry Participants, local Aquaculture Companies and Fishers, media and includes detractors and opponents of the Project – communication remains ongoing.
- **Information Provided:** Interested parties are sent all Annual Reports, FAQs, Information Session Invitations, Notices, and Interested Parties have been updated on Project timing and how to both support and object to the proposed Project.
- **Notification:** Information Sessions have been supported by advertising through local news, ABC Southcoast radio interviews, WIN News appearance, online platforms, physical notices in Wonboyn, notice boards (Eden Chamber of Commerce), Wonboyn Ratepayer's Association and Rural Fire Service notification.

6.2 Project Documentation

Auskelp has maintained open and ongoing communication with community and government stakeholders for more than four years through a range of engagement activities. These include publicly available online documentation, community information sessions, dedicated working groups, Indigenous consultation, and regular progress reporting. Engagement also involved independent meetings with Commonwealth, State, and Local Government agencies, as well as ongoing dialogue with industry representatives from the oyster, fishing, and mussel sectors. All interactions and feedback are carefully documented, reviewed, and incorporated into project planning and decision-making to ensure that relevant issues are addressed, and outcomes reflect community and stakeholder input relative to the environmental and social risks.

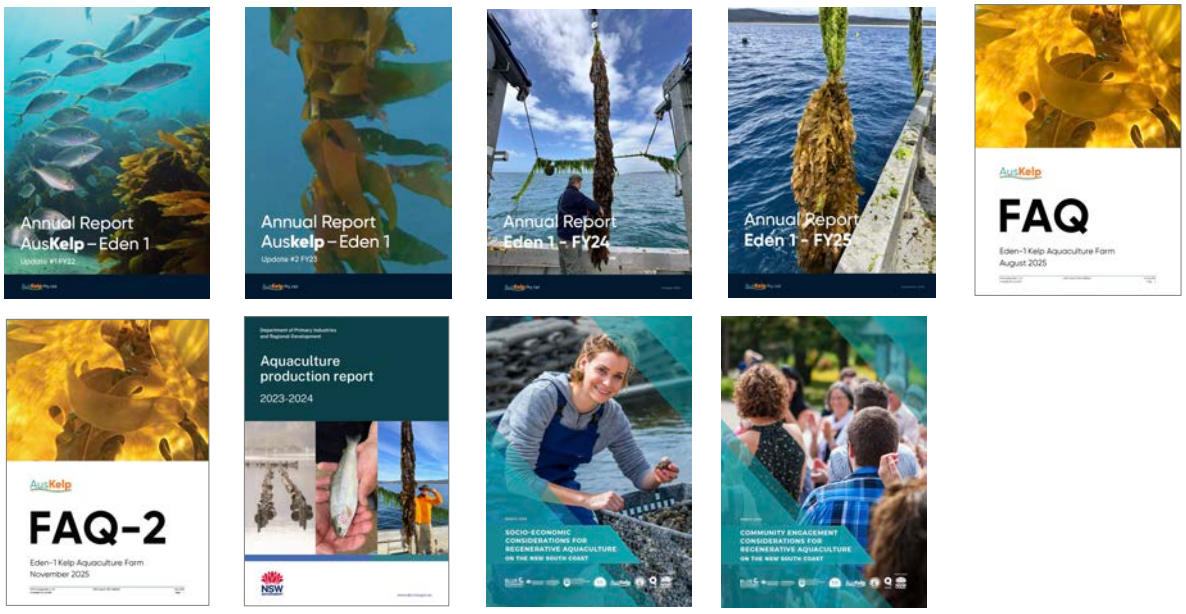

Figure 13: Auskelp public-facing annual reports and FAQ documents 2022-2025, NSW Government Aquaculture Production Report 2023-2024, and project consultation reports 2024 (Source: Auskelp, NSW Government, BECRC and University of Wollongong).

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6.3 Survey Methodology and Summary

Information on community feedback and views has been collected in a variety of manners which include: Government Department feedback and questions, Information Session feedback (in person and online), online chat groups (IE Eden Voice, 16k members; and, Protect Disaster Bay, 5 members), Auskelp website questions, direct Auskelp emails, and Wonboyn community questions both direct and indirect. In addition to these avenues, two formal processes were independently used to gather structured community perspectives related to the Project:

1. Blind Surveys (Online and In-Person): These were conducted by UOW to capture unbiased perspectives, using fixed-format questions and open comment fields.
2. Structured Stakeholder Interviews: Focused conversations with key stakeholder groups conducted by UOW to provide context, technical discussion, and targeted, unvarnished feedback.

A total of **302 community members participated in the formal surveys**. The results were statistically analysed and reported in the BECRC March 2024 "Socio-Economic Considerations for Regenerative Aquaculture on the NSW South Coast" report.

Positive Responses:

- **82%** of respondents indicated support for kelp aquaculture as a regenerative and sustainable industry.
- **74%** expressed confidence that the Project could generate local employment and economic resilience.
- **71%** believed the Eden region should be a leader in climate-smart marine industries.
- Common themes included: interest in local employment, youth employment pathways, marine habitat restoration, circular economy, and nature-based solutions for climate action.

Negative Responses:

- **12%** raised concerns about the potential impacts on marine mammals or navigation.
- **6%** were opposed to any form of ocean development near Disaster Bay, citing environmental sensitivity and visual amenity.

Common concerns included: lack of understanding of kelp infrastructure, visual impact from headlands and beaches, commercial longline fishers voiced opposition to seaweed farming (as commercial trawling is currently permitted in Disaster Bay), community concerns regarding loss of whale resting areas and mammal entanglement, scepticism about ecological claims, and lack of community consultation.

The complete March 2024 "Socio-Economic Considerations for Regenerative Aquaculture on the NSW South Coast" report can be found here.

6.4 Aboriginal Consultation and ACHAR Process

In accordance with statutory requirements and ethical research protocols, a formal Aboriginal Cultural Heritage Assessment Report (ACHAR) was completed by Biosis Pty Ltd and informed through structured consultation with First Nations stakeholders from the region.

This process included the following engagement:

- A comprehensive desktop review was undertaken, including searches of the Aboriginal Heritage Information Management System (AHIMS), ethnographic records, historical sources, and previous regional heritage studies.
- All known and relevant Aboriginal parties with potential cultural connections to the Project area were identified through statutory registers, Land Council records, Native Title searches, and public notification.

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- Nineteen (19) Aboriginal groups and organisations registered as Registered Aboriginal Parties (RAPs) and were formally contacted and invited to participate in the consultation process.
- RAPs were provided with Project information, methodology documentation, and opportunities to comment on the scope, findings, and management recommendations of the assessment.
- Direct consultation with Elders and representatives of the Bega Local Aboriginal Land Council, Yuin traditional custodians, and associated heritage bodies;

The findings of the ACHAR concluded that no known Aboriginal heritage sites exist within the proposed lease footprint of Eden-1 in offshore waters. However, recommendations for continued engagement and cultural monitoring throughout the lifecycle of the Project were adopted in the environmental management plan.

Nineteen (19) Aboriginal stakeholder groups were formally registered as Registered Aboriginal Parties (RAPs), including:

- Eden Local Aboriginal Land Council
- Eden Aboriginal Corporation
- Bega Local Aboriginal Land Council
- NSW Aboriginal Land Council
- Katungal Aboriginal Corporation
- Other individual First Nations representatives and groups

These groups are continuing to be consulted through a mix of correspondence, online meetings, and ongoing report distribution and collaboration.

All information relating to Aboriginal cultural context, consultation processes, Registered Aboriginal Party engagement, desktop investigations, and heritage assessment outcomes for the Eden-1 Kelp Aquaculture Project is documented in detail within the Aboriginal Cultural Heritage Assessment Report (ACHAR) prepared for the Project. The ACHAR is provided as Appendix A5 to this Environmental Impact Statement and forms the primary technical basis for the conclusions presented in this section. The assessment documentation includes full records of Aboriginal party identification and consultation, AHIMS search results, ethnographic context, methodological approach, and management recommendations. This EIS chapter summarises the key findings of the ACHAR, while the appended report should be referred to for comprehensive supporting information, detailed evidence, and regulatory compliance documentation.

6.5 Stakeholders Consulted

The Proponent and its partners undertook an inclusive stakeholder identification and engagement process. The following government departments, groups and entities were consulted and provided feedback through one or more methods (survey, interview, public session, or formal correspondence, online meetings, ongoing consultation):

<u>Local Government:</u>

- Bega Valley Shire Councillors
- Bega Valley Shire Council – Economic Development, Environmental Planning

<u>State and Commonwealth Agencies:</u>

- NSW Department of Planning, Housing and Infrastructure
- NSW Department of Planning and Environment – Biodiversity and Conservation
- NSW Department of Primary industries – Fisheries
- NSW Department of Primary Industries – Aquaculture Division
- NSW Department of Primary Industries – Biosecurity and Food Safety
- NSW Department of Primary Industries – Agriculture
- Transport for NSW – Maritime Division

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- Transport for NSW – Land Division
- NSW Crown lands
- Port Authority of NSW
- Heritage NSW
- Heritage Council of NSW
- NSW National Parks & Wildlife Service
- NSW Environmental Protection Agency
- NSW Department of Planning and Environment – Water
- NSW Marine Estate Management Authority
- NSW Department of Primary Industries and Regional Development
- NSW Department of Planning, Housing and Infrastructure (NSW Crown Lands)
- Australian Maritime Safety Authority
- NSW Marine Estate Management Authority (MEMA)
- NSW Maritime
- NSW Aboriginal Affairs (AANSW)
- Heritage Council of NSW
- Commonwealth Department of Climate Change, Energy, the Environment and Water
- Commonwealth Department of Climate Change, Energy, the Environment and Water – Nature and Natural Capital Division

Industry Stakeholders:

- Regional oyster aquaculture operators (Wonboyn and Pambula)
- Local commercial fishers (including abalone, prawn, gummy shark, mussel, sea urchin)
- Local aquaculture service providers
- Local wharf services
- Maritime services (boat operators, dive businesses)
- Cruise Ship operators
- Marine Bioproducts CRC
- Marine Bioproducts CRC
- Bega Circular Valley
- Bega Group
- Australian Sustainable Seaweed Alliance (ASSA)

Community Groups:

- Community Members: Wonboyn, Kiah, Eden, Bega
- Wonboyn Lake Ratepayers' Association
- Wonboyn Rural Fire Service
- Eden Chamber of Commerce
- Marine education stakeholders (local TAFE and Marine high school)
- Recreational fishing association
- Tourists and visitors
- First Nations stakeholders

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6.6 Issues Raised by Community

Key issues raised during consultation with community are as follows:

Issue Raised	EIS Section Applicable
■ Visual impact in Disaster Bay – relocate lease area from 656m to 1.1 km offshore from Greenglades Beach	9.3.1 Visual Amenity
■ Is commercial access via Nadgee Nature Reserve required? No	9.2.1 Noise During Construction 9.3.2 Marine Vessel and Vehicular Transport
■ Will the kelp farm produce microplastics?	9.4.1 Marine Habitat, Water Quality and Sedimentation
■ What will I see for the beach or Wonboyn?	4.7 Lease Location 9.3.1 Visual Amenity
■ Will kelp from the farm wash up on the beach?	4.9 Beach-cast Kelp 9.4.1 Marine Habitat, Water Quality and Sedimentation
■ Visibility and number of floats - ~120 floats per hectare	9.2.3 Structural Integrity and Stability – Longline Infrastructure
■ Is there an exclusion zone for recreational fishers? No exclusion of recreational fishers	9.2.4 Navigation and Interactions with Other Waterway Users
■ Where does the seedstock come from and will it be genetically modified? Local kelp and not genetically modified kelp	9.4.2 Genetics, Disease and Introduced Pests
■ Kelp washing up on Greenglades Beach and blocking Wonboyn Entrance	9.4.1 Marine Habitat, Water Quality and Sedimentation
■ Will trucks come through Wonboyn? No	9.3.2 Marine Vessel and Vehicular Transport
■ Will the kelp farm affect Nadgee Nature Reserve?	9.4.6 Threatened/Protected Species and MNES
■ Does kelp spread disease?	9.4.2 Genetics, Disease and Introduced Pests
■ Will there be increased shark numbers?	9.4.7 Behavioural Changes
■ What will happen to fish populations?	9.4.10 Offshore Resources

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Issue Raised (continued)	EIS Section Applicable
■ Will whales be impacted?	9.4.4 Entanglement and Ingestion of Marine Debris
■ Will the seafloor be impacted?	9.1.2 Habitat Loss and Shading
■ Are wild kelp losses/reductions a concern?	2.3 Seaweed Farming in Australia 9.1.1 Coastal Process and Suitability of Infrastructure
■ Term of aquaculture lease.	5.3 Relevant State (NSW) Legislation and Regulations
■ Alternate locations for kelp farms.	3.6.1 Alternative Sites
■ Is Commonwealth approval required approval? Yes EPBC	7.13 EPBC – Not A Controlled Action
■ Will commercial fishing areas be limited? Yes, 5% of Disaster Bay will be restricted from commercial fishing.	9.2.4 Navigation and Interactions with Other Waterway Users
■ First Nations traditional areas affected. ■ Will cultural fishing be affected?	7.18.1 Aboriginal Heritage 9.3.3.1 Aboriginal Heritage in Disaster Bay Appendix A5: Aboriginal Cultural Heritage Report
■ Has there been adequate community consultation and reporting?	6.0 Consultation
■ Request for financial compensation by commercial fisherman for loss of gummy shark fishing area.	9.2.4 Navigation and Interactions with Other Waterway Users 9.3.6 Social and Economic
■ How many jobs will be created?	9.3.6 Social and Economic
■ Will the kelp farm affect the Nadgee Nature Reserve?	9.3.3.3 Environmental Heritage in Disaster Bay 9.4.8 Areas of Conservation Significance

Table 9. Issues raised via consultation with community and regulatory authorities during consultation process from Jan 2023 to January 2026.

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6.7 Issues Raised by Regulatory Authorities

Key issues raised during consultation with regulatory authorities (excluding Director General's requirements) are listed below:

Issue Raised	EIS Section Applicable
Water Supply • Identification of secure freshwater supply for the life of the Project. • Assessment of surface and groundwater impacts (quality and quantity).	Not applicable – no land-based infrastructure
Water Quality • Consistency with Coastal Management Act 2016. • Effects of coastal processes and document hazards. • Will water quality be affected? • Determine benthic and fish baselines.	9.4 Environment Appendix A3: BMT Coastal Processes Report Appendix A9: Elgin Benthic Ecology, Fish Assemblage and Seabed Habitat Assessment
Cultural Heritage and Aboriginal Engagement • Completion of an Aboriginal Cultural Heritage Assessment Report (ACHAR). • Registration of Project on AHIMS (Aboriginal Heritage Information Management System). • Engagement with Registered Aboriginal Parties (RAP) and Traditional Owner consultation framework. • Compliance with Native Title Act. • Maritime heritage assessment under the Heritage Act 1977 and Historic Shipwrecks Act 1976. • Protocols for accidental relic discovery during operations. • Clarification of Aboriginal heritage and current use of the area.	6.4 Aboriginal Consultation and ACHAR Process 7.18.1 Aboriginal Heritage 9.3.3 Aboriginal, European and Environmental Heritage 9.3.3.1 Aboriginal Heritage in Disaster Bay 9.3.3.2 European Heritage in Disaster Bay Appendix A5: Aboriginal Cultural Heritage Report (AL21/004) 2024 Appendix B2: Cultural Heritage Response Plan
Economic Development • Support for employment, training and research opportunities. • Stakeholder engagement framework. • Support for sustainable seafood production. • Project supported as a regenerative marine industry initiative. • Effect on local economy.	3.2 Project Rationale 7.19 Social and Economic 7.20 Social Impact Assessment 9.3.6 Social and Economic Appendix C1: Community Engagement Strategy 2025 Appendix A6: Socio-Economic Considerations for Regenerative Aquaculture on the NSW South Coast

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Issue Raised (continued)	EIS Section Applicable
Environmental and Biodiversity • Mammal entanglement. • Assessment of terrestrial and aquatic biodiversity impacts. • Assessment of significance for threatened marine and migratory species. • Impact assessment for threatened species under the Fisheries Management Act. • Water spills and oil spill mitigation. • Use of environmental management plan templates. • Marine pest and monitoring program. • Flood assessment and modelling. • No drones to be flown inside Nature Reserve or south end of Greenglades beach. • Road access via Nadgee Nature Reserve. • Ongoing effect of benthic environment. • Storm cast kelp from farm infrastructure.	7.11 Protected and Threatened Species, Populations and Communities (State Legislation) 7.12 Matters of National Environmental Significance (Commonwealth Legislation) 7.13 EPBC – Not A Controlled Action 7.14 Threatened and Protected Species List 7.15 Areas of Conservation Significance 9.4.2 Genetics, Disease and Introduced Pests 9.4.4 Entanglement and Ingestion of Marine Debris 9.4.5 Vessel Strike and Acoustic Pollution 9.4.6 Threatened/Protected Species and MNES 9.4.7 Behavioural Changes 9.4.8 Areas of Conservation Significance 9.4.10 Offshore Resources Appendix B1: Marine Fauna Interaction Plan Appendix B7: Environmental Management Plan
Regulatory Compliance • Alignment with the Fisheries Management Act 1994 and aquaculture permit conditions. • Lease on Crown Land requires Crown landowner consent. • Consistency with Marine Estate Management Strategy 2018–2028. • Security bond for aquaculture lease.	5.0 Statutory Framework 9.0 Assessment of Key Issues 9.1 Site Selection 9.2 Construction and Infrastructure 9.3 Impact On Community 9.4 Environment

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Issue Raised (continued)	EIS Section Applicable
Navigation and Maritime Safety • Lease location • Navigational risk assessment (including maps of anchor layout). • Lease area vessel exclusion zones must be clarified. • Notification to AMSA and maritime safety agencies • Safe navigation compliance with NSW Maritime officers. • Port Authority requires navigation risk and impact assessment agreed with Harbour Master • Impact on Port of Eden operations and recreational/commercial shipping must be assessed. • Avoid reliance on Wonboyn Lake ICOLL for access due to closure risk • Use of boat launching facilities • No impact on Naval activities	4.7 Lease Location 9.3.2 Marine Vessel and Vehicular Transport 9.2.4 Navigation and Interactions with Other Waterway Users 9.3.5 Work Health and Safety Appendix B4: Traffic Management Plan Appendix B3: Emergency Response Plan Appendix B7: Environmental Management Plan
Aboriginal Heritage • Aboriginal Cultural Heritage Report required • Ongoing consultation with First Nations required	6.4 Aboriginal Consultation and ACHAR Process 7.18.1 Aboriginal Heritage 9.3.3.1 Aboriginal Heritage in Disaster Bay Appendix A5: Aboriginal Cultural Heritage Report Appendix B2: Cultural Heritage Response Plan
European Heritage • Historic shipwrecks or Heritage items must be notified • Underwater search of lease area	7.18.2 European Heritage 9.3.3.2 European Heritage in Disaster Bay Appendix B2: Cultural Heritage Response Plan
Whale and Mammal • Management protocols • Monitoring • Review of documentation and procedures (DCCEEW)	9.4.4 Entanglement and Ingestion of Marine Debris 9.4.5 Vessel Strike and Acoustic Pollution 9.4.6 Threatened/Protected Species and MNES 9.4.7 Behavioural Changes Appendix B1: Marine Fauna Interaction Plan (approved by DCCEEW)

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Issue Raised (continued)	EIS Section Applicable
National Parks • Access restrictions • Drone usage	9.3.2 Marine Vessel and Vehicular Transport 9.4.8 Areas of Conservation Significance
Ports and Infrastructure • Navigation and marine traffic • Wharf access • Berthing	9.2.4 Navigation and Interactions with Other Waterway Users 9.2.2 Land Based Infrastructure 9.3.2 Marine Vessel and Vehicular Transport Appendix B4: Traffic Management Plan
Operational and Infrastructure • Structural integrity of marine infrastructure • Noise and visual amenity • Detailed operational information (seeding, anchoring, harvesting) • Anchoring infrastructure must mitigate marine debris risk from failure. • Visual impact study from land vantage points • Emergency access routes and staging areas • Visual inspections • Traffic impact assessment on council and state-managed roads • Fire safety planning and bushfire preparedness for land-based components – not assessed	9.2 Construction and Infrastructure 9.3 Impact On Community Appendix B2: Cultural Heritage Response Plan Appendix B3: Emergency Response Plan Appendix B4: Traffic Management Plan Appendix B5: Seaweed Aquaculture Biosecurity Plan Appendix B6: Monitoring and Maintenance Plan Appendix B7: Environmental Management Plan Appendix B8: Waste Management Plan

Table 10. Issues raised via direct consultation with regulatory authorities Jan 2023 to November 2025.

6.8 Future Engagement

The proponent undertakes to complete ongoing engagement, post successful project approval, as follows:

- **Transparency:** Annual Project Reporting (includes marine fauna interactions)
- **Contact:** Email updates to Interested parties
- **Aboriginal Engagement:** Continue RAP engagement; cultural awareness training; targeted First Nations employment and participation.
- **Commercial Fishing:** Ongoing engagement with NSW DPIRD Fisheries to ensure that unforeseen impacts on commercial fisheries are identified and addressed through collaborative, evidence-based measures.

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- **Assurance:** Third-party environmental audits every 3 years (fish assemblages and benthic habitat); publish findings and if required corrective actions.
- **Education:** Training pathways with schools/TAFE; local procurement priority; internships and site visits.
- **Complaints & Appeals:** Dedicated email; 10-day response SLA; public (de-identified) register; escalation pathway.
- **Adaptive Management:** Pre-defined triggers for operational changes (e.g., visual/amenity, navigation, environmental performance), agreed with regulators.

6.9 Summary of Consultation

Extensive consultation has been undertaken for Project over four (4) years, incorporating local community, First Nations stakeholders, government agencies, local government, industry groups, and marine users across the Bega Valley region. Engagement activities commenced in 2021 and have included surveys, interviews, community information sessions, targeted workshops, Aboriginal consultation including the ACHAR process, government briefings, and ongoing communication with more than 500 identified interested parties. Strong community support for kelp farming emerged through formal UOW-administered surveys — where 82% of participants supported regenerative kelp aquaculture — alongside widespread interest in local employment, youth pathways, and climate-positive industry development. Some detractors and opponents raised concerns regarding visual impact, navigation, ecological effects, cultural heritage, impacts to commercial fishing, access to recreational fishing areas, and consultation adequacy; these issues were recorded, transparently addressed and incorporated into Project refinements. Engagement with Registered Aboriginal Parties confirmed and ongoing, while emphasising the importance of continued cultural dialogue and engagement. Overall, the consultation process has sought to be inclusive, transparent, and iterative, generating support while at the same time ensuring that concerns have been documented and responded to in the Project's design and assessment.

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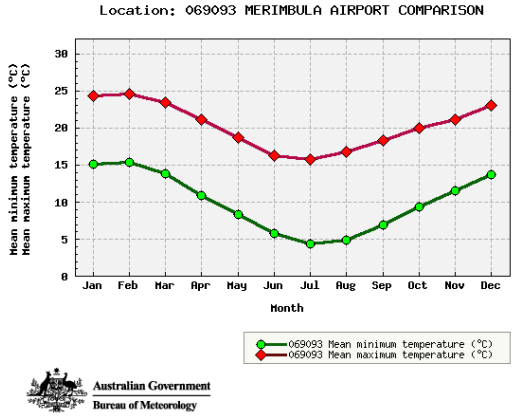
7.0 EXISTING COASTAL ENVIRONMENT

7.1 Coastal Climate

The Eden region experiences a temperate climate with mean maximum air temperatures ranging from 24.6˚C in February to 15.8˚C in July, while mean minimum air temperatures range from 15.4˚C in February and 4.4˚C in July (Figure 14). The highest average monthly rainfall for the region occurs in February-April (76 – 91.0mm), while the lowest rainfall occurs during July and September (41.2 – 56.3mm) (Figure 15).



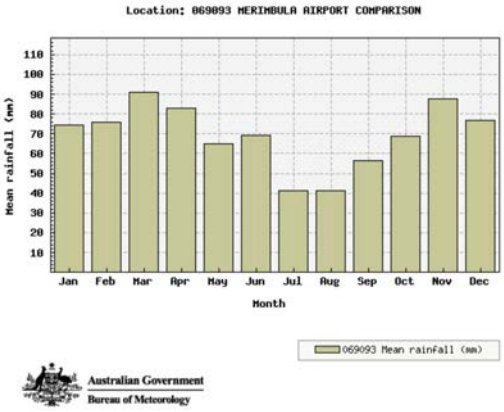


Figure 14: Mean minimum and maximum air temperatures from 1969-2016 for Merimbula Airport 36.91 °S 149.90 °E (Source: Bureau of Meteorology)

Figure 15: Mean Rainfall (mm) from 1969-2016 for Merimbula Airport 36.91 °S 149.90 °E (Source: Bureau of Meteorology)

For most of the year the morning winds are dominated by South-Westerly winds, with Oct-Jan having slightly more North-Easterly winds, and afternoon winds dominated by North-Easterly winds. Average morning wind speed varies slightly across the year with a maximum September – November (12-13.4 km/hr). Average afternoon wind speed varies over the year with maximums experienced September – January (20.3-21.2 km/hr). Wind speed and direction vary noticeably within Disaster Bay from the morning to the afternoon. During spring and summer southerly and northerly breezes dominate the morning wind pattern while afternoon winds are predominately onshore. During autumn and winter, westerly and south westerly winds prevail in the morning and southerly and onshore are characteristic of the afternoon. Mean morning wind speed varies across the year with the greatest speed experienced during late autumn and winter (maximum 19.1 km/h in June) (Figure 16). Average wind speeds in the afternoons are greatest during spring and summer (maximum 22.5 km/h in November).

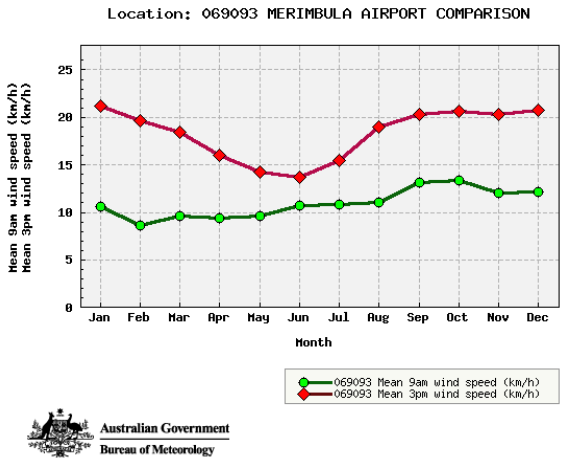


Figure 16; Mean Rainfall (mm) from 1969-2016 for Merimbula Airport 36.91 °S 149.90 °E (Source: Bureau of Meteorology).

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7.2 Bathymetry

Disaster Bay, located on the far south coast of New South Wales near Eden, is a broad, open coastal embayment characterised by moderately sloping bathymetry that deepens gradually from the nearshore zone to the continental shelf. The bathymetric profile of the bay reflects a transition from shallow subtidal zones near the shoreline to depths exceeding 60 metres within 5–6 km offshore. The average seafloor gradient within the main body of the bay ranges between 1:60 and 1:100, depending on location, with a general south-eastward deepening trend.

Multibeam sonar and navigational chart data (AusChart AUS 195 and Navtrionics Webapp 2021) indicate that the proposed 200-hectare lease area for kelp aquaculture lies predominantly in waters between 18 and 25 metres in depth. The seafloor within Disaster Bay is largely uncomplicated and gently contoured, with limited topographical variation and no steep escarpments or underwater hazards. This relatively smooth bathymetric setting is consistent with a high-energy, soft-sediment coastal environment. Benthic mapping indicates the absence of major rocky reefs or submarine canyons within the proposed development footprint, although some reef outcrops exist around Green Cape and around the southern edges of Disaster Bay adjacent to Nadgee Nature Reserve. The uniformity of the bathymetric profile in Disaster Bay helps ensure predictable current patterns and wave energy dissipation. The depth profile also facilitates safe vessel access and mooring operations across a range of tide and weather conditions.

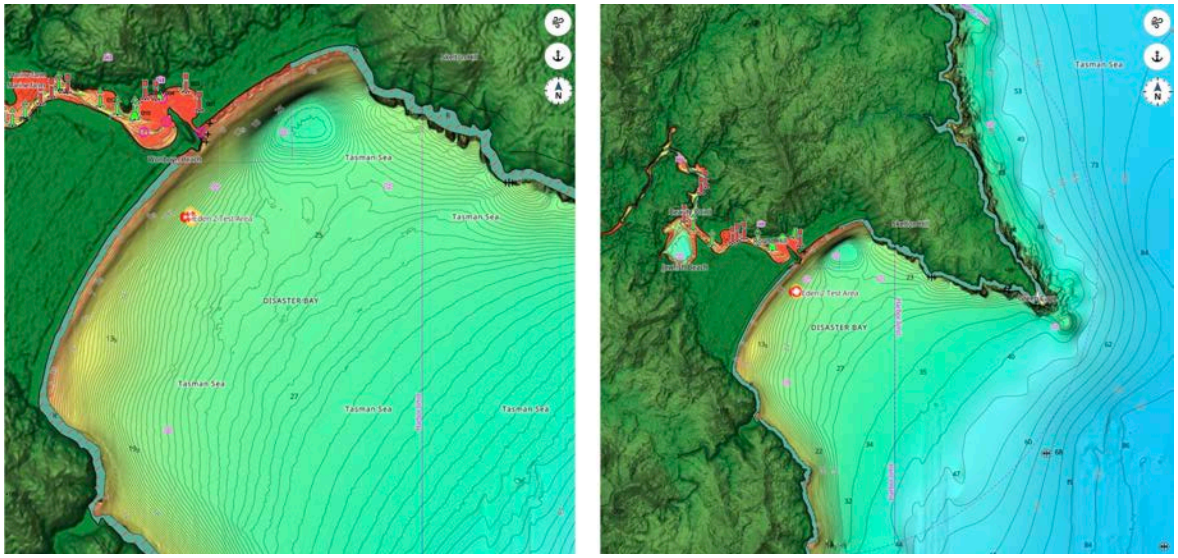

Figure 17 and 18: Bathymetry of Disaster Bay. (Source: Simrad, C-MAP Reveal™, June 2025).

7.3 Substrate Characteristics

The seafloor substrate within Disaster Bay is predominantly composed of soft sedimentary material, consistent with its classification as a high-energy, open-ocean embayment (Heap et al., 2001). This substrate is largely formed by wave and current action redistributing quartz-rich sands, silts, and finer sediments sourced from both fluvial and marine origins. Multiple benthic habitat mapping studies, including those conducted by the NSW Department of Primary Industries (NSW DPI, 2020), indicate that the dominant seafloor type in the proposed kelp aquaculture area comprises mobile, unconsolidated sand and sandy-mud, interspersed with occasional shell deposits. This classification was confirmed during seabed assessments and grab sampling conducted as part of regional seabed characterisation surveys (Jordan et al., 2010).

The absence of extensive rocky reef habitats or consolidated substrate within the lease footprint is significant from both a biological and infrastructure suitability standpoint. Soft sediment environments are typically low in structural complexity, supporting benthic invertebrate communities adapted to dynamic sediment conditions (Smith et al., 2008). This substrate type reduces the risk of interference with sensitive reef ecosystems or critical fish habitats (NSW DPI, 2020). Furthermore, soft sandy seafloors are favourable for the

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installation of screw anchors, which are planned for the kelp longline infrastructure, due to their ability to provide deep embedment and high pull-out resistance in fine sediment matrices (Burgess et al., 2017).

The substrate in Disaster Bay is also subject to periodic reworking due to strong southerly swells, especially during winter months, which contribute to a degree of seasonal variability in sediment composition and particle size distribution (Short & Woodroffe, 2009). However, the general stability of the mid-depth soft substrate zone (15–30 m) provides long-term consistency and low risk of erosion or scour. No seagrass meadows, reef platforms, or submerged cultural heritage structures have been recorded within the proposed lease area (Heritage NSW, 2022).

7.4 Hydrology

Disaster Bay exhibits hydrological conditions characteristic of a well-flushed, open ocean embayment. The bay is exposed to prevailing oceanic forces from the Tasman Sea, with limited terrestrial freshwater inputs, resulting in an environment dominated by marine hydrodynamics rather than estuarine or riverine influences. The principal drivers of circulation within Disaster Bay are tidal movements, wind-driven surface flows, and the broader influence of the East Australian Current (EAC). The East Australian Current flows southward along the east coast of Australia and often separates from the coastline in the vicinity of Eden, forming eddies and instabilities that influence circulation within the bay (Ridgway & Godfrey, 1997). These processes interact with seasonal wind regimes to generate a consistent clockwise circulation pattern within Disaster Bay. According to modelling presented in the "Coastal Processes and Climate Change" report prepared for Auskelp (BMT, 2023), ocean water typically enters the bay from the southern or southeastern boundary and exits along the northeastern margin. Current speeds reach 0.5 m/s and gradually decline to 0.1–0.3 m/s within the bay's central area.

The tidal regime is classified as semidiurnal and microtidal, with an average tidal range of 1.2 metres and up to 2.0 metres during spring tides. These moderate tides contribute to a steady exchange of water, maintaining high levels of dissolved oxygen and reducing the potential for thermal or nutrient stratification. Flushing time within Disaster Bay is estimated at between 1.5 and 2.5 days, which is relatively fast for a bay of its size and depth. This efficient turnover supports ecological resilience and disperses nutrients, sediments, and potential contaminants (Herzfeld et al., 2021).

The EAC also plays a significant seasonal role. During winter months, southerly winds and EAC separation promote upwelling of cooler, nutrient-rich waters from depth, supporting high marine productivity (Roughan & Middleton, 2002). These oceanographic processes contribute to a dynamic and biologically productive marine environment suitable for kelp aquaculture. Hydrodynamic nutrient modelling commissioned by Auskelp indicates that the proposed longline kelp farming infrastructure is unlikely to adversely affect natural circulation patterns. The infrastructure layout is designed with minimal obstruction—aligned parallel to prevailing currents and elevated above the seafloor to allow unimpeded water flow. This design ensures that the natural flushing characteristics and hydrological functions of the bay are not materially affected.

7.5 Tides

Disaster Bay is subject to a microtidal, semidiurnal tidal regime, typical of much of the southeastern coastline of New South Wales. The tidal cycle consists of two high tides and two low tides each lunar day, with generally modest amplitude. The average tidal range in Disaster Bay is approximately 1.2 metres, while spring tides can increase this range up to 2.0 metres (Manly Hydraulics Laboratory, 2021). Although the tidal range is relatively small compared to macrotidal systems elsewhere in Australia, it plays a crucial role in influencing local hydrodynamics, nutrient transport, and benthic ecology.

The tidal regime contributes to regular water exchange, supporting a well-oxygenated and biologically productive marine environment. This is particularly important for aquaculture operations, such as kelp farming, where water movement influences nutrient availability, waste dispersal, and kelp blade health. Despite the bay's modest tidal range, the tidal currents interact with wind-driven surface flows and oceanic influences, notably the East Australian Current (EAC), to create dynamic and variable local conditions. These interactions

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can amplify or dampen tidal flows, particularly near headlands or constricted passages at the bay's entrance.

Tidal asymmetry in Disaster Bay is minimal, with flood and ebb currents generally balanced, although some local variability can occur due to seabed features and coastal bathymetry. Modelling undertaken in support of the Eden-1 Kelp Aquaculture Project indicates that the tidal component of flow contributes approximately 20–30% of total water movement, with wind and EAC effects dominating the remainder (BMT, 2023). Nonetheless, this tidal component remains important in maintaining water column turnover and sediment resuspension on the seafloor. Long-term tide gauge data collected along the NSW south coast indicate no significant anomalies or disruptions in tidal patterns within Disaster Bay, supporting its suitability for marine infrastructure projects that rely on stable hydrodynamic regimes.

7.6 Wave Climate

Disaster Bay experiences a high-energy wave climate due to its exposed location on the far south coast of New South Wales. The dominant oceanic swells originate from the southern and southeastern quadrants, driven by systems in the Southern Ocean and Tasman Sea. These prevailing conditions contribute significantly to the hydrodynamic environment that defines the suitability of the bay for offshore kelp aquaculture.

The Eden Waverider Buoy, operated by the Manly Hydraulics Laboratory (MHL) and located approximately 25 km directly offshore from Disaster Bay, provides the most accurate local wave data for the region (see Figure 19 for buoy location). According to MHL data collected from 2011 to mid-2024 (with over 12 years and 92,565 hourly records), significant wave heights (Hs) in the area predominantly range from 1.5 to 3.0 metres, with the majority of wave energy arriving from the south to south-southeast (see Figure 20). The seasonal variation is marked, with higher average wave heights during winter and spring, and calmer conditions in summer and autumn.

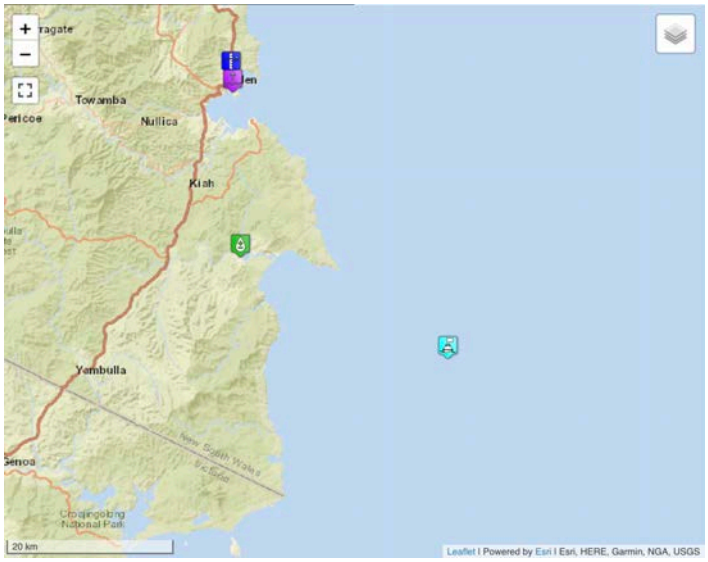

Figure 19: Eden Waverider buoy location in light blue, June 2025 (Source: Manly Hydraulics Laboratory).

The wave peak spectral period—a measure of the dominant wave energy frequency—ranges from 8.6 to 10.2 seconds, with a maximum recorded value of 19.8 seconds. These long-period swells, especially those from southern storm systems and occasional East Coast Lows, contribute the greatest energy loads and present the most significant design challenges for offshore infrastructure. Wave directionality, as shown in the MHL rose plots (Figure 21), is strongly concentrated from the S and SSE throughout most of the year, though summer records indicate a broader directional spread including NNE to SSW wave sources. This broadening is typically associated with localised wind-wave generation during periods of lighter and variable wind conditions.

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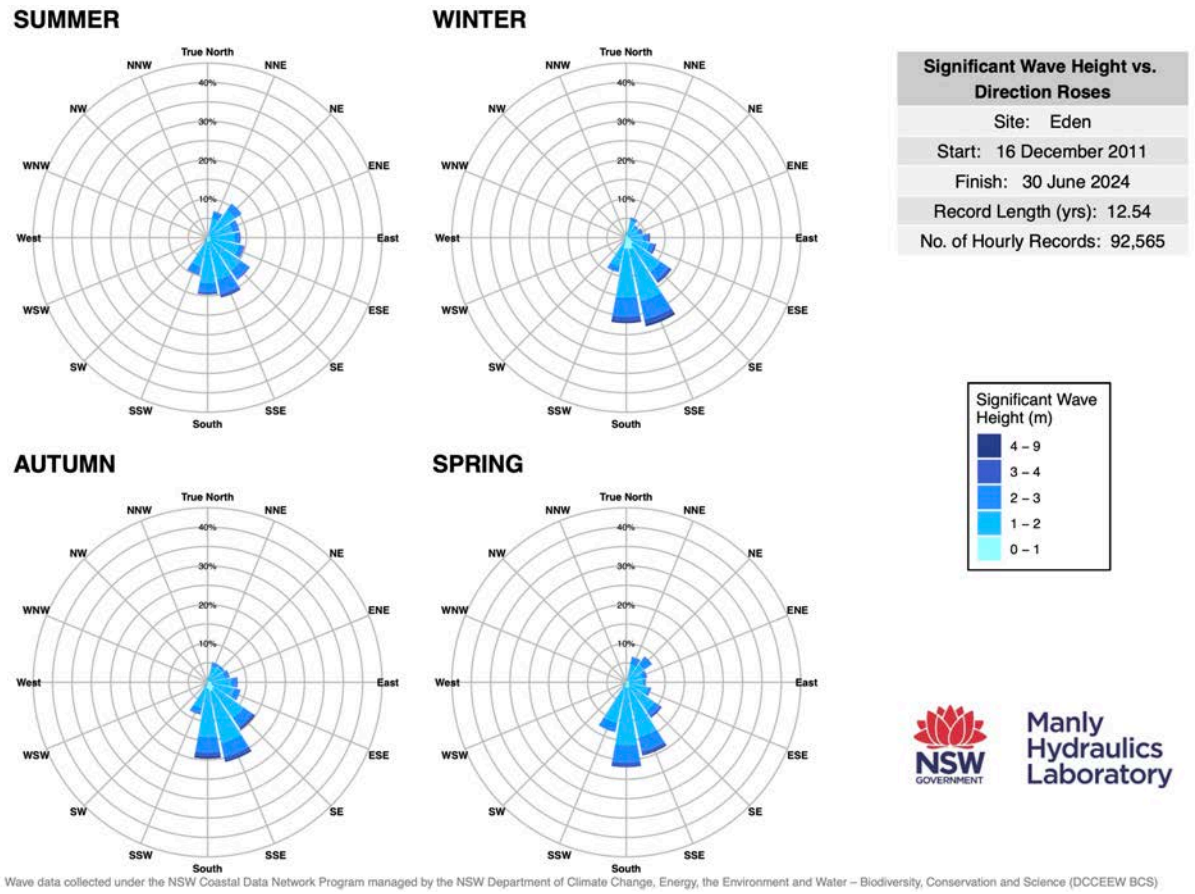

Figure 20: Significant Wave Height vs. Direction Roses from Eden Waverider Buoy 2011-2024 (Source: NSW Government, Manly Hydraulics Laboratory).

The percentage exceedance table (Table 1) reveals that waves over 1.5 m occur more than 50% of the time annually, while waves exceeding 3.0 m occur in roughly 4% of hourly observations. The maximum wave height recorded during the period of observation was 8.49 m (MHL, 2024). These metrics align with the exceedance probability curve shown in Figure 21, illustrating the frequency of higher wave events relevant to risk and resilience planning for kelp infrastructure. While the Eden Waverider Buoy reflects the offshore wave climate, average swell heights within Disaster Bay are generally lower due to the natural sheltering effects of Nadgee Headland to the south and Green Cape to the north. Nonetheless, severe events, especially from easterly-originating East Coast Lows, can penetrate the embayment and are considered the most likely extreme wave scenarios to impact kelp farming infrastructure

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NSW GOVERNMENT Manly Hydraulics Laboratory

Significant Wave Height Statistics

Site Name: EDEN
Site Code: EDENOW

Nominated Start/Finish: 08-February-1978 to 30-June-2024, Record Length: 46.39 years

Creation Date: 26-November-2024

Percentage Exceedance for Hsig (m)

	Monthly Exceedance Probability												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Hsig (m)													
0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	**100.000**
0.50	99.95	99.90	99.93	99.86	99.58	99.83	99.83	99.79	99.80	99.89	99.94	99.94	**99.853**
1.00	93.47	94.46	93.44	89.55	87.02	87.31	86.53	86.50	90.72	88.99	90.63	90.05	**89.844**
1.50	55.93	56.56	54.13	52.77	52.40	53.75	50.98	46.60	52.66	51.80	51.34	49.01	**52.331**
2.00	19.86	20.85	21.50	22.60	24.11	27.64	24.83	20.64	22.20	22.09	19.52	19.23	**22.167**
2.50	5.21	7.43	8.71	9.36	10.35	14.66	11.60	8.99	8.87	9.35	7.64	6.96	**9.158**
3.00	1.64	2.50	3.92	4.45	4.47	8.15	5.61	3.92	3.30	4.26	3.25	2.55	**4.046**
3.50	0.54	0.98	2.13	1.82	2.08	4.84	2.96	1.98	1.13	1.90	1.54	1.15	**1.951**
4.00	0.27	0.48	1.31	0.93	1.11	2.51	1.59	0.97	0.34	0.99	0.70	0.53	**0.993**
4.50	0.18	0.26	0.77	0.42	0.53	1.27	0.87	0.47	0.21	0.56	0.29	0.16	**0.506**
5.00	0.11	0.09	0.42	0.14	0.29	0.64	0.39	0.19	0.14	0.20	0.09	0.04	**0.231**
5.50	0.03	0.02	0.13	0.02	0.16	0.33	0.11	0.08	0.08	0.09	0.00	0.01	**0.091**
6.00	0.00	0.00	0.05	0.00	0.05	0.13	0.02	0.02	0.04	0.03	0.00	0.00	**0.028**
6.50	0.00	0.00	0.02	0.00	0.01	0.06	0.00	0.00	0.02	0.00	0.00	0.00	**0.010**
7.00	0.00	0.00	0.01	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	**0.006**
7.50	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	**0.003**
8.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	**0.001**
8.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.000**
Monthly Statistics													
Minimum	0.37	0.38	0.38	0.29	0.29	0.38	0.29	0.29	0.29	0.38	0.38	0.38	**0.29**
Average	1.64	1.67	1.68	1.66	1.66	1.76	1.68	1.60	1.65	1.65	1.63	1.60	**1.66**
Maximum	5.88	5.98	8.06	5.68	7.31	8.49	6.70	6.14	7.15	6.35	5.73	5.56	**8.49**
Number of Data Points Used for Statistical Analysis													
No. Points	24,591	23,023	24,029	24,498	27,060	26,316	25,706	25,925	23,419	26,506	25,906	25,711	**302,690**
Percent Capture Based on Nominated Start/Finish													
% Capture	80.90	83.14	78.70	83.25	87.72	84.68	82.47	85.12	81.38	87.78	86.73	81.22	**83.59**

Wave data collected under the NSW Coastal Data Network Program managed by the NSW Department of Climate Change, Energy, the Environment and Water – Biodiversity, Conservation and Science (DCCEEW BCS)

Figure 21. Percentage exceedance of significant wave heights Eden Waverider Buoy 1978 – 2024 (Source: NSW Government, Manly Hydraulics).

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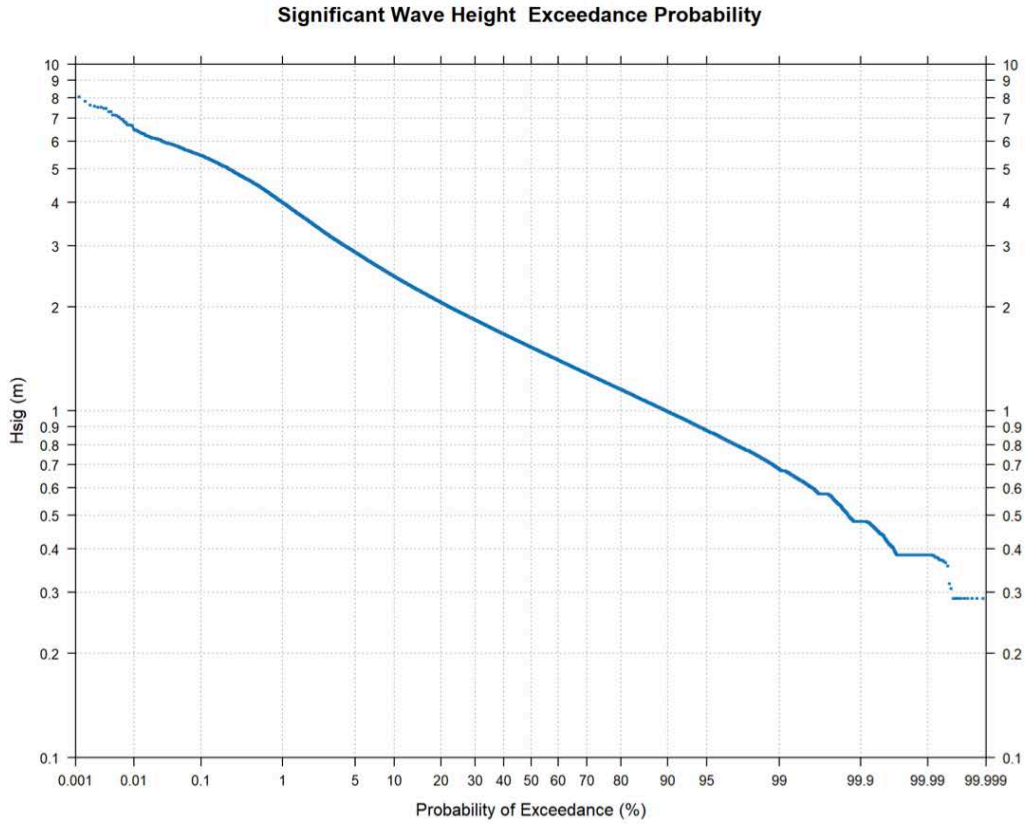
Manly Hydraulics Laboratory

Significant Wave Height Exceedance Statistics

Site Name: EDEN
Site Code: EDENOW

Nominated Start/Finish: 08-February-1978 to 30-June-2024
Record Length: 46.39 years
No. of Records: 302,690
Data Capture: 83.59 %

Creation Date: 26-November-2024



Wave data collected under the NSW Coastal Data Network Program managed by the NSW Department of Climate Change, Energy, the Environment and Water – Biodiversity, Conservation and Science (DCCEEW BCS)

Figure 22: Significant Wave Heights Exceedance Probability Manly Hydraulics Eden Waverider Buoy 1978 – 2024 (Source: NSW Government, Manly Hydraulics).

7.7 Water Quality Characteristics

Disaster Bay, located on the far south coast of New South Wales, is widely regarded as one of the most pristine marine environments in the region. Its remoteness, absence of significant human settlements or industrial activities, and the lack of estuarine or riverine discharge into the bay contribute to consistently high water quality. The surrounding land is predominantly protected by the Beowa National Park to the north and the Nadgee Nature Reserve to the south, which further minimises catchment impacts and reduces the likelihood of nutrient or sediment runoff entering the marine system.

Routine ocean monitoring conducted by the NSW Department of Planning and Environment and reference studies from nearby regions suggest that levels of nutrients such as nitrates, phosphates, and ammonia in the open ocean waters of Disaster Bay are low and well within ecological guideline limits (NSW DPIE, 2023). No

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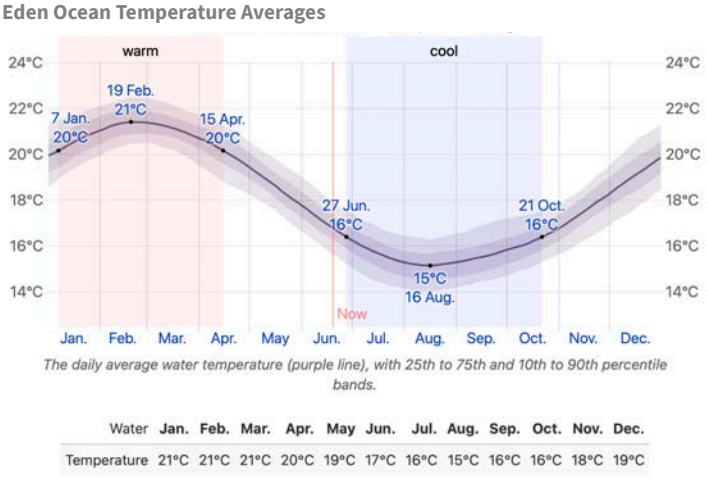
major point-source discharges, agricultural runoff, or wastewater outflows exist in the catchment area. This reduces the risk of eutrophication or harmful algal blooms, which are more commonly associated with enriched or semi-enclosed coastal systems with high runoff or pollution input areas. The oceanic waters of Disaster Bay are classified as oligotrophic to mesotrophic, meaning nutrient levels are low to moderate, providing optimal conditions for native kelp species such as *Ecklonia radiata*. High water clarity, strong oceanic exchange, and consistent flushing by prevailing currents help maintain dissolved oxygen levels and suppress the accumulation of organic waste materials. Additionally, the exposed nature of the bay and its open coastline orientation allow for high levels of water circulation, particularly during the prevailing southeast swells. This natural hydrodynamic activity aids in dispersing biological material and contributes to water column mixing, supporting a stable marine environment.

Upwelling is a significant oceanographic process influencing the ecology of Disaster Bay. In this region, upwelling occurs primarily due to the separation of the East Australian Current (EAC) from the coast near Eden and Green Cape during autumn and winter months. This separation, in combination with southerly wind patterns, facilitates the rise of cold, nutrient-rich waters from deeper layers of the ocean to the surface—a process known as Ekman transport (Ridgway & Godfrey, 1997; Oke & Griffin, 2001). These seasonal upwelling events enhance primary productivity by supplying essential nutrients such as nitrates and phosphates to the surface waters, supporting robust kelp and phytoplankton growth (Roughan & Middleton, 2002).

Disaster Bay is also subject to a clockwise current system that brings in oceanic water from the southeast and discharges towards the northeast near Green Cape (BMT, 2023). This current pattern supports both horizontal and vertical water exchange and contributes to the bay's rapid flushing time of approximately 1.5 to 2.5 days. The lack of internal topographic obstructions and the bay's smooth, sloping bathymetry further promote efficient water circulation. Wind-driven upwelling, particularly during persistent southerly winds, acts synergistically with this circular flow to enhance nutrient turnover in the upper water column (Herzfeld et al., 2021).

7.8 Ocean Temperature

Disaster Bay, situated on the far south coast of New South Wales, experiences a sea surface temperature (SST) regime that is influenced by both seasonal cycles and broader oceanographic processes, notably the East Australian Current (EAC) and local upwelling. SSTs in this region generally range from 14-16°C in winter (July–August) to 21-22°C in summer (January–February), with interannual variability driven by wind patterns, upwelling intensity, and climate anomalies such as El Niño and marine heatwaves (Ridgway & Hill, 2009; Suthers et al., 2011).



Water	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Temperature	21°C	21°C	21°C	20°C	19°C	17°C	16°C	15°C	16°C	16°C	18°C	19°C

Figure 23: Wide-area average ocean surface temperature, Eden NSW (Source: Weatherspark.com).

This southern section of the NSW coastline occasionally benefits from cold-water upwelling, particularly during strong northeasterly winds in summer. These upwelling events introduce cooler, nutrient-rich waters into the euphotic zone, enhancing productivity and supporting the growth of macroalgae such as *Ecklonia*

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radiata (Roughan et al., 2003; Baird et al., 2006). However, long-term satellite data and in situ observations indicate a warming trend in SSTs across southeastern Australia, with increases of approximately 2°C over the past century, largely attributed to the poleward intensification and extension of the EAC (Oliver et al., 2014; Wu et al., 2012). This warming presents both risks and opportunities for kelp aquaculture. While *Ecklonia radiata* has adapted to local conditions, it is considered vulnerable to elevated SSTs above 24°C, especially if sustained over long periods (Wernberg et al., 2011). Fortunately, Disaster Bay's southern latitude and exposure to ocean mixing make it more resilient to temperature extremes than areas to the north, and modelling by the Marine Biodiversity Hub suggests this region will remain climatically suitable for temperate kelp farming under medium-range climate scenarios (Johnson et al., 2020).

7.9 Benthic Habitats

Disaster Bay, located on the far south coast of New South Wales, encompasses various benthic habitats that support a diverse array of marine flora and fauna. These habitats are shaped by a combination of geomorphological, oceanographic, and ecological processes, and are of critical importance to the structure and function of the region's coastal marine ecosystems. The bay's benthic environment is dominated by soft sediment substrates, including fine sands, muddy sands, and gravelly areas. These sediments are typically deposited in the deeper subtidal zones (>20 m), where reduced hydrodynamic energy allows for fine particle settlement (Heap et al., 2001; Jordan et al., 2010). These soft-bottom habitats support a range of infaunal communities such as polychaetes, bivalves, amphipods, and echinoderms, many of which play key roles in nutrient cycling and sediment bioturbation (Thrush & Dayton, 2002).

In addition to soft sediments, rocky reef outcrops and consolidated substrates occur sporadically around the perimeter of the bay, particularly near the edges of the Greencape to the north and Nadgee headlands to the south. These hard-bottom habitats, generally within 200 m of the coastline are colonised by macroalgal assemblages, including species of red, green, and brown algae, with *Ecklonia radiata* (common kelp) forming important subtidal forests in the shallower reef areas (Connell & Irving, 2008). These kelp-dominated reefs serve as critical nursery grounds and foraging habitats for commercially and ecologically important species, including morwong, snapper, lobsters and abalone (Coleman et al., 2013). Notably, benthic biodiversity in Disaster Bay remains relatively intact, largely due to its remoteness, low coastal urbanisation, and limited historical bottom trawling compared to other parts of the NSW coast (NSW DPI, 2020). Benthic habitat mapping conducted through seabed imagery and acoustic sonar data as part of national benthic mapping programs confirms a low level of anthropogenic degradation, particularly in comparison to estuarine and nearshore habitats to the north (Geoscience Australia, 2012). The benthic environment within the proposed Kelp Aquaculture Farm is characterised as unconsolidated fine sediments and lacks reef structures or other sensitive benthic habitat features, including seagrass, corals, rocky substrates, kelp assemblages, or sponge gardens; baseline surveys also indicate low abundance and diversity of demersal fish and benthic fauna such as starfish, consistent with a mobile, low-complexity sandy seabed.

7.10 Flora and Fauna

Based on current biodiversity records, analysis from the NSW BioNet Atlas, and local recordings and experience, the Disaster Bay region and the surrounding locality of Wonboyn Lake contain a wide variety of terrestrial and marine flora and fauna. Within Disaster Bay itself, 83 listed fauna species are likely to occur, including threatened and protected species under the Biodiversity Conservation Act 2016 and the Environment Protection and Biodiversity Conservation Act 1999.

A summary of findings for ocean lease area AL21/004 located in Disaster Bay NSW is as follows:

World & National Heritage

- World Heritage Properties: None
- National Heritage Places: None
- Commonwealth Heritage Places: None
- Commonwealth Lands: None

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Marine & Species Listings

- Listed Marine Species: 66
- Whales and Other Cetaceans: 12
- Listed Threatened Species: 42
- Listed Migratory Species: 41
- Habitat Critical to the Survival of Marine Turtles: None

Conservation Areas

- Wetlands of International Importance (Ramsar): None
- Critical Habitats: None
- Commonwealth Marine Area: None
- Australian Marine Parks: None
- Commonwealth Reserves (Terrestrial): None
- Listed Threatened Ecological Communities: None
- Great Barrier Reef Marine Park: None
- State and Territory Reserves: None
- Nationally Important Wetlands: None
- Regional Forest Agreements: None
- EPBC Act Referrals in area: None
- Key Ecological Features: 1 (Upwelling East of Eden)
- Biologically Important Areas: 8
- Bioregional Assessments: None
- Geological and Bioregional Assessments: None

7.11 Protected and Threatened Species, Populations and Communities (State Legislation)

State legislation relevant to protected and threatened species, populations, and ecological communities includes the Biodiversity Conservation Act 2016 (BC Act), which replaced the former Threatened Species Conservation Act 1995 (TSC Act). Under the BC Act, all listed threatened terrestrial and some marine species are protected, while fish and marine vegetation remain regulated under the Fisheries Management Act 1994 (FM Act).

A targeted search of the NSW BioNet Atlas of Wildlife (see Figure 24 for actual search area) and the NSW Department of Primary Industries (DPI) Threatened and Protected Species Listings was undertaken to identify threatened species, populations, and ecological communities listed under the relevant schedules of the BC Act and FM Act that are likely or predicted to occur within the study region.

The search was conducted on 21 June 2025 and included records for marine fish, marine mammals, marine reptiles, marine algae/vegetation, mammals, marine invertebrates, and seabirds. A total of 619 species were recorded across the broader search area, of which 38 species are likely or may be associated with the AL21/004 lease area in Disaster Bay and its adjacent marine environment.

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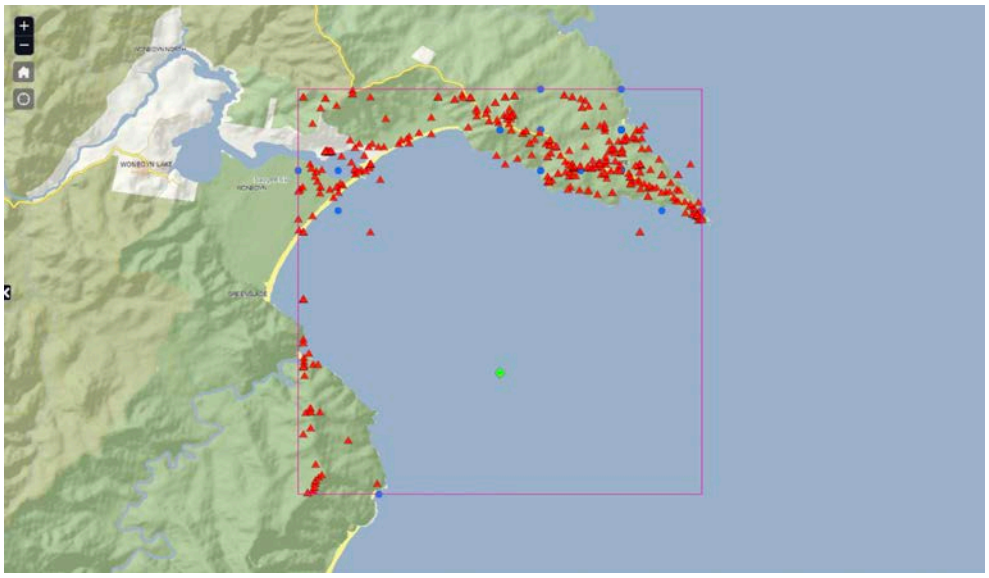

Figure 24. Atlas of NSW Wildlife – BioNet, NSW Government June 2025 (Source Bionet).

The query was conducted using the BioNet Map Search Tool, focusing on the marine and coastal region surrounding the proposed Eden-1 Kelp Aquaculture Farm in Disaster Bay, New South Wales. This area is situated offshore and does not encompass terrestrial habitats or upland ecosystems. In the absence of fine-scale ecological filtering for specific habitat use within the lease boundaries, the following list adopts a precautionary approach, including all species known to occur within the offshore mapped search area. The resulting list includes marine mammals such as whales and dolphins, seabirds such as shearwaters, albatrosses, and penguins, as well as coastal and reef-associated fish species, many of which are listed under NSW or Commonwealth threatened species legislation as vulnerable, endangered, or protected. This conservative approach ensures that all relevant species potentially interacting with the offshore marine environment of the Kelp Aquaculture Farm are evaluated. It is considered that excluding land-based species is appropriate for offshore aquaculture operations.

Affected Species

The listed species possibly interacting with the AL21/004 lease area is as follows [Common Name – Scientific Name – Species – If Migratory – FM/TSC Status (CE = Critically Endangered, E = Endangered, P = Protected, V = Vulnerable):

Endangered Species (3):

- Gould's Petrel – *Pterodroma leucoptera*, Bird, Migratory: Yes, FM/TSC Status: E,P
- Southern Right Whale – *Eubalaena australis*, Mammal, Migratory: Yes, FM/TSC Status: E,P
- Blue Whale – *Balaenoptera musculus*, Mammal, Migratory: Yes, FM/TSC Status: E,P

Vulnerable Species (12):

- Sooty Oystercatcher – *Haematopus fuliginosus*, Bird, Migratory: No, FM/TSC Status: V,P
- Shy Albatross – *Thalassarche cauta*, Bird, Migratory: Yes, FM/TSC Status: V,P
- Black-browed Albatross – *Thalassarche melanophris*, Bird, Migratory: Yes, FM/TSC Status: V,P
- Flesh-footed Shearwater – *Ardenna carneipes*, Bird, Migratory: Yes, FM/TSC Status: V,P
- White-chinned Petrel – *Procellaria aequinoctialis*, Bird, Migratory: Yes, FM/TSC Status: V,P
- Humpback Whale – *Megaptera novaeangliae*, Mammal, Migratory: Yes, FM/TSC Status: V,P
- Sperm Whale – *Physeter macrocephalus*, Mammal, Migratory: Yes, FM/TSC Status: V,P
- Sei Whale – *Balaenoptera borealis*, Mammal, Migratory: Yes, FM/TSC Status: V,P
- Fin Whale – *Balaenoptera physalus*, Mammal, Migratory: Yes, FM/TSC Status: V,P
- Australian Humpback Dolphin – *Sousa sahulensis*, Mammal, Migratory: No, FM/TSC Status: V,P

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- Eastern Blue Devil – *Paraplesiops bleekeri*, Fish, Migratory: No, FM/TSC Status: V,P
- Black Rockcod – *Epinephelus daemelii*, Fish, Migratory: No, FM/TSC Status: V,P

Protected Species (23):

- Eastern Spinebill – *Acanthorhynchus tenuirostris*, Bird, Migratory: No, FM/TSC Status: P
- Short-tailed Shearwater – *Ardenna tenuirostris*, Bird, Migratory: No, FM/TSC Status: P
- Double-banded Plover – *Charadrius bicinctus*, Bird, Migratory: No, FM/TSC Status: P
- Pacific Gull – *Larus pacificus*, Bird, Migratory: No, FM/TSC Status: P
- White-bellied Sea-Eagle – *Haliaeetus leucogaster*, Bird, Migratory: Yes, FM/TSC Status: P
- Little Penguin – *Eudyptula minor*, Bird, Migratory: No, FM/TSC Status: P
- Australian Fur-seal – *Arctocephalus pusillus doriferus*, Mammal, Migratory: No, FM/TSC Status: P
- Crested Tern – *Thalasseus bergii*, Bird, Migratory: No, FM/TSC Status: P
- Silver Gull – *Chroicocephalus novaehollandiae*, Bird, Migratory: No, FM/TSC Status: P
- Australasian Gannet – *Morus serrator*, Bird, Migratory: No, FM/TSC Status: P
- Wedge-tailed Shearwater – *Ardenna pacifica*, Bird, Migratory: Yes, FM/TSC Status: P
- Little Shearwater – *Puffinus assimilis*, Bird, Migratory: Yes, FM/TSC Status: P
- Fairy Prion – *Pachyptila turtur*, Bird, Migratory: Yes, FM/TSC Status: P
- White-faced Storm-Petrel – *Pelagodroma marina*, Bird, Migratory: Yes, FM/TSC Status: P
- Short-beaked Common Dolphin – *Delphinus delphis*, Mammal, Migratory: No, FM/TSC Status: P
- Common Bottlenose Dolphin – *Tursiops truncatus*, Mammal, Migratory: No, FM/TSC Status: P
- Dwarf Minke Whale – *Balaenoptera acutorostrata*, Mammal, Migratory: Yes, FM/TSC Status: P
- Orca (Killer Whale) – *Orcinus orca*, Mammal, Migratory: No, FM/TSC Status: P
- Ocean Sunfish – *Mola mola*, Fish, Migratory: Yes, FM/TSC Status: P
- Blue Groper (Eastern) – *Achoerodus viridis*, Fish, Migratory: No, FM/TSC Status: P
- Eastern Kelpfish – *Chironemus marmoratus*, Fish, Migratory: No, FM/TSC Status: P
- Rock Flathead – *Platycephalus laevigatus*, Fish, Migratory: No, FM/TSC Status: P
- Australian Anchovy – *Engraulis australis*, Fish, Migratory: No, FM/TSC Status: P

7.12 Matters of National Environmental Significance (Commonwealth Legislation)

The proposed Kelp Aquaculture Farm designated AL21/004 is assessed with reference to the Environment Protection Biodiversity Conservation Act 1999 (EPBC Act) and according to the EPBC Act Policy Statement 1.1 (Significant Impacts Guideline 1.1) in conjunction with EPBC Act Policy Statement 2.2 (Offshore Aquaculture). The EPBC Act Protected Matters Search Tool (Web Reference 9) generated a summary of matters of National Environmental Significance (NES) which may relate to or occur in the area of the proposed Commercial Kelp Aquaculture Farms. The Protected Matters Search Tool was consulted on 23 May 2025 using the 'Report by Coordinates' option. The search results (See Appendix A7 and A13) included a range of marine, intertidal and terrestrial fish, bird, mammal, reptile species which are listed under the following classifications:

Critically Endangered:

- Curlew Sandpiper (*Calidris ferruginea*), Bird – Migratory
- Eastern Curlew (*Numenius madagascariensis*), Bird – Migratory
- Grey Nurse Shark (east coast population) (*Carcharias taurus*), Shark

Endangered Species:

- Blue Whale (*Balaenoptera musculus*), Mammal – Migratory
- Chatham Albatross (*Thalassarche eremita*), Bird – Migratory
- Gould's Petrel (*Pterodroma leucoptera leucoptera*), Bird

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- Leatherback Turtle (*Dermochelys coriacea*), Reptile – Migratory
- Loggerhead Turtle (*Caretta caretta*), Reptile – Migratory
- Northern Royal Albatross (*Diomedea sanfordi*), Bird – Migratory
- Nunivak Bar-tailed Godwit (*Limosa lapponica baueri*), Bird
- Shy Albatross (*Thalassarche cauta*), Bird – Migratory
- Southern Giant-Petrel (*Macronectes giganteus*), Bird – Migratory
- Southern Right Whale (*Eubalaena australis*), Mammal – Migratory

Vulnerable Species:

- Albatross (*Diomedea antipodensis*), Bird – Migratory
- Australian Fairy Tern (*Sternula nereis nereis*), Bird – Migratory
- Australian Grayling (*Prototroctes maraena*), Fish
- Black-browed Albatross (*Thalassarche melanophris*), Bird – Migratory
- Black Rockcod (*Epinephelus daemeli*), Fish
- Blue Petrel (*Halobaena caerulea*), Bird
- Buller's Albatross (*Thalassarche bulleri*), Bird – Migratory
- Campbell Albatross (*Thalassarche impavida*), Bird – Migratory
- Eastern Hooded Plover (*Thinornis cucullatus cucullatus*), Bird
- Fairy Prion (southern) (*Pachyptila turtur subantarctica*), Bird
- Gibson's Albatross (*Diomedea antipodensis gibsoni*), Bird – Migratory
- Great White Shark (*Carcharodon carcharias*), Shark – Migratory
- Green Turtle (*Chelonia mydas*), Reptile – Migratory
- Hawksbill Turtle (*Eretmochelys imbricata*), Reptile – Migratory
- Indian Yellow-nosed Albatross (*Thalassarche carteri*), Bird – Migratory
- Little Tern (*Sternula albifrons*), Bird – Migratory
- Northern Buller's Albatross (*Thalassarche bulleri platei*), Bird – Migratory
- Northern Giant Petrel (*Macronectes halli*), Bird – Migratory
- Red Knot (*Calidris canutus*), Bird – Migratory
- Salvin's Albatross (*Thalassarche salvini*), Bird – Migratory
- Sharp-tailed Sandpiper (*Calidris acuminata*), Bird – Migratory
- Sooty Shearwater (*Ardenna grisea*), Bird – Migratory
- Southern Royal Albatross (*Diomedea epomophora*), Bird – Migratory
- Wandering Albatross (*Diomedea exulans*), Bird – Migratory
- Whale Shark (*Rhincodon typus*), Shark – Migratory
- White-bellied Storm-Petrel (*Fregetta grallaria grallaria*), Bird
- White-capped Albatross (*Thalassarche steadi*), Bird – Migratory

Conservation Dependent Species:

- *Galeorhinus galeus* – School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark – Shark
- *Seriolella brama* – Blue Warehou – Fish

While sea snakes are occasionally found in warmer tropical waters of northern Australia, they are highly unlikely to inhabit or occur in the temperate waters of southern New South Wales. In addition, no kelps or seaweeds are currently listed as endangered or vulnerable in the Disaster Bay region.

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7.13 EPBC – Not A Controlled Action

In May 2025, Auskelp Pty Ltd submitted a comprehensive referral to the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The referral sought to determine whether the proposed Eden-1 Kelp Aquaculture Farm constituted a controlled action due to potential interactions with Matters of National Environmental Significance (MNES), including listed threatened species and migratory marine fauna such as whales, seals, turtles, fish, and seabirds. The submission included detailed information on project design, infrastructure layout, environmental safeguards, marine biodiversity assessments, side-scan sonar surveys, operational protocols, and entanglement risk assessments, supported by scientific studies, desktop analyses, and Auskelp's own operational testing programs.

Following its assessment on 20 June 2025, DCCEEW issued a formal determination confirming that the Eden-1 Kelp Aquaculture Farm is not a controlled action (EPBC 2025/10149) under Section 75 of the EPBC Act. This decision means the Project is not likely to have a significant impact on any MNES and no additional Commonwealth approval conditions are required. The decision applies specifically to matters regulated under the EPBC Act and does not replace or remove the requirement for Auskelp to obtain all relevant NSW State approvals, licences, and permits.

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7.14 Threatened and Protected Species List

Table 11. Threatened and Protected Species Listed Under the TSC Act (1995), FM Act (1994) and EPBC Act (1999) for Disaster Bay region.

P = Protected V = Vulnerable, E = Endangered, CE = Critically Endangered, C = Conservation

Latin Name(s)	Common Name(s)	FM Act/TSC Listing	EPBC Listing			
			Status	Migratory Species	Listed Marine Species	Cetacean
Birds						
14 Albatross						
Diomedea antipodensis	Antipodean Albatross		V	✓	✓	
Diomedea antipodensis	Gibson's Albatross		V		✓	
Diomedea epomophora	Southern Royal Albatross		V	✓	✓	
Diomedea exulans	Wandering Albatross		V	✓	✓	
Diomedea sanfordi	Northern Royal Albatross		E	✓	✓	
Thalassarche bulleri	Buller's Albatross, Pacific Albatross		V	✓	✓	
Thalassarche bulleri	Northern Buller's Albatross, Pacific Albatross		V		✓	
Thalassarche carteri	Indian Yellow-nosed Albatross		V	✓	✓	
Thalassarche cauta	Shy Albatross	V	E	✓	✓	
Thalassarche eremita	Chatham Albatross		E	✓	✓	
Thalassarche impavida	Campbell Albatross, Campbell Black-browed Albatross		V	✓	✓	
Thalassarche melanophris	Black-browed Albatross	V	V	✓	✓	
Thalassarche salvini	Salvin's Albatross		V	✓	✓	
Thalassarche steadi	White-capped Albatross		V	✓	✓	
11 Petrels and Shearwaters						
Ardenna carneipes	Flesh-footed Shearwater, Fleshy-footed Shearwater	V	V	✓	✓	
Ardenna grisea	Sooty Shearwater		V	✓	✓	
Ardenna pacifica	Wedged-tailed Shearwater	P				
Ardenna tenuirostris	Short-tailed Shearwater	P				
Halobaena caerulea	Blue Petrel		V		✓	
Macronectes giganteus	Southern Giant-Petrel, Southern Giant Petrel		E	✓	✓	
Macronectes halli	Northern Giant-Petrel		V	✓	✓	
Procellaria aequinoctialis	White-chinned Petrel	V				
Pterodroma cervicalis	White-necked Petrel				✓	
Pterodroma leucoptera	Gould's Petrel, Australian Gould's Petrel	E	E			
Puffinus assimilis	Little Shearwater	P				

Table 4 Continued. Threatened and Protected Species Listed Under the TSC Act (1995), FM Act (1994) and EPBC Act (1999) for Disaster Bay region.

P = Protected V = Vulnerable, E = Endangered, CE = Critically Endangered, C = Conservation

Latin Name(s)	Common Name(s)	FM Act/TSC Listing	EPBC Listing			
			Status	Migratory Species	Listed Marine Species	Cetacean
Birds						
2 Stormpetrels						
Fregetta grallaria grallaria	White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel		V			
Pelagodroma marina	White-bellied Faced Storm-Petrel	P				
6 Gulls and Terns						
Chroicocephalus novaehollandiae	Silver Gull	P				
Larus pacificus	Pacific Gull	P				
Sterna albifrons	Little Tern		V	✓	✓	
Sterna striata	White-fronted Tern				✓	
Sternula nereis nereis	Fairy Tern		V			
Thalasseus bergii	Crested Tern	P	V			
Birds of Prey						
Haliaeetus leucogaster	White-bellied Sea-Eagle	P				
10 Shorebirds						
Actitis hypoleucos	Common Sandpiper			✓	✓	
Calidris acuminata	Sharp-tailed Sandpiper		V	✓	✓	
Calidris canutus	Red Knot, Knot		V	✓	✓	
Calidris ferruginea	Curlew Sandpiper		CE	✓	✓	
Calidris melanotos	Pectoral Sandpiper			✓	✓	
Charadrius bicinctus	Double-banded Plover	P				
Thinornis cucullatus cucullatus	Eastern Hooded Plover, Hooded Dotterel		V		✓	
Numenius	Eastern Curlew		CE	✓	✓	
Limosa lapponica baueri	Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit		E	✓		
Haematopus fuliginosus	Sooty Oystercatcher	V				
4 Sea Birds						
Morus serrator	Australiasian Gannet	P				
Pachyptila turtur subantarctica	Fairy Prion (southern)		V			
Pachyptila turtur	Fairy Prion	P			✓	
Stercorarius antarcticus	Brown Skua				✓	

Table 4 Continued. Threatened and Protected Species Listed Under the TSC Act (1995), FM Act (1994) and EPBC Act (1999) for Disaster Bay region.

P = Protected V = Vulnerable, E = Endangered, CE = Critically Endangered, C = Conservation

Latin Name(s)	Common Name(s)	FM Act/TSC Listing	EPBC Listing			
			Status	Migratory Species	Listed Marine Species	Cetacean
Birds						
Bushland Bird						
Acanthorhynchus tenuirostris	Eastern Spinebill	P				
Swifts						
Apus pacificus	Fork-tailed Swift			✓	✓	
Penguins						
Eudyptula minor	Little Penguin	P				
Fish						
8 Marine Fish						
Achoerodus viridis	Eastern Blue Groper	P	V			
Chironemus marmoratus	Eastern Kelp Fish	P	V			
Engraulis australis	Australian Anchovy	P	V			
Epinephelus daemelii	Black Rockcod	V	V			
Mola mola	Ocean Sunfish	P				
Platycephalus laevigatus	Rock Flathead	P				
Paraplesiops bleekeri	Eastern Blue Devil	V				
Seriolella brama	Blue Warehou		C			
Diadromous Fish						
Prototroctes maraena	Australian Grayling		V			
All Syngnathiformes						
6 Seahorses including						
Hippocampus	Bigbelly Seahorse, Eastern or New Zealand Potbelly Seahorse				✓	
Hippocampus breviceps	Short-head Seahorse, Short-snouted Seahorse				✓	
Hippocampus minotaur	Bullneck Seahorse				✓	
19 Pipefish including						
Heraldia nocturna	Upside-down Pipefish				✓	
Histiogamphelus briggsii	Crested Pipefish, Briggs' Crested Pipefish, Briggs'				✓	
Histiogamphelus	Rhino Pipefish, Macleay's Crested Pipefish				✓	

Table 4 Continued. Threatened and Protected Species Listed Under the TSC Act (1995), FM Act (1994) and EPBC Act (1999) for Disaster Bay region.

P = Protected V = Vulnerable, E = Endangered, CE = Critically Endangered, C = Conservation

Latin Name(s)	Common Name(s)	FM Act/TSC Listing	EPBC Listing			
			Status	Migratory Species	Listed Marine Species	Cetacean
Birds						
Hypselognathus	Knifesnout Pipefish, Knife-snouted Pipefish				✓	
Kaupus costatus	Deepbody Pipefish, Deep-bodied Pipefish				✓	
Kimblaeus bassensis	Trawl Pipefish, Bass Strait Pipefish				✓	
Leptoichthys fistularius	Brushtail Pipefish				✓	
Lissocampus runa	Javelin Pipefish				✓	
Maroubra perserrata	Sawtooth Pipefish				✓	
Mitotichthys semistriatus	Halfbanded Pipefish				✓	
Mitotichthys tuckeri	Tucker's Pipefish				✓	
Notiocampus ruber	Red Pipefish				✓	
Stigmatopora argus	Spotted Pipefish, Gulf Pipefish				✓	
Stigmatopora nigra	Widebody, Wide-bodied or Black Pipefish				✓	
Stipecampus cristatus	Ringback Pipefish, Ring-backed Pipefish				✓	
Urocampus carinirostris	Hairy Pipefish				✓	
Vanacampus margaritifer	Mother-of-pearl Pipefish				✓	
Vanacampus phillipi	Port Phillip Pipefish				✓	
Vanacampus	Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted				✓	
3 Pipehorses including						
Solegnathus robustus	Robust Pipehorse, Robust Spiny Pipehorse				✓	
Solegnathus	Spiny Pipehorse, Australian Spiny Pipehorse				✓	
Syngnathoides	Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish				✓	
1 Seadragon						
Phyllopteryx taeniolatus	Common Seadragon, Weedy Seadragon				✓	
6 Sharks						
Carcharhinus longimanus	Ocean Whitetip Shark			✓		
Carcharias taurus	Greynurse Shark		CE	✓		
Carcharodon carcharias	White Shark, Great White Shark		V	✓		
Galeorhinus galeus	School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin		C	✓		
Rhincodon typus	Whale Shark		V	✓		
Lamna nasus	Porbeagle, Mackerel Shark			✓		

Table 4 Continued. Threatened and protected Species Listed Under the TSC Act (1995), FM Act (1994) and EPBC Act (1999) for Disaster Bay region.

P = Protected V = Vulnerable, E = Endangered, CE = Critically Endangered, C = Conservation

Latin Name(s)	Common Name(s)	FM Act/TSC Listing	EPBC Listing			
			Status	Migratory Species	Listed Marine Species	Cetacean
Mammals						
2 Seals						
Arctocephalus forsteri	New Zealand Fur Seal				✓	
Arctocephalus pusillus doriferus	Australian Fur Seal	P			✓	
18 Whales and Dolphins						
Balaenoptera	Minke Whale					✓
Balaenoptera acutorostrata	Dwarf Minke Whale	P				✓
Balaenoptera borealis	Sei Whale	V				✓
Balaenoptera edeni	Bryde's Whale			✓		✓
Balaenoptera musculus	Blue Whale	E	E	✓		✓
Balaenoptera physalus	Fin Whale	V				✓
Caperea marginata	Pygmy Right Whale			✓		✓
Delphinus delphis	Common Dolphin or Short-beaked Common Dolphin	P				✓
Eubalaena australis	Southern Right Whale	E	E	✓		✓
Grampus griseus	Risso's Dolphin, Grampus					✓
Lagenorhynchus	Dusky Dolphin			✓		✓
Megaptera novaeangliae	Humpback Whale	V		✓		✓
Orcinus orca	Killer Whale, Orca	P		✓		✓
Physeter macrocephalus	Sperm Whale	V				✓
Sousa sahulensis	Australian Humpback Dolphin	V				✓
Tursiops aduncus	Indian Ocean, Spotted Bottlenose Dolphin					✓
Tursiops truncatus	Common Bottlenose Dolphin	P				✓
Tursiops truncatus s. str.	Bottlenose Dolphin					✓
Reptiles						
4 Marine Reptiles						
Caretta caretta	Loggerhead Turtle		E	✓	✓	
Chelonia mydas	Green Turtle		V	✓	✓	
Dermochelys coriacea	Leatherback Turtle, Leathery Turtle, Luth		E	✓	✓	
Eretmochelys imbricata	Hawksbill Turtle		V	✓	✓	

7.15 Areas of Conservation Significance

The proposed Eden-1 Kelp Aquaculture Lease is located in offshore waters within Disaster Bay, New South Wales. This area is not situated within any Commonwealth or State-designated area of conservation significance, nor is it encompassed by any marine park, aquatic reserve, RAMSAR-listed wetland, or World Heritage area. As such, there are no formal marine conservation designations that apply to Disaster Bay or directly to the lease area [under either the NSW Biodiversity Conservation Act 2016, the Fisheries Management Act 1994, or relevant Commonwealth legislation such as the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)].

The closest marine park is the Cape Howe Marine Park, a Commonwealth-managed multiple-use marine park located in Victorian waters, approximately 23 km south of the AL21/004 lease area, extending from the Victorian border into offshore waters of the Tasman Sea. The Cape Howe Marine Park forms part of the South-east Marine Parks Network, but it does not overlap with, or directly influence, the environmental management of the proposed kelp farming zone within Disaster Bay.

Although Disaster Bay itself is not a designated area of marine conservation significance, it is situated adjacent to several terrestrial conservation areas. To the north lies Beowa National Park, which encompasses coastal heathland, forested headlands, and dune systems along the shoreline, while to the south, Nadgee Nature Reserve forms part of the Nadgee to Mallacoota Inlet Important Bird Area. These protected areas, managed under the NSW National Parks and Wildlife Act 1974, are known for their high terrestrial biodiversity and minimal disturbance. While these nearby reserves contribute to the broader ecological character of the region, the offshore location of the AL21/044 lease does not intersect with these terrestrial or coastal protected zones. This spatial separation supports the assessment that the lease area itself does not fall within a recognised conservation priority area.

Distances to conservation areas are as follows:

Area of Marine Conservation Significance	Designation	Distance from Disaster Bay
MARINE: Cape Howe Marine Park (Victoria)	Commonwealth Marine Park	23 km
Batemans Marine Park (NSW)	NSW State Marine Park	120 km
MARINE: Grey Nurse Shark Sanctuary (NSW)	NSW Fisheries Sanctuary Zone	150 km
MARINE: Lord Howe Marine Park (NSW)	NSW State Marine Park	500 km
TERRESTRIAL: Nadgee Nature Reserve (NSW)	NSW Nature Reserve	1.1 km
TERRESTRIAL: Beowa National Park (NSW)	NSW National Park	4.2 km

Table 12. Distances to Marine and Terrestrial conservation areas.

7.16 Commercial and Recreational Activities

Disaster Bay is a remote offshore marine embayment located on the far south coast of New South Wales designated by NSW DPIRD Fisheries located within Site Code: I10-29 and I10-20 (see figure 38: NSW DPIRD Fisheries MGA94 Mapping Grid of Australia). Recreational activity in the Disaster Bay is generally limited due to its geographic isolation, lack of infrastructure, generally rough conditions, and difficulty of access. The bay has no designated boat ramps or direct vessel land-to-sea access points, navigation channels, commercial shipping routes, or permanent moorings. Access via boat to Disaster Bay is primarily taken through Wonboyn Lake, which can only be accessed via a generally hazardous entrance featuring shallow sandbars, strong surf, and shifting tidal flows. This generally restricts access via Wonboyn to experienced operators in small vessels (typically under 7 metres) and only during favourable tidal and swell conditions.

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Commercial fishing activity within Disaster Bay includes localised fishing (both net and longline) operations originating from Twofold Bay. According to NSW DPIRD Fisheries catch information records less than six (6) fishing businesses in the last 10 years (NSW DPIRD 18 Nov 2025) having operated in Disaster Bay. Due to privacy restrictions, DPIRD Fisheries are unable to release aggregated catch information for Disaster Bay Site Code: I10-29 from fewer than six (6) individual fishers. What is generally known is that an Eden-based prawn trawler targets school prawns (*Metapenaeus macleayi*) during late autumn and early winter, targeting a known depression at the northern end of Wonboyn Beach. Longline fishing for gummy sharks occurs in Disaster Bay, however the exact frequency and catch numbers are unknown. Abalone and sea urchin divers operate in the bay on the bay's perimeter, over established wild kelp beds. There are currently no known marine tourism operations currently operating in Disaster Bay. Seasonal whale-watching charters and scuba diving tours operate from of Eden, but concentrate generally on the Twofold Bay area with good dive sites available that are easy to access and have nearby services/rescue. Shipping density mapping for vessels equipped with Automatic Identification System (AIS) transponders, showed that AIS equipped marine vessels rarely passed through Disaster Bay (see Figure 41: Shipping traffic density map for all vessels 2022-2023 Source: MarineTraffic, 2023). During 2022-2023, less than four AIS equipped vessels passed through Disaster Bay, and none were >500 Gross Tonnes. Ongoing communication and consultation with fishers utilising Disaster Bay has been ongoing, with one particular longline fisher voicing strong opposition to losing any access whatsoever to Disaster Bay fishing grounds.

Recreational beach use within Disaster Bay is generally limited to a small number of tourists and local residents that frequent Wonboyn, due primarily to the difficulty of land and marine access. Beach fishing occurs along Wonboyn and Greenglades beaches. Surfing is rare, with no recognised beach breaks, and there are no recorded instances of kiteboarding, windsurfing or organised regattas in the bay. Recreational boating, water skiing, and wakeboarding have not been recorded in Disaster Bay as these activities are better suited to the Wonboyn Lake system. While recreational fishing and spearfishing take place around rocky outcrops of Disaster Bay, such activities are typically localised and opportunistic, targeting shallow reef zones and natural kelp beds for fish, lobster or abalone. Overall, marine-based tourism and recreation in Disaster Bay are limited and intermittent.

7.17 Naval Operations and Commonwealth Waters

Twofold Bay performs an important logistical support function for the Royal Australian Navy (RAN) on Australia's east coast. Located near Eden in southern New South Wales, the Defence Support Facility at East Boyd Bay (Edrom) includes the East Boyd Bay Multi-Purpose Wharf, a purpose-built deep-water facility used for naval logistics and the safe handling of explosive ordnance. The facility supports the loading and unloading of munitions and provides logistical support for naval vessels operating along the east coast, including those engaged in offshore training and readiness activities.

Constructed in the early 2000s to replace earlier ammunitioning arrangements, the East Boyd Bay Multi-Purpose Wharf was selected for its deep-water access, low surrounding population density, and suitability for safe explosives handling. Planning documentation indicates the wharf was designed to accommodate large naval and auxiliary vessels and is supported by associated Defence infrastructure, including explosives transit storage areas and inland magazine facilities located approximately 10–12 km from Edrom. These facilities enable secure handling, staging, and transport of ordnance between storage and the wharf in accordance with Defence safety protocols.

Use of the facility varies depending on fleet operational requirements and training schedules. Temporary maritime exclusion zones are established during ammunition transfer operations to ensure navigational safety and environmental protection, with separation distances determined in accordance with Defence explosive safety regulations. The proximity of Twofold Bay to offshore naval training areas along the NSW coast makes it a practical staging and resupply location for naval operations. While training exercises occur offshore in Commonwealth waters, the East Boyd Bay Multi-Purpose Wharf supports fleet logistics, personnel movements, and operational readiness activities along the east coast.

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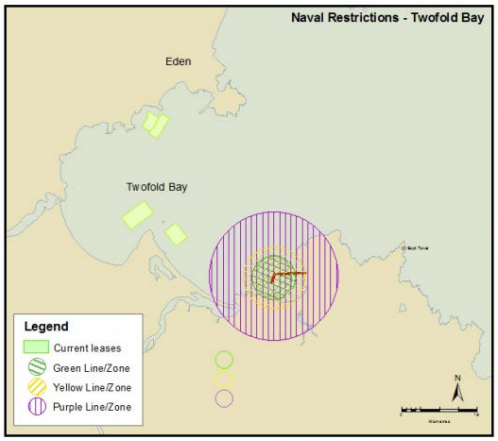

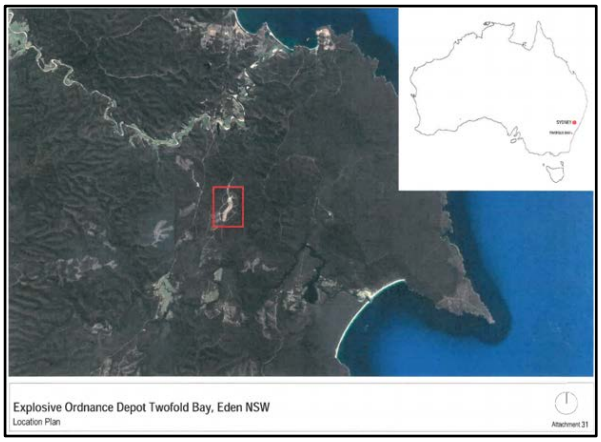

Figure 25: Royal Australian Navy Exclusion Zones, Twofold Bay NSW (Source: Australian Government Department of Defence).

Figure 26: Closest military facility, Explosive Ordnance Depot Twofold Bay, Eden NSW (Source: Australian Government Department of Defence).

Disaster Bay is located approximately 25 km south of Twofold Bay is not historically been used for Australian naval operations and does not contain any designated naval infrastructure, vessel access points, or recognised defence-related activities. The bay has no port facilities or mooring zones that would typically support Royal Australian Navy (RAN) operations. There are no historical or contemporary records of RAN vessel activity or military exercises taking place within Disaster Bay, and the area is not included within the boundaries of the East Australia Exercise Area.

Whilst the proposed Kelp Aquaculture Farm is located in Disaster Bay, it is relevant to note that primary staging and processing activities will occur via Twofold Bay, in close proximity to the Royal Australian Navy (RAN) Multi-Purpose Wharf at East Boyd Bay. Auskelp acknowledges the strategic importance of RAN infrastructure and confirms that kelp aquaculture operations — including vessel movements, wharf access, land transport and operational scheduling associated with kelp processing — will comply with Defence security protocols and any designated Naval Restricted Areas (refer Figures 25 and 26). Movements associated with the transport of explosives to inland ordnance storage facilities north of Wonboyn will be afforded priority access at all times. Auskelp will coordinate operational scheduling with NSW Port Authority to ensure compatibility with naval operations and navigation safety requirements. All activities will be undertaken in a manner consistent with national security obligations, maritime safety requirements, and port management directions when Defence operations are underway.

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7.18 Heritage

7.18.1 Aboriginal Heritage

Aboriginal communities have occupied the south coast of New South Wales for at least 20,000 to 40,000 years, with archaeological evidence from sites such as Lake Mungo, Pambula, and the coastal dune systems confirming long-term and continuous habitation. These communities developed sophisticated social systems deeply integrated with the seasonal rhythms of land and sea. Societies were structured around language groups and kinship systems, with laws, responsibilities, and cultural practices passed down orally through generations. Daily life was governed by seasonal movement across Country to access food, water, and materials, with people utilising rich coastal resources—such as fish, shellfish, marine mammals, and edible plants—supplemented by inland hunting and gathering. Communities lived in small, mobile family groups, forming larger gatherings during key times for ceremony, trade, and kinship connection. Knowledge of ecology, astronomy, and land management was encoded in songlines, stories, and ceremonial law. Cultural obligations included caring for Country, conducting rituals, and maintaining the balance between human life and the environment. Far from being isolated, Aboriginal societies were complex, interconnected, and highly adapted to the diverse coastal and inland environments of southeastern Australia.

As such, Aboriginal communities have a deep association and connection to the land. The land and water within a landscape are central to Aboriginal spirituality and contribute to Aboriginal identity. Aboriginal communities associate natural resources with the use and enjoyment of foods and medicines, caring for the land, passing on cultural knowledge and strengthening social bonds. Aboriginal heritage and connection to nature are inseparable from each other and need to be managed in an integrated manner across the landscape.

The Disaster Bay region, located on the far south coast of New South Wales, sits within the traditional lands of the Bidwell people—a distinct Aboriginal group whose territory historically extended from Cape Everard (Point Hicks) and the Cann River area in East Gippsland, Victoria, into southern New South Wales as far north as Green Cape and Disaster Bay. Immediately north lies the territory of the Yuin Nation, one of the larger cultural groups of the south coast of New South Wales, encompassing areas from Bermagui to the Shoalhaven River. Eden and the waters of Twofold Bay are located with the designated areas of the Yuin Nation which is currently under a native title claim (Federal Court file NSD1331/2017).

The Bidwell people lived in a semi-nomadic manner, moving seasonally between inland forested ranges and coastal zones to access food, water, and shelter. Their knowledge of local flora and fauna underpinned a sustainable use of the land, with coastal headlands, river mouths, and dune systems playing important roles in their cultural and economic life. Commonly used resources included shellfish, fish, bush fruits, and medicinal plants. Two key Aboriginal heritage sites have been recorded near Disaster Bay: Greenglades, where a hearth, stone artefact scatter, and evidence of tool-making were found; and Baycliff, which contains a dense concentration of artefacts. These sites are protected under the NSW National Parks and Wildlife Act 1974 and are consistent with known patterns of Aboriginal occupation and use of coastal landscapes for habitation and subsistence. Such locations were often used repeatedly, seasonally, and strategically, depending on resource availability and weather conditions.

Linguistically, the Bidwell-Maap spoke a dialect referred to as muk-thang ("good speech"), a language isolate with links to the neighbouring Thawa and Ngarigo peoples. Despite shared boundaries and interactions with these and Yuin groups, the Bidwell-Maap retained a distinct cultural identity, recognised today through archaeological records and oral histories. The Aboriginal connection to the Disaster Bay area is validated by these known cultural sites and ethnographic records. Contemporary heritage assessments continue to identify and protect these places, ensuring they remain part of the cultural landscape of far south coastal New South Wales.

- No Aboriginal objects, places, or submerged cultural heritage sites were identified within the offshore lease area. All recorded Aboriginal heritage sites occur on land and outside the project footprint.

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- The highly dynamic, high-energy marine environment of Disaster Bay, combined with the offshore nature of the proposal, significantly reduces the likelihood of intact Aboriginal archaeological deposits within the lease area.
- The assessment concluded that the proposal presents a low risk to Aboriginal cultural heritage, provided that cultural heritage due-diligence measures are implemented in the form of a Cultural Heritage Response Plan.
- The assessment concluded that the impact on aboriginal cultural fishing practices is negligible.
- Procedures are in place to manage unexpected Aboriginal heritage finds, including stop-work protocols and notification requirements that are detailed in the Cultural Heritage Response Plan (Appendix 2), should any Aboriginal objects or places be identified during future activities.

As required under SEARs, the Eden-1 Kelp Aquaculture Farm has been assessed with regard to potential impacts on Aboriginal cultural fishing practices, including customary fishing rights exercised Traditional Owners along the NSW South coast. Under the Fisheries Management Act 1994 (NSW) and associated cultural fishing provisions, Aboriginal people may undertake cultural fishing for domestic, ceremonial and community purposes, including the use of nets under specific cultural fishing authorities (commonly referred to as Section 37 cultural fishing permits). These activities are primarily undertaken in estuaries, rivers, lakes and nearshore coastal environments where traditional fishing practices and community harvesting previously occurred.

The Eden-1 lease area is located approximately 1.1–3.1 km offshore in high-energy marine waters over sandy substrate and does not overlap with estuarine systems, intertidal zones, or recognised cultural fishing locations. The suspended longline infrastructure occupies the mid-water column and maintains navigational clearance, ensuring continued access for vessels transiting offshore waters. No exclusion of customary fishing areas is expected, and the Project does not restrict access to shoreline or estuarine environments where cultural fishing is most commonly practised.

Consultation undertaken as part of the Aboriginal Cultural Heritage Assessment and ongoing engagement with Traditional Owners has not identified concerns regarding interference with cultural fishing practices. Given the offshore location, small physical footprint, and absence of habitat exclusion in culturally significant nearshore waters, the Project is not expected to adversely affect Aboriginal cultural fishing activities.

All information relating to Aboriginal cultural context, consultation processes, Registered Aboriginal Party engagement, desktop investigations, and heritage assessment outcomes for the Eden-1 Kelp Aquaculture Project is documented in detail within the Aboriginal Cultural Heritage Assessment Report (ACHAR) prepared for the Project. The ACHAR is provided as Appendix A5 to this Environmental Impact Statement and forms the primary technical basis for the conclusions presented in this section. The assessment includes full records of Aboriginal party identification and consultation, AHIMS search results, ethnographic context, methodological approach, and management recommendations. This EIS chapter summarises the key findings of the ACHAR, while the appended report should be referred to for comprehensive supporting information, detailed evidence, and regulatory compliance documentation.

7.18.2 European Heritage

The European heritage of the Disaster Bay and Wonboyn region is closely linked to early maritime industries, coastal navigation, and the legacy of shipwrecks that have shaped the cultural identity of the area. European settlement in this part of far south coastal New South Wales began in the 1870s, primarily driven by fishing, forestry, and the development of early aquaculture. Wonboyn Lake is notable as one of the earliest recorded oyster farming locations in New South Wales, with operations beginning as early as the 1800s. These small-scale but innovative farming efforts contributed to the area's reputation for high-quality estuarine products and marked the beginnings of commercial aquaculture in the region. Some of the original settler families still have a presence at Wonboyn including the Palmer and Hyde family who are reported to have been at Wonboyn since the late 1880s.

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One of the most enduring symbols of European activity along this coast is the Green Cape Lighthouse, constructed between 1880 and 1883. It was the first concrete lighthouse tower built in Australia and remains a heritage-listed site. Its construction was a direct response to a series of maritime tragedies along the treacherous coastline, and it played a crucial role in improving safety for ships navigating the hazardous southern approach to New South Wales and Twofold Bay. The name Disaster Bay reflects a grim history of maritime accidents that occurred along this exposed and high-energy stretch of coast. Notable shipwrecks include the City of Sydney (1862), Ly-ee-Moon (1886), and New Guinea (1911). The Ly-ee-Moon disaster, which claimed over 70 lives, is one of Australia's most tragic maritime events and contributed significantly to the bay's foreboding name. These wrecks not only signify the dangers of early seafaring but also underscore the importance of navigational safety and the eventual construction of lighthouse infrastructure. Collectively, these events and landmarks form the foundation of the European cultural and historical narrative of Disaster Bay and its surrounding region.

To the north of Disaster Bay, Twofold Bay became a hub of early European occupation and economic development, particularly through the establishment of the shore-based whaling industry in the 1830s. The bay's deep natural harbour and proximity to whale migration routes made it an ideal location for hunting whales and processing and exporting whale oil. One of the most prominent figures in the region's colonial history was Ben Boyd, a Scottish entrepreneur who founded Boydtown in 1843 as part of his broader vision for economic expansion along the south coast. Boyd invested in port infrastructure, shipbuilding, and the expansion of trade, although his ventures and overall vision for the area were short-lived. Nonetheless, his legacy—along with the early whaling operations—left a lasting impression on the settlement patterns and maritime economy of the region. Today, remnants of these early activities, including the whaling station and Boyd's historic tower, form part of the region's layered European heritage.

- Procedures are in place to manage unexpected European heritage finds, including stop-work protocols and notification requirements that are detailed in the Cultural Heritage Response Plan (Appendix 2), should any heritage objects be identified during future activities.

7.19 Social and Economic

Disaster Bay, Eden and Edrom are located within the Bega Valley Shire Local Government Area (LGA). Located at New South Wales' southeastern extremity, Bega Valley Shire spans approximately 6,040 km^2, encompassing over 100 beaches, 26 estuaries, and around 78% of the area covered by national parks and state forests (Bega Valley Shire Council, 2023).

Population: The shire is home to around 37,000 residents as of 2024, with the population forecast to increase to approximately 40,800 by 2046 (Forecast.id, 2024). The median age is significantly higher than the NSW average—around 48 years old compared to 38 statewide—indicating an ageing demographic (ABS, 2021). Approximately 6–7% of the population identifies as Aboriginal or Torres Strait Islander, and over 80% of residents were born in Australia or the United Kingdom (ABS, 2021). Around 18.6% of residents hold a bachelor's degree or higher, with a significant proportion holding vocational qualifications (ABS, 2021). The region has a mature population, with 37% aged over 60 (BVSC, 2023).

Key population centres include Bega (approx. 5,000 residents), Merimbula, Pambula, Tathra, Eden, and Bermagui. These towns are focal points for services, tourism, and business activity (Bega Valley Shire Council, 2023). Inland areas like the Bega District are projected to grow by over 18% between 2019 and 2036 (Forecast.id, 2024).

Income, GDP and Employment: Household income levels are below state averages; the median weekly household income is approximately $986, compared to $1,233 across New South Wales (ABS, 2021).

The Bega Valley region's Gross Regional Product (GRP) is approximately $2.2 billion, contributing around 0.3% to NSW's economy (Economy.id, 2024). Key employing industries include Health Care and Social Assistance (16%), Retail Trade (10.5%), and Construction (10.2%) and Agriculture, Forestry and Fishing (6.6%) of the workforce (Economy.id, 2024). Exports focus on dairy, timber, seafood, and tourism-related services.

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The most prominent private-sector employer is the Bega Group, originally a dairy co-operative based in Bega. Now an ASX-listed company, it reported $3.5 billion in revenue in FY2024 and exports globally (Bega Group, 2024). Bega Valley Shire Council is also a major employer, with an annual revenue of approximately $130 million (BVSC, 2023).

The region's workforce consists of approximately 17,600 employed residents within the LGA (Economy.id, 2024). The unemployment rate is approximately 7%, slightly above the NSW average (Labour Market Information Portal, 2024).

Social and Economic Summary: Bega Valley Shire combines a diverse economy anchored in traditional industries like dairy, forestry, fishing, and tourism, alongside growth in health, construction, and retail sectors. The shire's aging population, modest income levels, and emphasis on small- to medium-sized enterprises—including major regional players like the Bega Group—shape its social and economic character.

The socio-economic implications of the Eden-1 Kelp Aquaculture Project have been assessed in accordance with Item 15 of the Secretary's Environmental Assessment Requirements (SEARs), which requires a social impact assessment consistent with the Department of Planning, Housing and Infrastructure's Social Impact Assessment Guideline for State Significant Projects. This assessment draws on both project-specific engagement and the findings of the NSW Government-funded research program Socio-economic Considerations for Regenerative Aquaculture on the NSW South Coast (Croft et al., 2024), prepared by the University of Wollongong, the Blue Economy Cooperative Research Centre, and associated research partners.

7.20 Social Impact Assessment

The socio-economic implications of the Eden-1 Kelp Aquaculture Project have been assessed in accordance with Item 15 of the Secretary's Environmental Assessment Requirements (SEARs), which requires a Social Impact Assessment (SIA) to be prepared in accordance with the Department of Planning, Housing and Infrastructure's Social Impact Assessment Guideline for State Significant Projects. This assessment is informed by three regional studies completed in 2024 by University of Wollongong in partnership with the Blue Economy CRC and commissioned by the NSW Government, specifically relating to the Eden-1 Aquaculture Project in partnership with Auskelp and other regional stakeholders.

Collectively, these documents provide a comprehensive evidence base addressing the social context, community values, economic structure, industry readiness, and stakeholder expectations relevant to the introduction of regenerative aquaculture on the NSW South Coast.

- **Report 1:** Socio-Economic Considerations for Regenerative Aquaculture on the NSW South Coast (attached as Appendix A6). This provides a robust regional-scale baseline assessment of the social and economic context for regenerative aquaculture development across the Shoalhaven, Eurobodalla, and Bega Valley LGAs. The report draws on a comprehensive methodology including regional telephone surveys (n=540), stakeholder interviews, focus groups, and case studies, and identifies key demographic characteristics, workforce constraints, economic vulnerabilities, and community values relevant to emerging kelp aquaculture.
- **Report 2:** Community Engagement Considerations for Regenerative Aquaculture on the New South Wales South Coast (attached as Appendix A11). This provides region-wide research and consultation undertaken to understand community values, expectations, and concerns relating to the Project and the emerging regenerative aquaculture sector. The report draws on surveys, workshops, interviews, and stakeholder discussions involving South Coast residents, Aboriginal organisations, commercial and recreational fishers, tourism operators, local councils, industry representatives, and government agencies.
- **Report 3:** Regenerative Aquaculture Farming on the New South Wales South Coast (attached as Appendix A12). This report examines the current and emerging regenerative aquaculture business ecosystem on the NSW South Coast, with a focus on supply-chain capacity, workforce skills, infrastructure availability, regulatory constraints, and commercial readiness.

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Together, these three documents demonstrate that a robust, regionally grounded assessment of social and economic impacts has been undertaken, consistent with the Department's SIA Guideline. They confirm that the Eden-1 Kelp Aquaculture Project has been designed with a clear understanding of the local social environment, potential impact pathways, and community expectations. The findings have been directly integrated into project design, site selection, engagement strategy, and impact mitigation measures presented in this EIS.

Conclusion

The Eden-1 Project is assessed as having low social risk and a net positive socio-economic outcome, provided that the commitments to ongoing engagement, transparency, and adaptive management set out in this EIS are implemented. The assessment satisfies the requirements and intent of Item 15 of the SEARs and demonstrates alignment with NSW Government objectives for sustainable, community-supported growth in the Blue Economy.

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8.0 RISK ASSESSMENT

8.1 Risk Assessment Method

To ensure the ecologically sustainable development (ESD) of kelp aquaculture farming in offshore environments, a comprehensive risk assessment has been undertaken for the proposed Eden-1 Kelp Aquaculture Farm in Disaster Bay, encompassing all construction and operational aspects of the Project. This assessment follows the framework established in the National ESD Reporting Framework: The 'How To' Guide for Aquaculture (Fletcher et al., 2004), which is based on the widely adopted AS/NZS ISO 31000 Risk Management Principles and Guidelines (Standards Australia and Standards New Zealand, 1999; 2000), and ensures that environmental, social, and economic risks are systematically identified, evaluated, and managed in a manner that satisfies the requirements of the Secretary's Environmental Assessment Requirements (SEARs).

Risk in this context is defined as "the chance of something happening that will have an impact on objectives" (AS/NZS, 1999). The primary objective of this assessment is to distinguish minor, acceptable risks from major, unacceptable ones, and to guide the development of mitigation, monitoring, and management strategies for the proposed Kelp Aquaculture Farm.

The methodology involved a structured and transparent process that included:

- Review of current scientific literature, reports and information related to the local area (including flora and fauna) within and adjacent to all intersected areas.
- Review of current scientific literature related to kelp farming and offshore infrastructure.
- Analysis of historical environmental and operational data.
- Stakeholder consultation (including Aboriginal stakeholders, community members, commercial operators, and government agencies).
- Expert panel input from aquaculture, marine ecology, and navigation specialists.
- Review of regulatory guidelines and existing environmental management plans.

The risk assessment also served to identify knowledge gaps, informing the development of project-specific monitoring objectives and adaptive management plans. While the primary focus was on environmental risks, attention was also given to social and economic considerations, consistent with a triple-bottom-line approach to ESD.

The ESD component trees outlined in the national aquaculture framework were adapted to suit the specific characteristics of offshore kelp farming. Each risk-related issue was evaluated in terms of:

- The consequence of its impact on the marine environment, human uses, and social values; and
- The likelihood of that impact occurring under proposed operational conditions.

Risks were ranked using a semi-quantitative risk matrix, based on the calculated value of Consequence × Likelihood, resulting in a score between 0 and 30. These scores were then assigned to one of five risk categories:

- Negligible (0–2)
- Low (3–6)
- Moderate (7–12)
- High (13–20)
- Extreme (21–30)

Issues assessed as negligible risk were studied, with justifications provided in the risk summary tables. Conversely, any issues rated as low, moderate, high, or extreme triggered the development of documented management responses utilising available best practice, including:

- Operational objectives
- Performance indicators
- Monitoring and compliance protocols

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- Contingency strategies

This risk assessment process ensures that Kelp Aquaculture Farming in Disaster Bay will be assessed, and if approved, operated in a responsible manner, aligned with ESD principles and best-practice aquaculture standards, while also being responsive to evolving environmental and social conditions. A detailed risk assessment for each component is provided in Section 9.

8.2 Component Tree

The following table represents the marine Seaweed Agriculture Risk Assessment Framework "Component Tree" determined by the Australian Seaweed Institute and AgriFutures Australia in 2020 (see Table 5) in an effort to ensure thorough and relevant risk reporting framework required to adequately assess new Kelp Aquaculture farm operations located in offshore environments. The risk assessment Component Tree framework was used as a baseline to determine the project specific risks and their relevant reporting and operational requirements for Kelp Aquaculture Farming and provides regulators a structured framework to assess risks and informing management measures for marine farms.

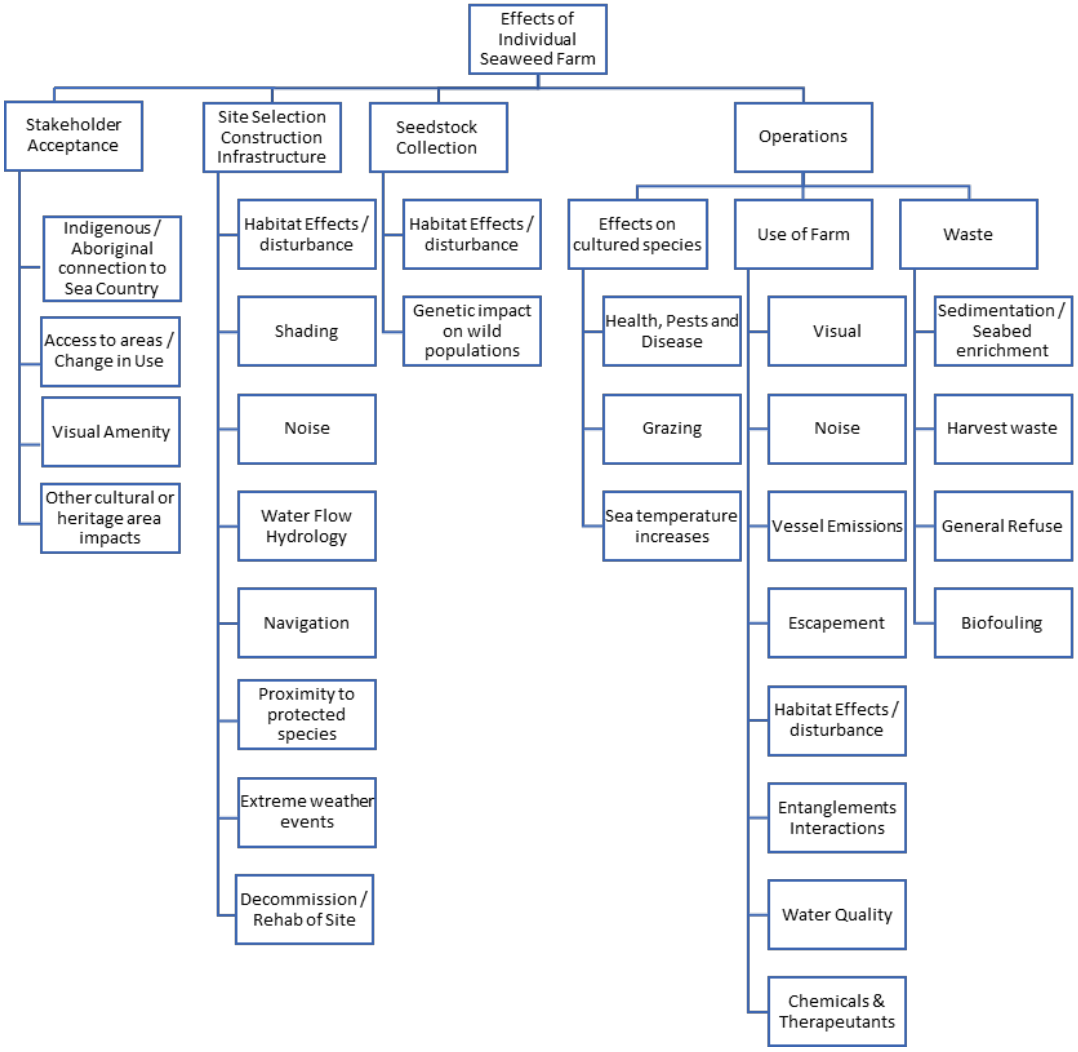

Table 13. Risk Assessment Component Tree used for the evaluation of Kelp Aquaculture Farming in Disaster Bay (Source Agrifutures, 2020).

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8.3 Likelihood Levels

The following likelihood levels have been adopted as the reporting standard.

Likelihood level	Descriptor
Remote (1)	Never heard of, but not impossible
Rare (2)	May occur in exceptional circumstances
Unlikely (3)	Uncommon
Possible (4)	Some evidence to suggest this is possible
Occasional (5)	May occur
Likely (6)	Is likely to occur

Table 14. Likelihood levels of risk for the evaluation of Kelp Aquaculture Farming in Disaster Bay.

8.4 Consequence Levels

Level	Standard Consequence Levels	Impact on Protected Species
Negligible (0)	Insignificant impacts. Impacts unlikely to be measurable at the scale of the stock, ecosystem, or community level against background variability.	Almost none are impacted.
Minor (1)	Possibly detectable but minimal impact on structure, function or dynamics.	Some are impacted but there is no impact on stock.
Moderate (2)	Maximum appropriate/acceptable level of impact (e.g. full assimilation rate for nutrients).	Levels of impact are at the maximum acceptable level.
Severe (3)	Wider, longer-term impacts (detectable at the stock, ecosystem or community level).	
Major (4)	Serious impacts that require a relatively long timeframe to restore to an acceptable level.	
Catastrophic (5)	Widespread and permanent irreversible damage or loss – possibility that the problem cannot be fixed (e.g. extinction).	

Table 15. Consequence levels of risk for the evaluation of Kelp Aquaculture Farming.

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8.5 Risk matrix

		Consequence					
Likelihood		Negligible 0	Minor 1	Moderate 2	Severe 3	Major 4	Catastrophic 5
Remote	1	0	1	2	3	4	5
Rare	2	0	2	4	6	8	10
Unlikely	3	0	3	6	9	12	15
Possible	4	0	4	8	12	16	20
Occasional	5	0	5	10	15	20	25
Likely	6	0	6	12	18	24	30

Table 16. Risk Matrix Table used for the evaluation of Kelp Aquaculture Farming.

8.6 Risk Rankings and Required Levels of Management

Risk rankings	Risk values	Explanation and likely management response
Negligible	0	Nil
Low	1-6	No specific additional management is needed, but low-level monitoring of the issue may be required. Any current management should continue, as the risk ranking is based on the current management in place.
Moderate	7 -12	Additional information may be needed, or the issue may require monitoring. Immediate management is required, but the issue should be the subject of continuous improvement with the aim of achieving a low risk ranking in the future.
High	13-18	Possible increases to management activities in addition to those already being applied should be considered. Issue needs to be monitored and any information deficiencies should be addressed.
Extreme	>19	Increases in management activities [in addition to those already being applied] are strongly recommended.

Table 17. Risk Rankings and Required Levels of Management used for the evaluation of Kelp Aquaculture Farming.

8.7 Risk Assessment Method

A range of risk assessment processes were reviewed, but the National ESD Reporting Framework was considered the most appropriate risk assessment process for Kelp Aquaculture Farming.

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The National ESD method is specific to aquaculture and has been designed to be used nationally by the aquaculture industry. The method enables a range of environmental and socio-economic issues to be reviewed in a succinct manner and in a relatively short time frame when compared with other risk assessment methods. It has proven effective in identifying and prioritising issues and ensuring appropriate allocation of management effort. The method also encourages effective management by establishing predetermined outcomes that must be achieved for issues that are identified as potentially representing a substantial risk to the environment and/or community (Fletcher et al., 2004, revised 2020).

The proposed Eden-1 Kelp Aquaculture Farm represents a non-intensive aquaculture operation, with no use of feed, fertiliser, antibiotics, or pesticides, and no anticipated impacts on water quality. The site is located in a well-flushed offshore embayment, further reducing the potential for environmental harm. Given these characteristics, the National ESD method was considered not only fit-for-purpose but the most effective tool to meet the primary objective of the risk assessment: to identify and prioritise ecological and socio-economic risks and ensure appropriate and proportional management responses are applied to avoid adverse impacts.

8.8 Risk Categories

Utilising the Seaweed Aquaculture Risk Assessment Framework and the requirements from SEARs, it was determined that risk categories relevant to the Eden-1 Kelp Aquaculture Farm should be broken down into 22 distinct categories to enable a structured and comprehensive evaluation. This approach aligns with best practice guidance under the National ESD Framework and ensures all environmental, operational, and social factors are appropriately considered. The categories encompass both construction and operational phases, including key risks such as water quality, marine debris, biosecurity, stakeholder interaction, and ecological impacts, allowing for targeted risk ranking, prioritisation of management actions, and adaptive monitoring throughout the life of the Project.

Feedback from government regulators and key stakeholders was reviewed and incorporated into the risk assessment process. This input assisted in the identification, refinement and prioritisation of specific issues and informed the development of tailored mitigation and management responses. Where relevant, stakeholder concerns were directly addressed through risk rankings and associated monitoring or operational controls to ensure regulatory expectations and community values were reflected in the risk framework.

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8.9 Summary of Risk Evaluation

The comprehensive risk assessment evaluated the potential environmental, operational, and community impacts associated with the proposed Eden-1 Kelp Aquaculture Farm. The findings, clearly summarised in the attached table, provide a structured overview of risk categories and confirm the effectiveness of the Project's mitigation and management measures.

A total of 23 key risk areas were identified for the proposed Kelp Aquaculture Farm. These issues were categorised into four key areas:

- Site Selection (2 categories)
- Construction and Infrastructure (5 categories)
- Impact on Community (6 categories)
- Environment (10 categories)

Of the 23 risks assessed on a post-mitigation basis, six were considered to represent a 'negligible' level of risk, while 17 were ranked as 'low' risk. No risk areas were found to pose a 'moderate', 'high' or 'extreme' risk levels.

Category	Consequence	Likelihood	Risk Value	Risk Ranking	Section
◊ Site Selection					**9.1**
Coastal Processes and Suitability of Infrastructure	1	5	5	Low	9.1.1
Habitat Loss and Shading	1	2	2	Low	9.1.2
◊ Construction and Infrastructure					**9.2**
Noise During Construction	1	5	5	Low	9.2.1
Land Based Infrastructure	1	2	2	Low	9.2.2
Structural Integrity and Stability – Longline Infrastructure	1	4	4	Low	9.2.3
Navigation and Interactions with Other Waterway Users	1	6	6	Low	9.2.4
Decommissioning	1	2	2	Low	9.2.5
◊ Impact on Community					**9.3**
Visual Amenity	1	6	6	Low	9.3.1
Marine Vessel and Vehicular Transport	1	4	4	Low	9.3.2
Aboriginal, European and Environmental Heritage	0	1	0	Negligible	9.3.3
Noise During Operation	1	4	4	Low	9.3.4
Work Health and Safety	1	6	6	Low	9.3.5
Social and Economic	1	1	1	Low	9.3.6
◊ Environment					**9.4**
Marine Habitat, Water Quality and Sedimentation	0	2	0	Negligible	9.4.1
Genetics, Disease and Introduced Pests	0	2	0	Negligible	9.4.2
Artificial Lights	0	1	0	Negligible	9.4.3
Entanglement and Ingestion of Marine Debris	1	4	4	Low	9.4.4
Vessel Strike and Acoustic Pollution	1	1	1	Low	9.4.5
Threatened / Protected Species and Matters of MNES	1	2	2	Low	9.4.6
Behavioural Changes	1	2	2	Low	9.4.7
Areas of Conservation Significance	0	1	0	Negligible	9.4.8
Resource Use and Waste	0	2	0	Negligible	9.4.9
Offshore Resources	1	2	2	Low	9.4.10

Risk Table 1: Summary of risk categories: consequence, likelihood, risk value and risk ranking.

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9.0 ASSESSMENT OF KEY ISSUES

The Eden-1 Project has been assessed using a structured risk assessment framework that is consistent with the Secretary's Environmental Assessment Requirements (**SEARs**). Under this framework, risks are grouped into four key assessment domains:

1) Site Selection
2) Construction and Infrastructure
3) Community
4) Environment

These domains are further divided into 23 discrete risk categories. Within **Sections 9.1–9.4**, each category clearly identifies: the specific issues under consideration; the expert studies considered, technical appendices, regulatory advice, and stakeholder submissions informing the assessment; key baseline data and environmental conditions relevant to the site; and the impact pathways evaluated. Each section then outlines the proposed avoidance, management and mitigation measures, together with monitoring and adaptive management commitments adopted to reduce risk.

Risk ratings are derived through a transparent evaluation of consequence and likelihood, based on scientific evidence, regulatory standards, and site-specific conditions. This produces a quantified risk value and an overall risk ranking after mitigation. Consideration is also given to relevant legislation, policy frameworks, and best-practice industry guidance to ensure compliance and consistency with NSW regulatory expectations.

This structured methodology is used to ensure risks are assessed systematically, transparently, and proportionately. By interrogating each issue individually rather than in aggregate, the assessment provides regulators and stakeholders with clear visibility of the Project's risk profile, the evidentiary basis for conclusions, and the targeted mitigation measures adopted. It also strengthens traceability between identified risks, management controls, compliance obligations, and monitoring commitments, thereby supporting informed decision-making and ongoing environmental and operational accountability.

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9.1 SITE SELECTION

9.1.1 Coastal Process and Suitability of Infrastructure

Risk Table 2: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – climate change and impacts of the longline infrastructure on coastal processes and water flow (modified from Fletcher et al., 2012, 2018; Vom Berg, 2009, DAWE/FRDC, 2020, FAO & UNEP, 2021).

Issue	Will the installation of the longline infrastructure have a significant impact on coastal processes and water flow in Disaster Bay? Will climate change and rising ocean temperatures likely to have a significant impact on the operations of the Kelp Aquaculture Farm?			
Comments for consideration	• Will the longline infrastructure interrupt water movement in Disaster Bay e.g. flushing rates, wave action, water circulation or any other coastal processes? • Is the longline infrastructure likely to cause changes in wave behaviour, including wave dispersion and creation via amendments to orbital/oscillatory motions? • Is coastal inundation or wave run up/reflection an issue? • Is climate change and rising ocean temperatures expected to have a significant impact on the operation of the Kelp Aquaculture Farm? • Is the loss of wild kelp in Australian waters representative of reducing kelp farming biomass over time?			

Description	• Wave processes in Disaster Bay = refraction, shoaling, diffraction and reflection
	  • Wave climate = low/moderate (energy distributes across bay)
	  • Predominant wave direction = south to southeast
	  • Mean wave height = 1 - 2 m
	• Semidiurnal and microtidal mean range = 1.2 m
	• Increasing ocean temperatures
	• Ebb and flood flow = 0.01 to 0.5 m/sec
	• Current flow = clockwise direction, enters south or southeast of bay and discharges towards the northeast (protected by Greencape)
	  • Mouth of bay = 0.2 – 0.5 m/s
	  • Inside bay = 0.1 - 0.3 m/s			

Proposed Management – Mitigation and Monitoring	• Longline infrastructure design • Open, streamlined and flexible • Scale of lease area = 200 ha (5% of Disaster Bay) • Estimated number of 1-hectare rigs = 100 • Total rig area = 100 ha 2.5% of (Disaster Bay) • Biofouling removal - regular cleaning of ropes, moorings and culture apparatus to reduce drag • Locally sourced kelp sporophytes grown in hatchery • Disaster Bay – very well flushed			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	5	5	Low

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Justification of Ranking

Coastal processes play a critical role in the planning and sustainability of offshore kelp aquaculture farms, particularly in high-energy environments. These processes – such as wave dynamics, tidal currents, sediment transport, and flushing rates – influence nutrient delivery, and potential impacts on adjacent shorelines. Understanding and accounting for these factors ensures that aquaculture farms are designed to minimise hydrodynamic disruption, avoid interference with natural sediment movement, and remain structurally sound under variable ocean conditions. In offshore sites with strong wave exposure, such as Disaster Bay, a thorough assessment of coastal processes is essential to ensure long-term operational resilience and ecological compatibility. In general, waves travelling from deep water to the shallower areas may be transformed by the processes of refraction, shoaling, attenuation, reflection, breaking and diffraction (Demirbilek, 2002). At the depth of the proposed Kelp Aquaculture Farm (20 m), the main wave transformation processes are likely to be refraction, shoaling, diffraction and reflection. Orbital velocities and accelerations in the water column below are also generated by waves.

In the southeast corner of Australia, particularly around Mallacoota and Green Cape, the presence of cold water in winter is the result of seasonal upwelling events driven by the dynamics of the East Australian Current (EAC) and prevailing wind conditions. The EAC, a warm south-poleward-flowing current, begins to separate from the coast around Eden and Green Cape, especially during autumn and winter. This separation, combined with retroflection and the formation of mesoscale eddies, allows cold, nutrient-rich sub-surface waters from the continental slope to rise onto the continental shelf (Ridgway & Godfrey, 1997; Oke & Griffin, 2001). Additionally, persistent southerly winds during winter generate offshore Ekman transport, which displaces surface waters away from the coast and draws deeper cold water upward—a process particularly strong in known upwelling zones such as Eden–Green Cape, Cape Howe (near Mallacoota), and the Ninety Mile Beach (Roughan & Middleton, 2002). These events are often referred to as "EAC-induced coastal upwelling" or "winter upwelling cells" in scientific literature, and while they are not identified as separate cold currents, they significantly influence local sea surface temperatures and marine productivity during winter months.

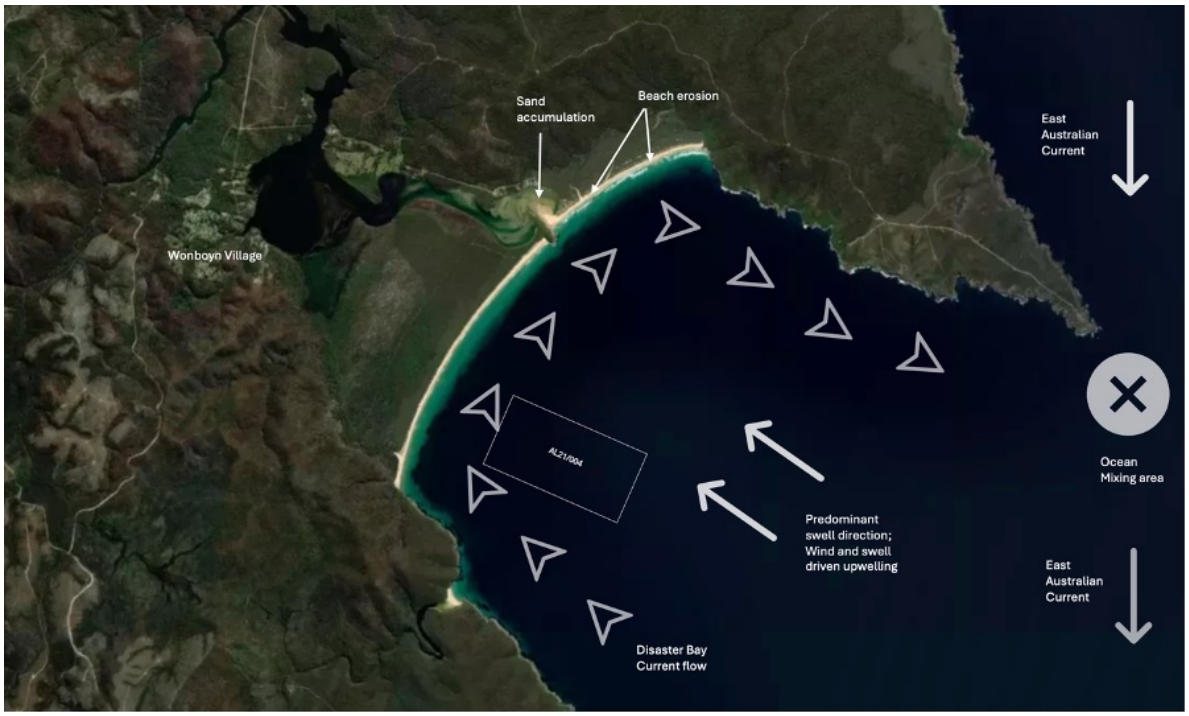

Figure 27: Disaster Bay Coastal Process; predominant current flow, East Australian Current (EAC), mixing area, wind and swell driven current drivers (Credit: Google and Auskelp 2025).

Research and observation indicate there is constant transportation of seawater into and out of Disaster Bay due to a circular flow that enters the bay on the southeast and discharges from the bay near the seabed on

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the northeast (BMT, 2023). The hydrological processes in the bay are mainly driven by oceanic processes (e.g. currents). Calculations of flushing times reveal that it takes approximately 1.5 – 2.5 days for water to circulate and flush from the bay. Disaster Bay exhibits relatively rapid flushing for a large body of water due to its broad, open connection to the Tasman Sea, persistent exposure to south and southeast ocean swell, and the influence of regional boundary currents such as the East Australian Current. The bay is flanked by rocky headlands at its northern and southern ends—notably around Green Cape and Nadgee Nature Reserve—and has a uniform, gradually sloping bathymetry that deepens from the shoreline to approximately 40 metres at the perimeter of the bay, with no internal rocky outcrops or topographic obstructions that would inhibit water movement. This open and smooth subtidal profile allows for efficient horizontal and vertical water exchange, further enhanced by wind-driven upwelling and current-forced circulation, which are characteristic of this part of the NSW South Coast (Ridgway & Dunn, 2003; Herzfeld et al., 2021). These features collectively result in a highly dynamic and well-flushed marine environment.

Tides in the Disaster Bay region are semidiurnal (i.e. two high tides a day) and microtidal with a range of 2 m for spring tides. Tidal currents during ebb and flood flow are weak to moderate with speeds of 0.2 – 0.5 m/s at the opening of Disaster Bay and less than 0.1 – 0.3 m/s inside the bay (BMT, 2023). Waves and swells in Disaster Bay are predominately from a southeast to east direction with a wave period of 6-12 seconds. Disaster Bay is characterised by a predominant swell direction from the south to southeast, with a mean wave height of approximately 0.75 m under ambient conditions. According to BMT's calibrated spectral wave ray tracing (SWRT) model, the 100-year return period significant wave height (Hs) is 7.15 m, with a peak wave period of 12.22 seconds and mean wave period of 10.79 seconds.

While Disaster Bay is exposed to periodic high-energy swell events, the proposed kelp aquaculture infrastructure is not expected to materially alter wave climate, current dynamics, or sediment transport processes due to its design, scale, and offshore configuration. Unlike solid or continuous marine structures such as breakwaters, seawalls, reefs, or artificial headlands, the Eden-1 infrastructure consists of fully submerged, flexible, and porous elements, including rope-based longlines, discrete screw anchors, and small-diameter surface buoys. These components present minimal frontal area to incoming wave energy and do not form rigid barriers capable of inducing reflection, refraction, diffraction, or wave shadowing effects.

The longline system is aligned predominantly parallel to prevailing swell and current directions and is deployed in spatially discrete one-hectare modules, separated by substantial open water. This configuration allows waves and currents to pass through and around the infrastructure with negligible attenuation or redirection. Screw anchors are embedded flush with the seabed and do not protrude into the water column, thereby avoiding interference with near-bed orbital velocities or sediment mobilisation processes. As a result, the infrastructure does not meaningfully modify orbital wave motion, wave run-up, or oscillatory flow regimes associated with coastal erosion or sediment transport.

Importantly, the lease area is located over 1.1 kilometres offshore, beyond the nearshore surf zone where wave transformation, breaking, and sediment exchange processes that shape beach morphology occur. At this distance, the kelp farm is hydrodynamically decoupled from surf-zone processes, and any interaction between offshore infrastructure and nearshore wave form would be dissipated long before reaching the shoreline. Consequently, the Project does not present a mechanism by which wave height, period, direction, or form at Greenglades Beach or adjacent coastlines could be altered.

Concerns raised in other jurisdictions regarding the influence of solid ocean infrastructure on surf quality are not applicable to the Eden-1 Project, as those impacts are typically associated with fixed, impermeable structures that intersect wave crests or seabed contours in shallow water. The proposed kelp farming system does not modify bathymetry, introduce rigid obstructions, or alter seabed morphology, and therefore does not have the capacity to influence wave peeling, breaking patterns, or surf amenity.

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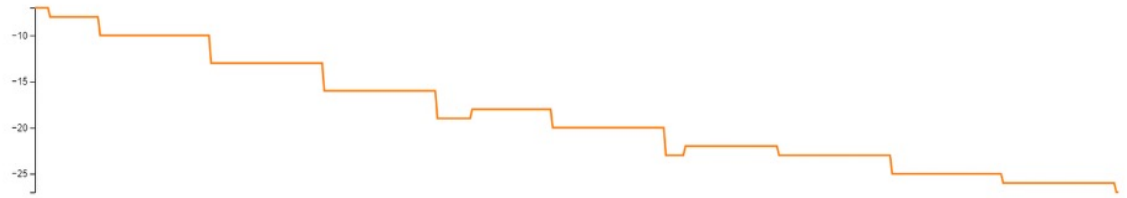

Figure 28: Disaster Bay general ocean floor elevation profile, depth in metres (Source: Aus Seabed Marine 2023)

Disaster Bay increases in depth at a gradient of 1.1°, as can be seen above in Figure 28, this gradient begins closest to shore at depths of 5 metres below sea level and accumulating further from shore at depths of 25 metres below sea level. The undersea landform of Disaster Bay has been described as a very flat plain closer to the shoreline before transitioning to gentle slopes (Aus Seabed Marine., 2023).

The hydrodynamic impact of kelp aquaculture infrastructure—specifically the reduction of surface current velocities and associated nutrient transport—is known to vary significantly depending on aquaculture farm design, kelp type, location, and scale of farm. Several studies have shown that dense or continuous arrays of particular kelp species can reduce current velocities within the farm footprint, potentially leading to localised nutrient depletion in poorly flushed environments. For example, He et al. (2016) observed current reductions of 30–78% in large-scale kelp (*Saccharina*) farms in Sanggou Bay, China, while Zhao et al. (1996) documented a 50% reduction in vertical mean current speeds over a decade of expanding aquaculture activity. However, these findings are typically associated with shallow, semi-enclosed bays featuring closely spaced infrastructure and limited tidal or wind-driven mixing.

In contrast, when kelp infrastructure is installed in deeper offshore environments above unvegetated sandy substrate with no biological assemblages, such as Disaster Bay, and when rigs are spaced apart and aligned parallel to the predominant swell and current direction, the hydrodynamic effects are significantly reduced (Gagnon & Bergeron 2024). Dispersed farm layouts composed of individual 1-hectare units with independently moored longlines—as proposed by Auskelp—are less likely to create continuous barriers to flow. The deeper water column increases vertical mixing and disperses drag forces over a greater volume, while alignment with prevailing currents (as opposed to perpendicular orientation) minimises lateral resistance and the accumulation of wake zones. These structural and locational factors reduce the potential for widespread current attenuation and allow for more effective horizontal and vertical nutrient exchange across the farm. Accordingly, the hydrodynamic effects observed in shallow, high-density farm systems may not be directly applicable to offshore kelp farms such as Eden-1. As noted by Shi et al. (2011), farm-induced changes to hydrodynamics are scale-dependent and should be evaluated on a site-specific basis.

The proposed longline infrastructure is a flexible, open system-rather than a solid obstruction (found in oyster farming) of individual ropes set parallel to current flow. The infrastructure will be located on average more than 2.1 km offshore in +24 m of water. The typical 1-hectare rigs will be spaced irregularly and will be secured to the seafloor using a system of screw anchors and 25-35 mm ropes. The supporting buoys will float on or near the water's surface and the backbone will be 1-1.5 m below the surface. The dropper lines will extend to an average depth of 10 m and this will leave >10 m below for current access and tidal movement, delivering unobstructed hydrodynamic flow at lower levels.

Only the anchoring system will be in contact with the seabed so bottom currents beneath the proposed leases are unlikely to be significantly altered. Consequently, the subsurface infrastructure of the kelp lines are not expected to significantly impede the path of waves or currents due to their parallel alignment, which are expected to pass under, over and through this parallel infrastructure with limited alteration to coastal processes or the ongoing stability of the shoreline in Disaster Bay. In total, 2.5% of Disaster Bay will be deployed with individual 1-hectare kelp aquaculture rigs. The proposed Kelp Aquaculture Farm is not expected to reduce current speeds or hydrodynamics in any way beyond the bay.

Disaster Bay is currently undergoing notable hydrodynamic and geomorphological changes, particularly in relation to sediment transport and coastal erosion. Observational data and scientific context indicate the

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bay has recently experienced an increase in storm-driven coastal (beach) erosion, which has contributed to sand accumulation at the Wonboyn Lake entrance. This geomorphological shift has reclassified Wonboyn Lake from a historically Wave-Dominated Barrier Estuary to an Intermittently Closed and Open Lagoon (ICOLL) system—a designation associated with infrequent natural opening and closing due to sediment build-up.

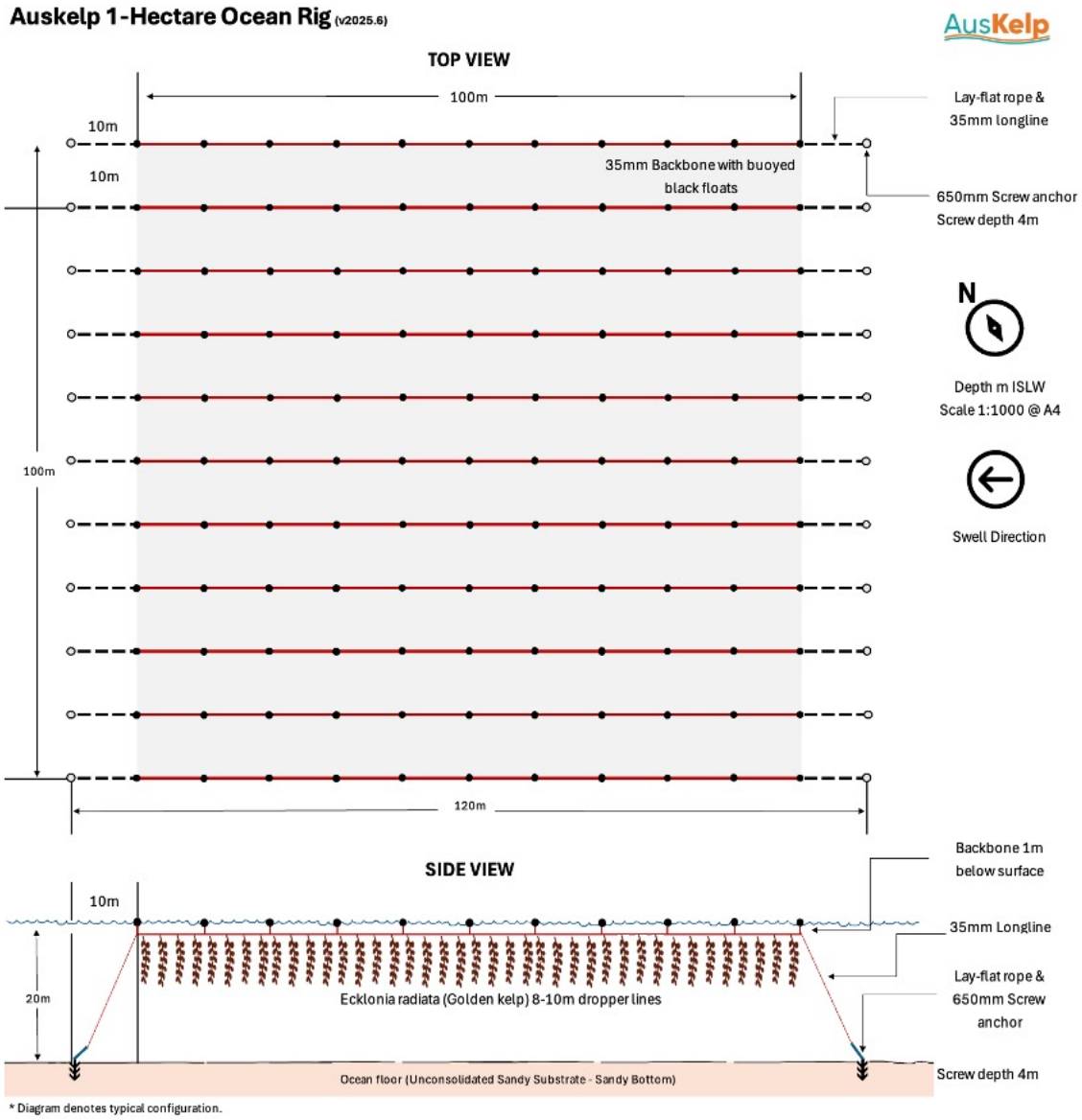

Figure 29: Auskelp 1-Hectare Ocean Rig (Credit: Auskelp 2025).

Wonboyn Lake, located on the far south coast of New South Wales, was first officially observed to close its ocean entrance in September 2004, marking a significant shift in its geomorphic and hydrological behaviour. Prior to this event, the lake had maintained a continuous open connection to the ocean since at least the 1940s. The 2004 closure was attributed to progressive sand accumulation at the lake entrance, exacerbated by severe offshore storm activity, and this event prompted the lake's reclassification as an Intermittently Closed and Open Lake or Lagoon around 2015. Since that time, the lake has experienced multiple closures, including notable events in 2009 and 2019, with the latest mechanical intervention required to reopen the entrance in June 2020. These episodic closures reflect broader shifts in regional coastal processes, including increased storm frequency, changed rainfall patterns, altered sediment loads, and potential wave energy amplification associated with climate change. The reclassification of Wonboyn Lake as an ICOLL has

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important implications for coastal ecology, estuarine management, and aquaculture operations—particularly oyster farming—which are highly dependent on consistent ocean-lake exchange.

In the context of kelp aquaculture, the evolving coastal dynamics of Disaster Bay highlight the importance of site selection and the need to assess how offshore aquaculture infrastructure interacts with sediment transport and nearshore hydrodynamic patterns–especially under changing coastal conditions related to increasing ocean temperatures and climate change. While offshore kelp farms in deep, open-ocean settings like Disaster Bay are unlikely to contribute to coastal erosion due to their distance from the shoreline and dispersed layout, it is essential to monitor potential secondary effects on wave energy distribution and sediment movement over time.

Climate Change

The effects of climate change on marine environments, including aquaculture systems, are of international concern and continue to be addressed by a number of coordinated research efforts. The National Climate Change Adaptation Research Facility (**NCCARF**), originally hosted by Griffith University, has played a central role in synthesising data across Australia to help decision-makers manage the risks associated with climate variability in key sectors such as water, emergency response, and primary industries. These research frameworks are essential to understanding and planning for the sustainability of emerging industries such as offshore kelp aquaculture.

Multiple institutions including NSW DPI, the University of Tasmania, University of Technology Sydney, and James Cook University have conducted interdisciplinary studies into the long-term viability of aquaculture in a changing climate. These investigations have generally focused on shellfish and finfish aquaculture, but their frameworks also apply to macroalgae systems, particularly regarding temperature tolerance, urchin numbers and biofouling dynamics. For reference, El Niño events tend to strengthen upwelling along the NSW coast, and La Niña phases may reduce nutrient availability due to weakened oceanic mixing. These dynamics could influence kelp yield depending on the seeding season and location. In addition, kelp growth is influenced by current velocity and light penetration, both of which may be altered under projected changes in storm intensity and cloud cover.

Disaster Bay is the proposed location for the Eden-1 Kelp Aquaculture Farm, which is located offshore in +20m deep, open water with high flushing rates and persistent current and wind-driven upwelling. These conditions make it a suitable location for climate-resilient aquaculture. However, climate change introduces a range of stressors to kelp systems that must be carefully monitored, especially for wild *Ecklonia radiata* stands. One of the most pressing concerns is rising sea surface temperatures, which, beyond a threshold of approximately 23°C, can reduce the productivity of wild *Ecklonia radiata*.

A catastrophic decline in *Ecklonia radiata* kelp forests was recorded along the west coast of Australia following a marine heatwave in the summer of 2010–2011, which elevated sea surface temperatures by 2–4°C above average for an extended period. This anomalous warming event led to the widespread and near-total loss of kelp forests across more than 100 km of coastline, particularly in the Midwest region between Kalbarri and Jurien Bay. According to Wernberg et al. (2013), up to 43% of temperate reef habitats previously dominated by *Ecklonia radiata* experienced a regime shift to turf algae or barren substrates, with no sign of kelp recovery even a decade later. Long-term monitoring indicates that the kelp ecosystems have not returned, largely due to continued ocean warming and the southward expansion of tropical herbivorous fish and urchins, which inhibit kelp regrowth. This event represents one of the most well-documented examples of irreversible kelp loss due to climate change and underscores the vulnerability of *Ecklonia radiata* populations at the warm edge of their distribution.

Research has confirmed significant regional declines in *Ecklonia radiata* kelp forests in both Victoria and New South Wales, reflecting broader national trends in the degradation of temperate reef ecosystems. According to the Victorian Kelp Cover Scientific Report (2025), *Ecklonia radiata* kelp forests in Victorian waters are projected to experience a significant decline of over 50% in cover across the Bass Strait region by 2050 under moderate emissions scenarios. The report attributes this decline to rising sea surface temperatures, increased

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herbivory by sea urchins, and sedimentation stress, with some sites already exhibiting early-stage transitions to urchin barrens (Victorian Kelp Cover Scientific Report, 2025).

Long-term monitoring has identified substantial kelp loss in Port Phillip Bay, where *Ecklonia radiata* forests have been dramatically reduced over recent decades. The key drivers of this decline include overgrazing by the native purple sea urchin (*Heliocidaris erythrogramma*), declining water quality, and sedimentation. These pressures have contributed to the formation of extensive "urchin barrens"—zones stripped of macroalgal cover and associated biodiversity. According to The Nature Conservancy Australia (2022), these areas now span large portions of previously vegetated seafloor, threatening the ecological function of one of Victoria's most important nearshore habitats. To address these losses, restoration initiatives such as the Port Phillip Bay Golden Kelp Restoration Project have been launched. These projects aim to restore *Ecklonia radiata* by combining active urchin culling with the planting of juvenile kelp on reef areas cleared of herbivory pressure. Such measures are considered essential for halting further kelp forest decline and re-establishing critical ecosystem services provided by these marine forests.

In New South Wales, *Ecklonia radiata* populations have been negatively affected by multiple stressors, including ocean warming, coastal eutrophication, and cumulative climate impacts. These declines are particularly pronounced at the northern (warm) edge of the species' range, where exposure to marine heatwaves and changing oceanographic conditions have increased the frequency and severity of ecological stress events. A study by Vergés et al. (2022) highlights that *Ecklonia radiata* along the NSW coast is retreating poleward, a trend consistent with predictions for species under thermal stress from a strengthening East Australian Current.

In addition, climate change also affects ecological interactions within kelp beds as far south as Tasmania. A surge in sea urchin populations (*Centrostephanus rodgersii*), driven by warming waters and predator decline, has led to widespread kelp deforestation—particularly in Tasmania and southern NSW. Importantly, the design of open ocean kelp aquaculture systems, which are suspended above the seabed, are unaffected by grazing from benthic herbivores such as sea urchins.

If present trends in kelp forest decline continue, the ecological and economic consequences will be profound and likely irreversible in many coastal systems. *Ecklonia radiata* and other kelp species form the foundation of temperate reef ecosystems, providing food, habitat, and nursery grounds for hundreds of marine species, including commercially and culturally significant fish and invertebrates. The continued degradation of these habitats due to climate change, overgrazing by urchins, coastal development, and water quality deterioration will lead to cascading ecosystem collapse, including the loss of biodiversity, reduced fisheries productivity, and weakened carbon sequestration potential. Wernberg et al. (2011) demonstrated that kelp forests can shift to turf-dominated systems with reduced structural complexity, supporting far fewer species and providing little ecological resilience.

Globally, it is estimated that up to 38% of kelp forests have already declined (Krumhansl et al., 2016), and in regions like eastern Australia, warming-driven species displacement is accelerating this loss. Without intervention—including restoration, mitigation of climate impacts, and the development of sustainable aquaculture alternatives—Australia possibly risks losing one of its most valuable marine ecosystems, along with the services it provides to coastal communities, fisheries, and climate regulation.

Documented wild kelp losses indicate that the distribution and intensity of upwelling events are essential for delivering nitrate and phosphate nutrients to surface waters. Therefore, the location in upwelling prone areas is the most essential requirement of appropriate kelp farming placement. Whilst shifting climate patterns will affect many areas along Australia's coastline, Disaster Bay, and eastern Victoria (around Mallacoota), are expected to continue to benefit from cooler water temperatures and upwelling nutrients despite changing climate factors.

The global decline in wild kelp forests, particularly in temperate regions, has also been strongly linked to climate-driven stressors such as marine heatwaves, increased turbidity, and nutrient stratification (Krumhansl et al., 2016; Wernberg et al., 2019). These pressures reinforce the ecological importance of cultivated kelp as both a conservation strategy and a climate adaptation tool. Furthermore, the effects of climate change have

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extended to the broader fisheries sector in New South Wales, including the Eden region. According to DPI NSW (2022), total wild fisheries production has declined from over 22,000 tonnes in 2000 to less than 15,000 tonnes by 2020, with some of the sharpest declines seen in species sensitive to water temperature and ocean productivity. This reduction, combined with other factors, has led to a decrease in fishing vessel numbers and infrastructure use in Eden, and has catalysed local interest in alternative, low-impact marine industries such as kelp farming.

Open-ocean testing conducted by Auskelp between 2022 and 2025 has demonstrated that *Ecklonia radiata* sourced and propagated from local populations in Disaster Bay can be successfully seeded and grown in ocean temperatures exceeding 23°C without measurable impacts on survival or growth rates. These findings challenge the conventional assumption that *Ecklonia radiata* is limited to cooler waters and suggests that temperature thresholds for juvenile resilience may be higher than previously believed. It is hypothesised that when the spore-to-gametophyte-to-sporophyte life cycle stages are managed in a controlled hatchery environment, the resulting sporophytes exhibit enhanced tolerance to elevated ocean temperatures—a potential climate adaptation strategy. In addition, nutrient monitoring and testing at the Disaster Bay test location during April–December confirmed consistently adequate nitrate and phosphate concentrations to support robust kelp growth, regardless of seasonal or interannual variability. Notably, the data indicated minimal variation in nutrient availability between El Niño and La Niña phases, likely due to the strong upwelling and well-flushed nature of the bay. These results provide evidence that offshore kelp aquaculture in this region may be inherently more resilient to certain climate stressors.

Disaster Bay offers highly suitable conditions for kelp aquaculture, primarily due to the absence of direct land-based runoff from agriculture or urban development. The Wonboyn and Merrica Rivers flow through mainly forested and undeveloped catchments, and as a result, contribute negligible amounts of synthetic fertilisers such as urea into the bay. This lack of anthropogenic nutrient input helps maintain high water quality, which supports strong *Ecklonia radiata* survival rates. While large rainfall events exceeding 50 mm do not significantly affect salinity levels more than 1.1 km offshore—where the Eden-1 kelp farm is situated—surface stratification caused by freshwater input is generally confined to the upper 2 metres of the water column in major rainfall events and disperses quickly in high flushed areas. The primary concern during high rainfall events is not salinity change but increased nutrient and pollutant loads, including from sewage overflows, which rapidly amplify biofouling pressure on kelp surfaces. This fouling can lead to smothering of the fronds, reduced light availability, and subsequent tissue death. Trials in nearby Twofold Bay showed that such nutrient spikes rapidly degrade kelp health, underscoring the importance of locating farms in offshore, well-flushed environments with minimal pollution inputs.

Kelp aquaculture also supports climate adaptation in terrestrial food systems. When processed into biostimulants, kelp extracts can enhance crop drought resistance and reduce the need for synthetic fertilisers such as urea. Studies by Ali et al. (2022) and Sharma et al. (2014) have shown that kelp-based biostimulants improve nutrient uptake efficiency, promote soil microbiome health, and enhance crop resilience during heatwaves and drought events. This has direct implications for the Bega circular economy and decarbonisation of agriculture, positioning kelp as a key asset in climate-smart food systems.

In the face of global demographic and environmental pressures, the urgency of developing ocean-based food production systems is now widely acknowledged. The Food and Agriculture Organization (FAO) estimates that by 2050, the world will need to produce 50% more food to meet demand, and much of this increase must come from the ocean, given the limits of arable land expansion (FAO, 2020). Offshore kelp farming represents one of the few scalable, low-footprint methods of generating high-value biomass while sequestering carbon and restoring marine ecosystems.

Conclusion

Based on evaluation of hydrodynamic modelling, offshore testing experience, and climate-resilience indicators, the risk of significant impact from the Eden-1 Kelp Aquaculture Farm on coastal processes and operational sustainability is assessed as 'low'. The installation of longline infrastructure within Disaster Bay is not expected to significantly disrupt water circulation, wave energy distribution, or sediment dynamics; due to the open-ocean location of the farm with infrastructure being on average more than 1.1 km offshore; its

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position in a deep (20-27 m), well-flushed bay with a fast natural flushing time, and the use of parallel, low-resistance rig designs. Wave diffraction, shoaling, and reflection—while present under certain high-energy conditions—are expected to remain within acceptable thresholds. Lastly, the farm is likely to remain intact and operationally viable under changing climate scenarios.

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9.1.2 Habitat Loss and Shading

Risk Table 3: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – habitat loss and shading caused by the installation of longline infrastructure (modified from Fletcher et al., 2004; Vom Berg, 2008; NSW OEH, 2015).

Issue	Will the installation of longline infrastructure result in significant shading of marine benthic environment or significant loss of marine habitat through modification, isolation, disturbance or fragmentation?
Comments for consideration	• What habitat will be modified, removed, isolated and/or fragmented by the installation of the longline infrastructure? • How much habitat will be disturbed? • What fish and other biological assemblage exist within the lease location? • Will the longline infrastructure cause shading of the seabed or water column? • Is this area of habitat critical to the survival of any resident or vagrant species in the direct or wider area? • Is this habitat unique, under threat and/or restricted in extent/scale? • Is similar habitat available in the direct and wider area? • Are environmentally sensitive areas (e.g. seagrass, mangroves and corals) present in or in close proximity to the Kelp Aquaculture Farms?
Description	• Total lease area = 200 ha • 200 ha = 2,000,000 m2 • Total number of 1-hectare longline rigs = 100 • Lease area benthic habitat = TYPE 3 minimally sensitive key fish habitat • Average water depth = 24 m • Number of longlines per hectare = 10 • Clearance between culture apparatus and seabed = >10 m • 76 taxa (fish, crustacean, mollusc, worms, echinoderms, algae, nematode) observed and recorded within the lease area

Proposed Management – Mitigation and Monitoring	• Total operations area (5% of Disaster Bay)
	• Total rig coverage (2.5% of Disaster Bay)
	• Only 25 hectares will be deployed in the first operational year
	• Site selection
	  ◦ No environmentally sensitive or unique areas
	  ◦ Habitat type beneath longlines = fine to medium grained sand; unvegetated sandy substrate with no biological assemblages
	  ◦ An extensive area of similar habitat is directly available in wider area
	• Open, streamlined infrastructure design
	• Minimal disturbance to seabed i.e. anchors only
	• See Eglin Marine Benthic Survey 2025 (attached as Appendix A9)
	• Annual log of excessive beach cast *Ecklonia radiata* from farming operations

Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	2	2	Low

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Justification of Ranking

The seafloor within the proposed Eden-1 kelp farm footprint is characterised by unvegetated, fine–medium sandy substrate with variable shell grit and no reef, hard structure, or sensitive benthic communities. The lease area is classified as TYPE 3 minimally sensitive key fish habitat (Elgin 2025 – see full report attached as Appendix A9), which is the least sensitive marine environmental classification under the FM Act. These types of soft-bottom habitats are common along this section of the NSW coastline and typically support burrowing invertebrates and small demersal fish but lack the structural diversity of rocky reef or seagrass systems.

The proposed Eden-1 Kelp Aquaculture Farm will occupy ~5% of the total deep-water area of Disaster Bay, within a 200-hectare lease zone. Auskelp plans to install up to 100 x individual 1-hectare infrastructure rigs, each anchored to the seafloor with 22 x high-strength screw anchors. These screw anchors will be inserted to a depth of 3 – 6 m into the seabed. Anchors will be strategically placed, with one primary screw anchor per longline at the exposed ocean-facing end, and a single anchor at the sheltered, inshore end. Anchors were selected over concrete blocks due to their superior holding power at depth, minimal seabed profile, and their lack of structural complexity, which avoids encouraging artificial habitat colonisation (Carter et al., 2020).

The average water depth across the site is approximately 24 metres, and each rig will include 11 horizontal longlines, each approximately 100 m in length, oriented parallel to prevailing ocean swell in a southwest direction, perpendicular to Greenglades Beach. Longlines are spaced at ~15-metre intervals, independently moored to reduce hydrodynamic drag, maintain structural resilience during storm conditions, and ensure open passage for marine life. Field trials conducted by Auskelp between February 2022 and February 2026 during storm events, including peak wave heights (Mmax) of +12 metres, confirmed that *Ecklonia radiata* exhibits neutral buoyancy and streamlined morphology, resulting in minimal loading on longline infrastructure.

Each kelp dropper line will maintain a >10 metre vertical clearance from the seabed, ensuring benthic access for mobile fauna and mitigating shading effects. Given the water depth, dropper spacing, longline spacing, and the seasonal angle of incident sunlight, shading of the seafloor is not expected to be ecologically significant, even at peak biomass accumulation in winter. At a depth of 24 metres, only ~30% of surface irradiance penetrates the water column under clear oceanic conditions (Kirk, 2011), and modelling indicates that photosynthetically active radiation (PAR) levels will remain above minimum thresholds for benthic microbial and invertebrate activity under the proposed layout. The deployment of rigs will be staggered, with a gradual rollout of infrastructure established each year. This adaptive rollout enables detailed environmental performance monitoring, iterative design improvement, and the ability to detect any unexpected ecological responses prior to full-scale implementation.

The longline infrastructure will temporarily occupy the pelagic water column from the surface to ~10 metres depth, due to the presence of floats (approximately 10 per longline, depending on load), backbone ropes, and kelp droppers. This represents a functional rather than structural change in pelagic habitat. No barriers or nets will be installed, and ~15-metre open corridors between longlines will be maintained, enabling movement of marine megafauna. Similar configurations have been demonstrated to have negligible impacts on species such as dolphins and seals, which are known to pass freely through longline structures (Umwelt, 2003). Observations from pearl farms in Western Australia have reported increased dolphin residency, including female dolphins calving within longline areas and using them as refuge from predation (Umwelt, 2003). Longline structures have also been shown to provide substrate for colonisation by ascidians, bryozoans, molluscs, hydroids, and other sessile fauna, contributing to increased microhabitat complexity and secondary productivity (Campbell et al., 2019; WAMPA, 2005).

Biological Assemblage

A total of 76 taxa were recorded during benthic survey and underwater drone field surveys of the proposed lease area with the following biodiversity breakdown:

- 8 bony fish
- 9 elasmobranchs (sharks and rays)
- 17 crustaceans
- 16 molluscs

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- 20 annelid worms
- 4 echinoderms
- 2 algae (1 attached, 1 drift)
- 1 nematode

Of all these taxa, 67% (51 of 75) were sediment infauna living within the interstitial space of sand particles; 24% (18 of 76) were demersal and/or pelagic species including fish, shark, rays and squid; and 7% (5 of 76) were epifauna that live on top of the sediment including sea stars, tulip shell and hermit crab. The algal assemblage is a minor component of the sandy seabed ecosystem represented by one unidentified small filamentous brown alga that was attached to shell material (Plate 4). The other alga observed was *Phyllospora comosa* (crayweed) as drift wrack having been detached from outside of the survey area.

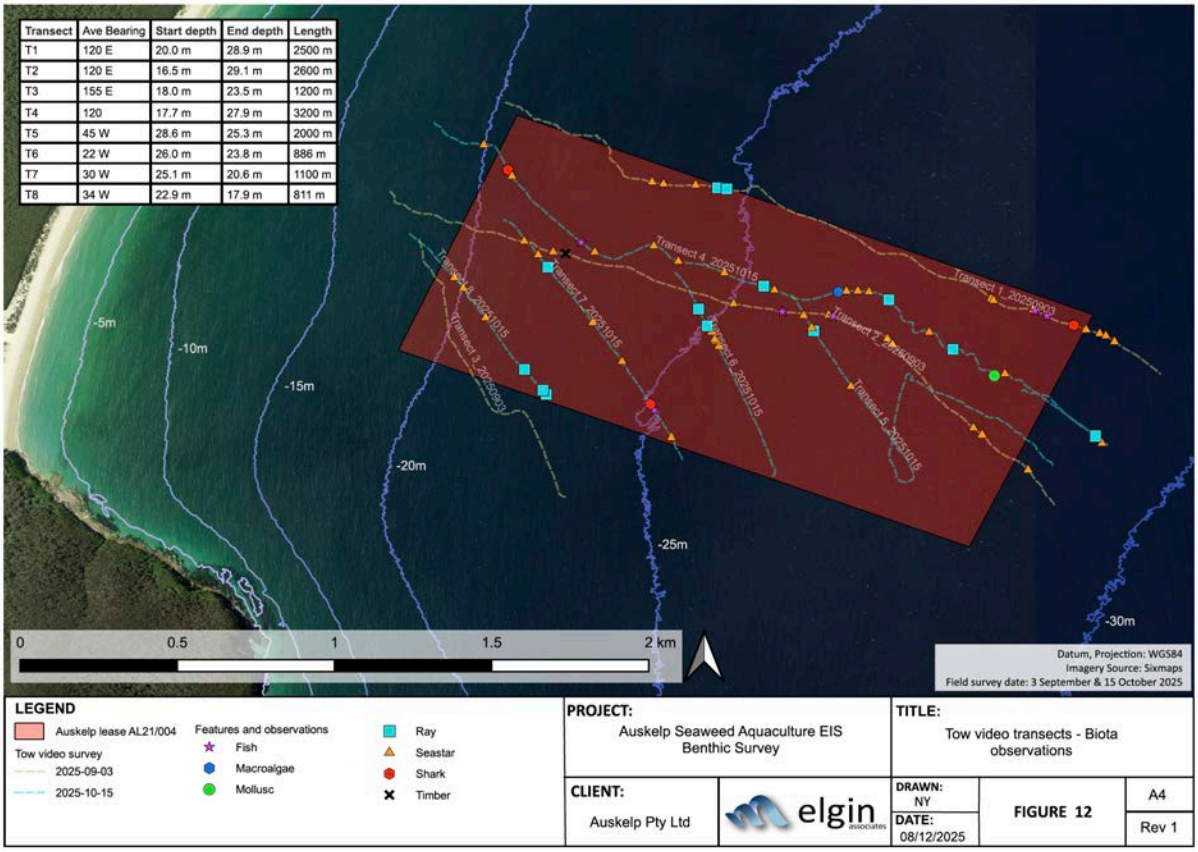

Figure 30: Disaster Bay tow video – Biota transects conducted by Elgin Associates – Sept and October 2025.

A total of 17 fish species were recorded including 8 bony fish species, 3 sharks, 5 rays and 1 skate. The majority of species (12 of 17) were recorded using the BRUV method (Table AT4) with three ray species (Eastern Shovelnose Ray, Sparsely-spotted stingaree, Kapala stingaree) and the cryptic Eastern fortescue recorded during tow video, and the big-belly seahorse observed incidentally while retrieving BRUV06. The most common and abundant fish observed were the yellowtail mackerel (*Trachurus novaezelandiae*, mean maxN = 23), jack mackerel (*Trachurus declivis*, mean maxN = 39) and eastern school whiting (*Sillago flindersi*, mean maxN = 19). Two species of flathead commonly recorded in similar abundance included the southern sand flathead (*Platycephalus bassensis*, mean maxN = 3) and eastern bluespotted flathead (*P. caeruleopunctatus*, mean maxN = 3). For shark and ray species, it was typical to observe a single individual per BRUV employment. Overall, species richness per BRUV deployment ranged from 5 – 10 with mean species richness of 7 (±SE 1.0).

All species observed are commonly recorded in the Twofold Shelf bioregion with majority of species observed typical of sand habitat. One exception is the big-belly seahorse which is typically observed in rocky reef habitat where the species prefers to cling to structure such as macroalgae, sponges and rocks. Seahorses are

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not strong swimmers and tend to be localised where they occur. The specimen observed during fieldwork attached to rope was likely to be a vagrant swept from its preferred habitat by ocean currents.

Under the proposed design model, the installation of the Eden-1 infrastructure will not remove, isolate, or fragment any critical habitat. The seafloor within the lease area consists of unconsolidated sandy sediments classified as TYPE 3 minimally sensitive key fish habitat under the Fisheries Management Act, characteristic of a high-energy coastal environment with active hydrodynamic transport. The site has been mapped with side-scan sonar and underwater drone operations (See Figure 30 above), and various mapping methods have only encountered unconsolidated sandy sediments. Disaster Bay functions as a sediment deposition zone, bounded by Green Cape to the north and Jane Spiers Beach Head to the south, where fine to medium sands dominate the seabed. This habitat type is neither unique nor ecologically sensitive, and similar benthic environments are widely distributed throughout the region. No seagrass beds, mangrove stands, coral reefs, or other sensitive benthic habitats have been mapped within or adjacent to the lease area (NSW DPI, 2023).

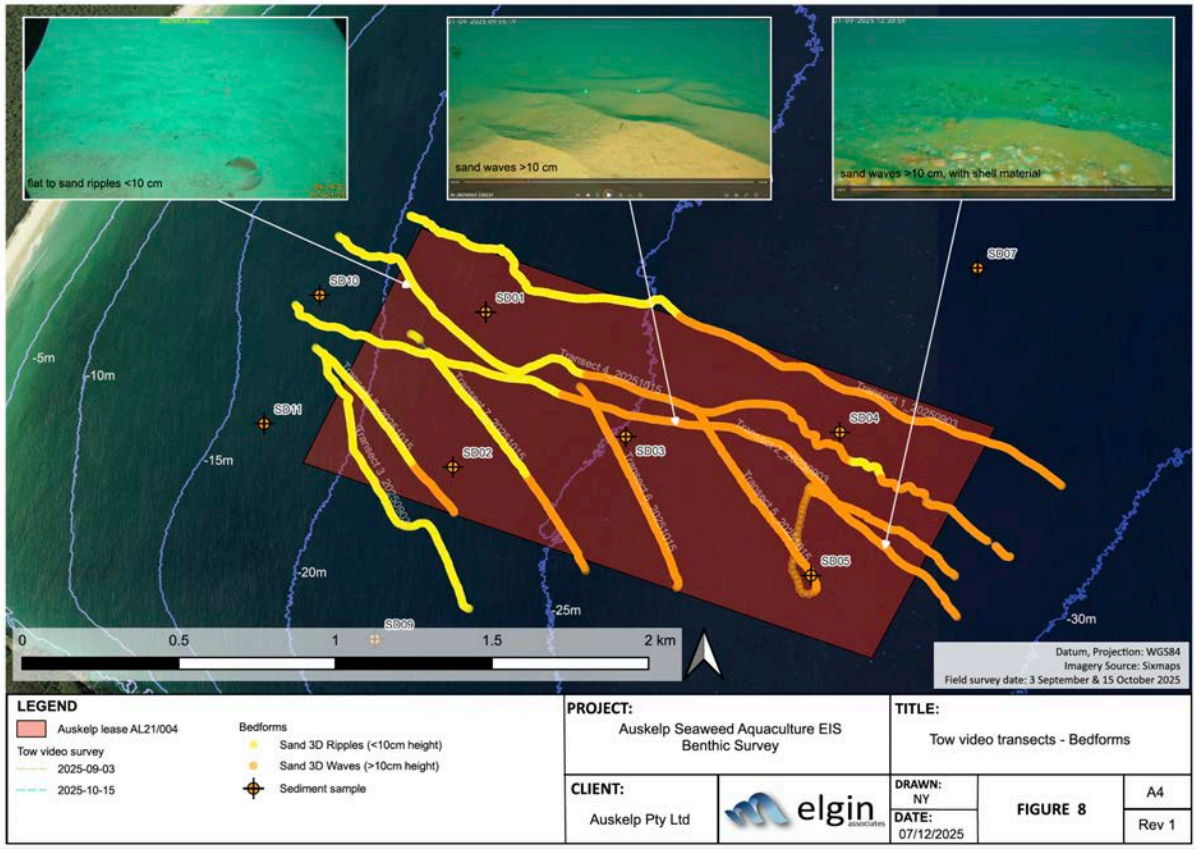

Figure 31: Disaster Bay tow video transects conducted by Elgin Associates – Sept and October 2025.

The site is not located within or adjacent to any critical habitat or recognised areas for foraging, breeding, or resting of marine fauna. The nearest areas of recognised ecological significance being Nadgee Nature Reserve and Beowa National Park are terrestrial zones and do not connect ecologically to the subtidal lease area. The Project is located outside known cetacean migratory corridors and grey nurse shark aggregation zones (DCCEEW, 2023). Scientific assessments of similar longline operations in Australian waters have shown minimal benthic impact from habitat loss or shading caused by suspended aquaculture systems. Gifford (2006) found no detectable effects on seagrass or benthic fauna beneath a longline pearl farm at Wanda Head, Port Stephens. Similarly, O'Connor et al. (2002) reported no significant ecological impact from mussel farms in Twofold Bay, despite greater stocking densities and shallower depths. These findings are consistent with the expected impact profile of the Eden-1 Kelp Aquaculture Farm.

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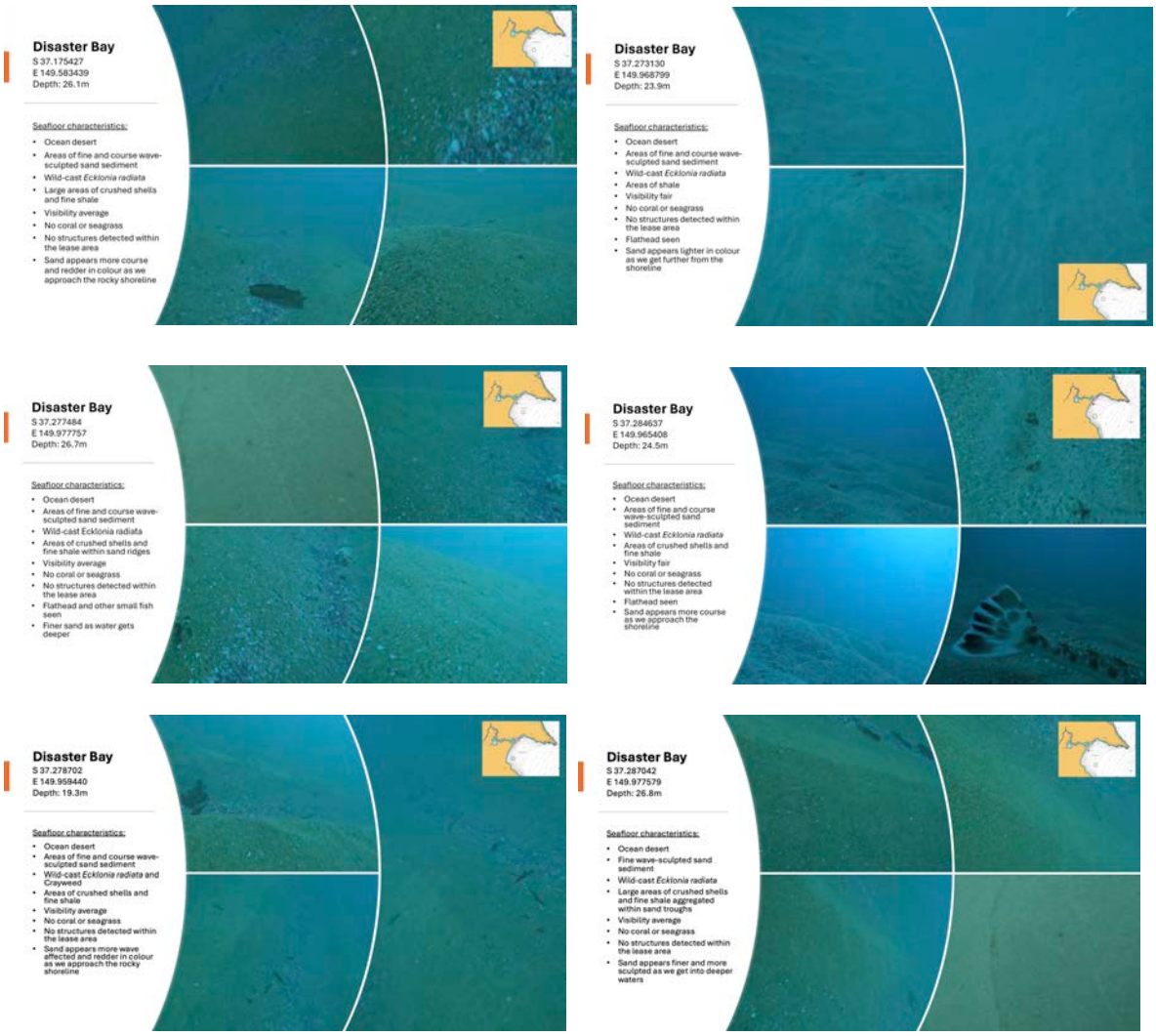

Figure 32: Disaster Bay underwater drone survey conducted by Auskelp– April 2024 (sample locations).

Biodeposition and Benthic Effects

The accumulation of organic material on the seabed beneath aquaculture operations is a recognised issue in certain aquaculture systems, particularly bivalve and finfish farming, and has recently been the subject of management focus in Tasmania. In these systems, biodeposition primarily results from the accumulation of faeces, pseudofaeces, and uneaten feed, which can increase sediment organic loading and, in poorly flushed environments, lead to localised benthic enrichment or hypoxic conditions.

The Eden-1 Kelp Aquaculture Farm presents a fundamentally different risk profile and is not expected to generate biodeposition impacts. Kelp aquaculture is a non-fed, extractive system that does not produce faecal material or introduce feed or nutrients into the marine environment. Biomass production occurs through photosynthesis using dissolved nutrients already present in the water column. Organic inputs are limited to minor detrital losses of kelp tissue, which are typically coarse, primarily neutrally buoyant, and are rapidly dispersed in high-energy offshore environments. Unlike the sheltered embayments where biodeposition issues are documented, Disaster Bay or the farming of *Ecklonia radiata* is not expected to promote organic accumulation.

Auskelp will maintain an annual log of significant beach-cast deposits of *Ecklonia radiata* post storm events to determine if the beach-cast kelp is originating from farming operations (which can be determined by species, kelp age and the presence of holdfasts adapted to ropes or rocky substrates) – findings will be reported annually to NSW Fisheries.

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Conclusion

The area of soft sediment and pelagic habitat expected to be affected by the Kelp Aquaculture Farm—primarily through shading, habitat modification and biodeposition—has been assessed as 'low'. This conclusion is based on the overall scale, configuration, and low-density design of the farm, as well as the extensive presence of soft sediment TYPE 3 substratum throughout the surrounding region. The proposed lease areas do not overlap with any environmentally sensitive or ecologically unique habitats and are characterised by a lack of complex benthic habitats, such as reefs, seagrass meadows, or other binding substrates that typically support high structural biodiversity. This absence of complex habitat types further reduces the potential for significant ecological disruption. Existing monitoring data from comparable longline aquaculture sites further supports the low-impact assessment. The farm's location has been designed to avoid isolation of any critical habitats, and large areas of similar soft sediment and pelagic environments remain accessible both within and beyond the lease footprint. Adjacent habitats are expected to support similar biological communities, with no significant alteration to fauna or flora assemblages anticipated in the broader study area.

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9.2 CONSTRUCTION AND INFRASTRUCTURE

9.2.1 Noise During Construction

Risk Table 4: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – noise during the construction stages of Kelp Aquaculture Farming (modified from NOAA Fisheries – Marine Mammals and Underwater Noise, 2025; and Fletcher et al., 2004; Vom Berg, 2008).

Issue	Will the Kelp Aquaculture Farming have uncharacteristic noise levels generated during the construction stage (i.e. level, type and/or duration) and is it likely to have a significant effect on land or marine communities?			
Comments for consideration	• Where will the land-based operations be based? • Will Nadgee Nature Reserve be required for access? • What types of machinery will be employed during the construction stage? • Will there be a significant increase in noise levels during the construction stage of the Project? • Is the noise uncharacteristic for the construction and deployment sites and will it be likely to exceed acceptable levels? • Will the noise affect the marine environment and marine mammals? • Will the noise affect residential areas, fishers or beachgoers? • What time of day will the daily operations and maintenance be carried out? • What mitigation and management measures are available to minimise the level of noise generated?			
Description	• Proposed construction site = Edrom, land zoned for industrial activities • Noise generated will be a maximum = 110 dB located 1.1km offshore • Noise attenuation will be 50 dB at Greenglades beach • Construction/pre-assembled and ocean deployment = short term duration • Farms will be deployed in 1 hectare lots, which consist of 11 x 100 m mainlines which are each independently secured to the seafloor by 2 x screw anchors (per mainline) • Types of machinery = outboard motors, diesel/motor generator, mobile crane, trucks, screw anchor drill, hand and small power tools			
Proposed Management – Mitigation and Monitoring	• Comply with Protection of the Environment Operations Act 1997 (POEO Act) and Protection of the Environment Operations (Noise Control) Regulation 2017 • Comply with industry best practice and noise management • Construction hours of operation = daylight hours • Approved Marine Fauna Interaction Plan • Employ observers when transporting and deploying longline infrastructure • Comply with the DCCEEW maximum approach distance from marine mammals • No pile driving, hammering or dredging • Site located away from standard whale migration routes and any shorebird nesting areas • Vessels used will be similar to existing commercial operations – noise will not be uncharacteristic of the general area			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	5	5	Low

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Justification of Ranking

In New South Wales, regulation of noise emissions from marine-based activities such as the Eden-1 Kelp Aquaculture Farm fall under the jurisdiction of the NSW Environment Protection Authority (EPA), as established by the Protection of the Environment Operations Act 1997 (POEO Act). The EPA is the primary regulatory authority for scheduled and non-scheduled activities that may generate environmental noise, including from vessels and aquaculture operations within state waters. Additionally, the Protection of the Environment Operations (Noise Control) Regulation 2017 sets out specific provisions regarding noise from marine vessels and equipment. While the EPA leads regulatory oversight, construction and deployment compliance may also be supported by the NSW Department of Primary Industries (Fisheries NSW), particularly where environmental impacts intersect with marine biodiversity or aquaculture licensing. Together, these agencies ensure that all activities remain within acceptable acoustic thresholds and adhere to best environmental practices.

The offshore construction phase of the Eden-1 Kelp Aquaculture Farm will seek to adhere, wherever practical, to the standard construction hours recommended by the NSW Environment Protection Authority (EPA) and the Department of Planning and Environment. These guidelines specify allowable working hours from 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm on Saturdays, excluding Sundays and public holidays, under the NSW Noise Policy for Industry (NSW EPA, 2017). However, given the offshore nature of the Project and the reliance on ocean conditions, there will be a necessary degree of flexibility. Construction and deployment activities are heavily dependent on sea state, prevailing swell and wind directions, tidal variation, and the availability of safe weather windows. Additionally, work hours must be adaptable to seasonal daylight patterns and biological timing relevant to kelp cultivation cycles. For example, early morning deployments during summer months may be required to avoid the afternoon onset of northeasterly sea breezes or southerly busters, which are characteristic of this region. Therefore, while best efforts will be made to comply with onshore noise regulations, the inherently dynamic and marine-based conditions of the site necessitate a more responsive operational approach.

Due to the size, remoteness, and offshore positioning of the Eden-1 lease area in Disaster Bay, the construction and operational activities of the Project are not expected to be materially affected by standard EPA noise or construction regulations typically applied to urban or nearshore environments. The proposed site lies approximately 25 km south of the town of Eden and is entirely marine based, located more than 1.1 km offshore in open ocean waters. It is not within acoustic proximity to any residential or sensitive land-based receptors. The surrounding coastline is dominated by uninhabited conservation land, including Beowa National Park to the north and Nadgee Nature Reserve to the south, both of which are managed primarily for biodiversity conservation and do not contain residential settlements or tourism accommodation infrastructure near the lease area. There are no roads, facilities, or populated zones adjacent to the site. This isolation substantially reduces the risk of any noise or construction-related amenity impacts, and thus the lease area should reasonably be considered outside the scope of typical construction hour restrictions as intended by the NSW EPA guidelines, which are designed to protect human amenity in populated or sensitive areas.

Nadgee Nature Reserve will not be used for any commercial access during construction or operational phases. The only requirement for entry relates to occasional visual observation following extreme storm events, and only in circumstances where safe ocean access from Eden or Edrom is unavailable. Under such scenarios, no vehicles will be permitted off designated roadways, and access to Greenglades Beach will be strictly by foot using designated pathways. Observations will be limited to the inspection of beach conditions for (i) potential loss of longline infrastructure, (ii) the observation of storm-cast kelp, or (iii) the launching of drones from the waterside to support farm inspection for vessel or marine mammal safety. Note: drones cannot be launched from within the Nadgee Nature Reserve and can only be launched from the beach area below the Mean High Water Mark (MHWM) and not within 1 km of the south end of Greenglades Beach. Where possible, a spotter should be used to ensure no interactions with local raptors. Access for this purpose is expected to occur fewer than twelve times per year and only under extreme conditions. Any detached infrastructure requiring removal will be retrieved from Disaster Bay directly, and not through the reserve, unless such recovery can be demonstrated to have no impact on pathways, roads, or vehicle access within the reserve. In the unlikely event of a catastrophic injury to a crewmember, emergency circumstances may

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necessitate coming ashore in the proximity of Wonboyn as the most expedient course of action; while this outcome is not anticipated, it is recognised as a contingency for the purposes of protecting human life.

Overview

The construction site for the setup, pre-assembly and staging of the longline infrastructure for the Eden-1 Kelp Aquaculture Farm is within the commercial precinct currently operated by Pentarch, located at the Eden Chip Mill site, William Allen Rd, Edrom NSW. This established industrial area supports a variety of commercial operations and benefits from direct access to existing wharf facilities, including the Eden Multi-Purpose Wharf, which is also managed by Pentarch. The site is appropriately zoned for industrial use and there are no residential zones in the area, with the exception of Edrom House. Noise associated with infrastructure assembly and vessel mobilisation is not expected to be uncharacteristic of the surrounding area.

The waters of Twofold Bay, adjacent to the construction site, are actively used by a range of vessel types including recreational boats, commercial fishing vessels, whale-watching charters, mussel farming vessels, tugboats, ocean liners, large commercial vessels (loading and transporting logs and woodchips), and Royal Australian Navy ships. The vessels used by Auskelp for the deployment of longline kelp infrastructure will be similar in nature, however significantly smaller than those already operating within the area.

Kelp Farming Infrastructure will be transported approximately 35 km by sea to the lease site in Disaster Bay. The nature and scale of the deployment activities are consistent with the existing Mussel Farming operations in Twofold Bay, the temporary increase in vessel activity will not introduce acoustic disturbances comparable to that already present in the local maritime environment. The Eden-1 Commercial Lease Area is situated offshore in Disaster Bay, approximately 25 km south of Eden and 4.2 km from the township of Wonboyn. The lease area is located over 1.1 km from the shoreline (at the nearest point), surrounded by Beowa National Park and Nadgee Nature Reserve, areas devoid of permanent human habitation. The remote nature of the site, coupled with its distance from populated areas, suggests minimal risk of noise impact on human receptors. When assessing the impact of noise generated during the construction stages of commercial kelp farming, consideration has been given to the offshore location of the farm, prevailing ambient sea noise conditions, the absence of residential receptors, and the low frequency and intensity of construction and deployment activities.

When assessing the potential impacts of farm construction on marine fauna, several key considerations must be taken into account. These include the acoustic sensitivity of marine mammals, such as whales, dolphins, and seals, particularly in areas near known migratory routes or breeding grounds. The type, frequency, and duration of vessel traffic associated with farm operations may influence the behaviour of marine species, especially if operations occur during periods of heightened biological activity. The sound propagation characteristics of aquaculture infrastructure, including ropes, buoys, and anchoring systems have been evaluated for their potential to transmit noise underwater. Consideration has been given to the timing of deployment and harvesting activities, particularly during sensitive periods such as whale migration, and the potential for cumulative effects in areas with other existing marine activities. These factors collectively inform the environmental assessment of kelp farming in marine ecosystems.

Justification of ranking

Noise will be generated in conjunction with the construction, transport and deployment of the longline infrastructure. When assessing the impact of noise generated during the construction stage, consideration has been given to ambient noise levels, existing land uses, noise source level, duration of operation and deployment activities, presence of noise softening measures (e.g. surrounding area and topography variations) and the sensitivity of the receiving environment (Cardno Ecology Lab, 2010).

The risk associated with noise emissions from the construction and deployment of the Eden-1 Kelp Aquaculture Farm has been assessed as low based on a range of environmental, technical, and contextual factors. This ranking is derived from a qualitative analysis of the likelihood of impact and the potential consequence of that impact on both human receptors and marine fauna.

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During the construction and deployment stages of the Eden-1 Commercial Kelp Farm, an assessment of noise generation and its potential impacts has been undertaken, addressing both terrestrial and marine environments. The site is located over 1.1 km offshore (at the nearest point) in Disaster Bay, approximately 25 km south of Eden and 4.4 km from the nearest township, Wonboyn. The surrounding coastline comprises national parks and nature reserves with no permanent residential receptors, and the area is only infrequently visited due to its remoteness. Acoustic modelling confirms that noise generated by daily construction and deployment activities—including vessel trips, equipment use and deployment – is unlikely to be detectable at any shoreline location, including the Wonboyn Lake entrance located 2.5 km to the northwest.

Construction and deployment noise sources are limited and include vessel engines, hydraulic lifting devices, winches, screw anchor drill, and low-decibel mechanical tools used onboard. Peak noise levels are estimated to range between 65–110 dB(A) at the source, but these attenuate with distance due to the offshore location and prevailing ambient sea noise. Critically, no pile driving, hammering, or other percussive construction methods are employed at any stage. All infrastructure—including screw anchors, rope-based mainlines, and surface buoys—is designed to minimise underwater acoustic transmission. Operations are not conducted during high swell or adverse weather conditions, and installation of screw anchors is scheduled outside of whale migration periods to further minimise any potential for acoustic disturbance to migratory marine megafauna.

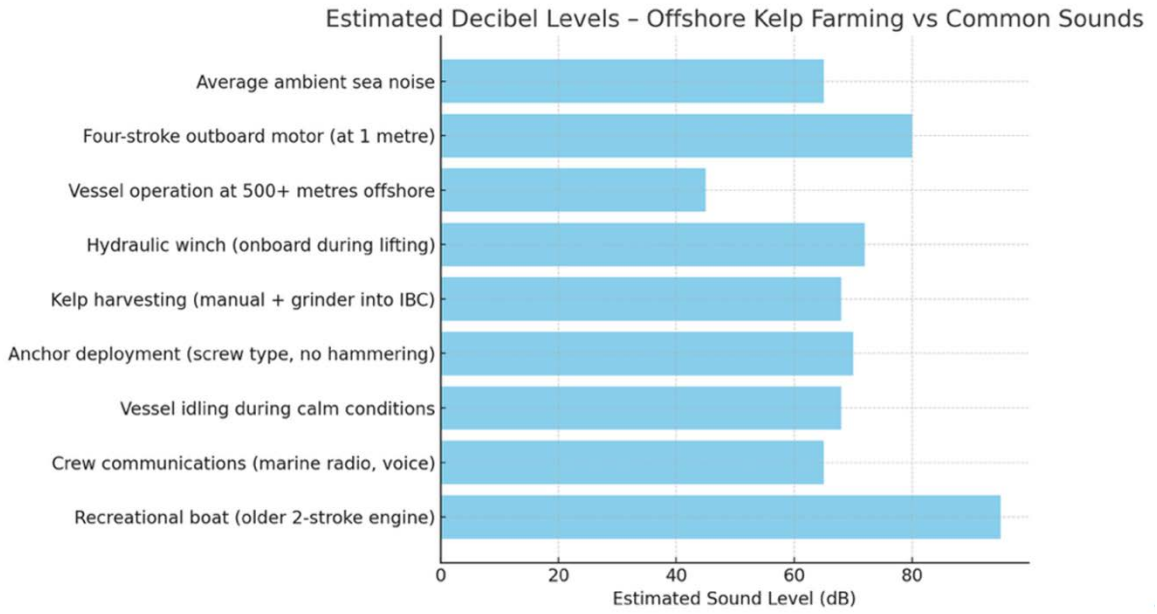

Figure 33: Estimated Decibel Levels – Offshore Kelp Farming vs Common Sounds (Source: NSW Department of Primary Industries & Environment Protection Authority (EPA NSW) and manufacturer specifications).

Importantly, the deployment of screw anchors, ropes and buoys is an inherently quiet process, especially when compared to other forms of marine infrastructure installation such as pile driving or mechanical dredging. The screw anchors used in the Eden-1 Kelp Aquaculture Farm are manually or hydraulically rotated into the seabed without impact-based force, significantly reducing underwater noise generation. Similarly, the attachment of non-metallic ropes and buoy systems involves no hammering or percussive activity, resulting in minimal disturbance to the surrounding acoustic environment. These components are deployed slowly and deliberately from vessels already common to the area, producing sound levels within the range of existing maritime operations. In addition, the deployment of farm modules in discrete one-hectare clusters provides physical and acoustic separation, further limiting any localised impact. To further reduce noise effects, operations will only be conducted during daylight hours. As a result, the deployment phase is not expected to generate surface or underwater noise that is uncharacteristic of the ambient conditions in Disaster Bay (Popper & Hawkins, 2012; NOAA, Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing, 2018).

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Quantitative Noise Assessment

An additional quantitative assessment of potential noise impacts has been undertaken, consistent with the approach adopted in comparable NSW aquaculture Environmental Impact Statements (Jervis Bay Mussel Farm 2023). The assessment considers airborne and underwater noise generated during offshore installation activities, including the use of a hydraulic drill for the installation of screw anchors.

The primary construction-related noise source is the hydraulic drill used to install screw anchors, with a conservative source noise level of approximately 110 dB(A) at the point of operation. This source level is higher than that associated with routine vessel operations, which are typically in the order of 84 dB(A), and therefore represents a conservative worst-case noise scenario for assessment.

Noise Modelling

Noise from the offshore works to the nearest land-based location at Greenglades Beach—located approximately 1,100 metres from the closest point of drilling activity—was estimated using the online modelling program noisetools.net utilising a 'Sound Propagation Level Calculator' that applies the ISO 9613-2 calculation algorithm to estimate attenuation of sound pressure levels with distance.

The ISO 9613-2 methodology accounts for:

- Geometric spreading of sound over distance
- Atmospheric absorption
- Ground and surface effects, including hard reflective surfaces such as open water
- Conservative meteorological conditions, including moderate downwind propagation and temperature inversion effects

These assumptions represent conditions most conducive to sound transmission toward the shoreline. Based on the modelling undertaken, airborne noise associated with the hydraulic drill (110 dB (A) at source) is predicted to attenuate to approximately 48–50 dB(A) at Greenglades Beach under conservative conditions. This level is consistent with natural ambient sound conditions commonly experienced in exposed coastal environments, including wind, distant surf, and background environmental noise, and is not expected to alter the acoustic character of the surrounding wilderness coastline. Measured ambient noise levels at exposed coastal locations have been documented in the range of approximately 47–60 dB(A) under typical wind and surf conditions (Lord Howe Island Winter Background Noise Monitoring Report, 2015).

For comparison, commonly cited environmental sound references indicate that natural sources such as 'light wind through trees' generate sound levels of approximately 48 dB(A), demonstrating that the predicted noise levels at Greenglades Beach are comparable to everyday ambient sounds in natural environments and are unlikely to be perceptible above prevailing coastal background noise (3M Noise Navigator, 2013).

Noise associated with routine vessel operations (source level approximately 84 dB(A)) is predicted to attenuate to approximately 18–20 dB(A) at Greenglades Beach, a level consistent with background sound levels in remote coastal or natural environments and is effectively imperceptible.

Installation activities will occur during daylight hours only. Screw anchor installation is an intermittent activity, with each anchor installation expected to take approximately 50 minutes, and only a limited number of anchors installed per day. While the Project allows for a maximum deployment of up to 2,200 screw anchors, installation will be staged progressively over many years, rather than occurring as a single continuous construction campaign. Staged deployment limits the duration and cumulative intensity of any noise emissions over a given period.

Potential noise impacts on marine fauna, including marine mammals have also been considered. The installation of screw anchors involves slow-speed hydraulic rotation rather than impact-based methods. As a result, underwater noise generated during anchor installation is indirect, continuous, low-intensity, and non-impulsive.

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Predicted noise levels at residential locations in Wonboyn and North Wonboyn are expected to be below ambient background levels and effectively imperceptible.

Note: Noise modelling conducted in this EIS utilises the same structure, process and modelling conducted by NSW DPIE Fisheries (on behalf of South Coast Mariculture) for the 2024 EIS for the Jervis Bay Mussel Farm Relocation and Expansion. NSW DPIE Fisheries was consulted and provided advice regarding the noise assessment process for the Eden-1 Project.

Management Measures

- Deployment schedule: during daylight hours.
- Weather limitation policy: No marine operations in high swell, strong winds, or storm conditions, unless in emergencies.

Mitigation Measures

- No piledriving or impact-based installation methods.
- Rope and buoy-based infrastructure only – minimise metal-to-metal latches, or metal components that could increase acoustic resonance.
- Use of well-maintained sound suppression devices (e.g. barriers, baffles and mufflers) when operating equipment.
- Use of marine radios to communicate between vessels.
- Deployment in one-hectare modules, limiting simultaneous sound-producing activities.
- Maintenance of all marine equipment (winches, hydraulic gear) to manufacturer-recommended standards to reduce vibrational and mechanical noise.
- Soft handling procedures for ropes, floats, and harvest infrastructure to avoid impulsive underwater sound.

Monitoring Measures

- Fauna interaction log: All operators will be trained to observe and report unusual behaviour or proximity of marine mammals during noise-generating activities.
- Stakeholder communication: NSW EPA, and DPIRD Fisheries will be notified of any exceedances or significant fauna interactions.

Conclusion

The risk is assessed as low, based on a qualitative analysis of potential impacts on both human receptors and marine fauna. This conclusion is supported by the inherently quiet nature of the activities involved, including the use of screw anchors (which produce continuous, non-impulsive, low-level noise), non-metallic rope and buoy systems, and the absence of pile driving, hammering, or other percussive installation methods. Infrastructure assembly will occur at an established industrial site within the Edrom commercial zone, and marine deployment will be conducted using vessels already typical in the local soundscape of Twofold Bay and Disaster Bay. Acoustic modelling and available literature indicate that sound levels produced during kelp infrastructure deployment are well within the range of existing marine operations and are not expected to introduce noise that is uncharacteristic of the region. The remote nature of Disaster Bay, coupled with limited vessel activity and adherence to best-practice operational protocols, ensures that both airborne and underwater noise impacts on human receptors or marine fauna are negligible. Consequently, no significant community-level or environmental noise impact is anticipated during the construction and deployment phases of the Eden-1 Kelp Aquaculture Farm.

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9.2.2 Land Based Infrastructure

Risk Table 5: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – availability of land-based infrastructure (modified from Fletcher et al., 2012, 2018; Vom Berg, 2009, DAWE/FRDC, 2020, FAO & UNEP, 2021).

Issue	Will existing land-based infrastructure (i.e. roads, boat ramps, wharfs, jetties and waste facilities) be significantly impacted by the construction and/or operation of kelp aquaculture farming?			
Comments for consideration	• Is the necessary infrastructure (e.g. roads, wharfs, jetties, electricity & moorings) available in the Eden/Disaster Bay region? • Will any upgrades of existing land infrastructure be required? • Will there be any impacts on assets e.g. breakwaters or boat ramps? • Will the construction and deployment of the longline infrastructure impact on air, soil and/or water quality? • Are there any issues relating to waste management during the construction and deployment stage that need to be considered?			
Description	• No new infrastructure required as existing land-based facilities are adequate, including: • Existing Edrom/Eden buildings and facilities • Eden-Snug Cove Wharf (as agreed by NSW Port Authority) • Edrom Multi-purpose Wharf (as agreed by NSW Port Authority) • Edrom Land-based Facilities (Pentarch)			
Proposed Management – Mitigation and Monitoring	• 4% increase in vehicle and marine vessel movements relative to existing traffic • Use vacant and underutilised buildings and wharfs • Use existing roads and commercial facilities • Partnerships with existing aquaculture operators • Partnership with Pentarch Group for infrastructure deployment and staging, kelp processing facilities and any waste management removal			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	2	2	Low

Justification of Ranking

The Eden-1 Kelp Aquaculture Farm infrastructure deployment and ongoing operations does not involve the construction of any new land-based buildings or upgrades of existing water access facilities in the Eden/Disaster Bay region. In the unexpected event that future development of land-based facilities associated with the proposed Kelp Aquaculture Farm is required, it will be evaluated through a separate development approval process by the Bega Valley Shire Council.

The Eden-1 Kelp Aquaculture Farm is uniquely positioned to leverage a significant suite of underutilised land-based infrastructure originally developed to support Eden's once-thriving commercial fishing and forestry industries. This infrastructure is now largely vacant due to a reduction in active fishing operations, providing an ideal, low-impact opportunity for the establishment of a regenerative offshore aquaculture project with minimal community or environmental disruption.

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Eden History

Eden, located on the far south coast of New South Wales, has a long and storied history as one of Australia's most important regional fishing ports. From the mid-20th century until the late 1990s, the town supported a thriving commercial fishing industry anchored by a fleet of tuna, swordfish, and inshore trawlers operating throughout the Tasman Sea. At its peak, the industry supported over 40 active tuna vessels and a large shore-based workforce that made Eden a key hub for the state's seafood economy.

Central to this era was the Eden fish cannery, originally established at Curalo in 1940 and relocated to the shores of Cattle Bay in 1948. The cannery underwent several ownership changes over its operational lifespan: initially managed by Greens Products of Narooma (1949), acquired by Kraft Foods in 1961, and later taken over by H.J. Heinz in 1974. Under Heinz, the facility operated under the well-known Greenseas brand, producing canned tuna and salmon products for both domestic and export markets. By the 1990s, the cannery was processing around 4,500 tonnes of product annually and employing approximately 140–150 workers from the Eden region, making it one of the largest employers in the area. In addition to cannery staff, the broader industry supported fishermen, dock workers, fuel suppliers, net makers, and marine servicing businesses.

Despite its success and profitability, the cannery closed in 1999 when Heinz relocated production to Port Lincoln and offshore facilities in Thailand—citing global supply chain efficiencies and lower labour costs. The closure led to a sudden and sharp contraction in the town's fishing-related economic activity, resulting in over 140 job losses and the near-collapse of the region's once-dominant seafood sector. In the years following the closure, the number of active commercial fishing vessels based in Eden declined significantly. Contributing factors included declining fish stocks, rising fuel and labour costs, and increasing regulatory constraints introduced under the Australian Government's Commonwealth Fisheries Harvest Strategy Policy (AFMA, 2014; 2019). This was further exacerbated by structural adjustment programs and license buybacks aimed at reducing fishing effort and restoring ecological balance (NSW DPI, 2017).

Existing Infrastructure

Today, many of the land-based facilities developed to support the once-booming fishing industry remain underutilised. These include processing sheds, bait supply buildings, cold storage units, and marine infrastructure such as wharves and jetties located in and around Snug Cove in Eden, and also industrial land and deepwater access points at Edrom, where Pentarch Group also own and manage extensive facilities which include a private slipway, and the Chipmill pier. In addition, Edrom is home to the Edrom Multi-purpose Wharf (which is managed by the NSW Port Authority on behalf of the Royal Australian Navy), which could be utilised for future expansion for bulk access, if required. The Edrom assets have been developed to service the export of timber and woodchips from Pentarch's forestry operations, now offer significant capacity for marine logistics, equipment staging, and biomass handling for new industries such as seaweed farming. Auskelp has established a strong working partnership with Pentarch for access to these facilities and is also collaborating with Ocean2Earth, a Pentarch-majority-owned enterprise developing liquid fertiliser products. A Memorandum of Understanding has been signed to supply kelp biomass as a feedstock for Ocean2Earth's future product line, ensuring long-term synergies between aquaculture and regenerative agriculture.

The industrial-zoned land at Edrom includes warehousing, direct wharf access, heavy vehicle access, and designated staging areas which have been allocated for Auskelp operations. All electrical power requirements will be met using the existing grid infrastructure at Edrom (and Eden), with no upgrades or new installations required. Kelp farming is inherently non-intensive in terms of energy use, as it does not involve mechanical feeding systems, temperature control, or substantial use of artificial lighting. Additionally, all fresh water required for cleaning, maintenance, and processing will be sourced from existing on-site dams and rainwater tanks (Edrom). These rainwater and dam systems are consistent with standard water use practices in seaweed farming globally, where seawater is the cultivation medium and freshwater is only required intermittently for operational support (FAO, 2021). Minimal drawdown from municipal water supplies (Eden) will be necessary for boat cleaning and hatchery services.

All floats, anchors, and longline infrastructure will be prepared and staged within existing Pentarch buildings, without requiring any additional construction. All vehicle and marine servicing will continue to be supported by

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Slipways Eden, who have been maintaining Auskelp's research vessels for the past three years and have all required marine repair, mechanical, fabrication, and slipway services.

There are no public wharf facilities that will be affected during the construction or operational phases. All marine vessels will be berthed either at Snug Cove Marina or on swing moorings adjacent to the Pentarch facility on the southern edge of Twofold Bay. Given the scale of existing marine activity and the nature of kelp farming infrastructure, there is no anticipated conflict over parking, mooring space, or boat ramp use.

Marine Users

Twofold Bay is an active maritime zone on the far south coast of New South Wales, supporting a diverse and continuous mix of commercial, recreational, and operational vessel movements. Based on available data and sector analysis, it is conservatively estimated that Twofold Bay experiences between 80 and 120 vessel movements per day, equating to approximately 58,000 to 88,000 vessel movements annually (including both arrival and departure). This activity includes regular movements by bulk carriers loading woodchips and logs at the Edrom chip mill (estimated at 200–300 large ship movements annually), Royal Australian Navy support vessels at the Edrom Multi-purpose Wharf, and cruise ships, with Eden receiving 41 cruise liners during the 2023–24 season and 47 scheduled for 2025–26. Total estimated large ship movements in Twofold Bay are estimated at 100–150 movements annually.

In addition, Twofold Bay supports a small but active commercial fishing fleets, including trawlers, longliners, netters, cage fishers, and aquaculture service vessels, with daily activity from mussel farming operations and seasonal abalone and sea urchin divers. Recreational boating is significant during holiday periods, with charter fishing, whale watching tours, private yachts, and local boaters increasing traffic during weekends and holidays. These activities are centred around key maritime infrastructure such as Snug Cove Wharf, Quarantine Bay, Snug Cove Marina, and swing moorings throughout the bay.

By comparison, the Eden-1 Kelp Aquaculture Farm will generate on average three vessel movements per day to Disaster Bay—two service trips and one small-scale support or logistics trip (weather dependant)—amounting to around 1,095 movements per year. This represents only 2.5% to 3.7% of the total estimated vessel activity in the area.

Current Maritime users

Commercial Fishing Vessels:

- Trawlers: Utilised for harvesting prawns.
- Longliners: Employed in targeting gummy sharks, flathead and whiting.
- Trap and Pot Vessels: Used for catching species such as lobster and crab.
- Netters: Engaged in gillnetting species like Australian Salmon.

Diving Operations:

- Abalone Divers: Commercial divers harvest blacklip abalone from rocky reefs using surface-supplied air or scuba gear.
- Sea Urchin Divers: Divers collect species like the red sea urchin and purple sea urchin from rocky substrates.
- Private Dive Operators.

Aquaculture Support Vessels:

- Mussel Farming Boats: Operate in the western part of Twofold Bay, servicing up to 37.5 ha of mussel lines across four lease areas.

Industrial and Commercial Shipping:

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- Woodchip Carriers: Large vessels transport woodchips from the chip mill at Jews Head to international markets.
- Naval Vessels: The Royal Australian Navy utilises the multi-purpose wharf for various operations, including the loading and unloading of munitions.
- Cruise Ships: The Eden Cruise Wharf accommodates cruise liners up to 370m in length, contributing to the local tourism industry (47 Cruise Ships booked for 2025-2026 Season).

Recreational and Other Vessels:

- Police and Maritime Vessels – located permanently at Eden.
- Private Yachts and Sailing Boats: Frequent the bay for leisure and tourism purposes.
- Charter Fishing Boats: Offer recreational fishing experiences for tourists and locals.
- Whale Watching Vessels: Operate seasonally, providing tours during whale migration periods.
- Tugboats: Three large tugboats assist in manoeuvring larger ships within the port facilities.

Vehicular Transport

Based on projected staffing and operational logistics, the Eden-1 Kelp Aquaculture Farm is expected to generate a relatively small number of vehicle movements annually from the Edrom or Eden locations. With up to 30 staff employed across administrative, marine operations, and processing roles, and assuming a standard five-day work week over 48 weeks per year, approximately 16,800 staff-related vehicle movements (including both arrival and departure) can be expected annually. In addition, the operation will generate (at maximum yield) approximately two truck movements to Edrom per day associated with the transport of kelp biomass and associated by-products, amounting to roughly 500 truck movements per year. Combined, the total estimated vehicle movements attributable to the Eden-1 Project are approximately 17,300 per year.

This figure is small when compared to the existing traffic volume at Edrom and Eden, where a conservative estimate of 83,000 vehicle movements occur annually. These movements are primarily related to the export of woodchips and hardwood logs from Pentarch's forestry operations, which involve high-volume truck logistics, port activities, and industrial support services. The site also hosts regular activity at the Edrom Multi-purpose Wharf, which is locally operated on behalf of the Royal Australian Navy and is used for naval vessel berthing and logistics.

Importantly, access to Eden and Edrom is via the Princes Highway, a federally designated arterial route that services the NSW South Coast. This highway is engineered to accommodate high flow volumes, including heavy vehicles, and connects directly to Edrom Road and William Allen Road. Both of these access roads have been specifically designed and maintained to support large-scale forestry haulage and munitions transport, given the area's industrial zoning and proximity to naval operations. These roads are not regularly used by the general public and do not service any significant residential areas (Edrom House and North Wonboyn – approximately 30 residents). As such, the roads have substantial existing capacity and are ideally suited to accommodate the low-impact, infrequent transport requirements of the kelp aquaculture operation. In this context, the additional traffic associated with the Eden-1 Kelp Aquaculture Farm represents a 21% increase of vehicle traffic compared only to local forestry uses and is not anticipated to place any measurable pressure on road capacity, site logistics, or public infrastructure.

Waste Management

No significant increases in air, soil, or water pollution are expected to result from the land-based construction or operational phases of the Eden-1 Kelp Aquaculture Project. Kelp aquaculture is a regenerative, non-fed production system that does not require artificial feed inputs and does not generate nutrient-rich effluent, sewage, or process water discharges. Waste streams associated with the Project are limited and primarily relate to routine operational and maintenance activities, including packaging materials, worn or damaged ropes and floats, minor quantities of general waste from vessel operations, and incidental biofouling material removed during maintenance. All land-based activities, including infrastructure assembly, storage, and vessel

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servicing, will occur within existing industrial-zoned facilities at Edrom and Snug Cove, which are already serviced by licensed waste contractors.

All solid wastes will be segregated, stored, and disposed of in accordance with EPA and local council requirements, using Pentarch's established waste management systems and licensed service providers. Recyclable materials, including plastics and metals, will be separated where practicable and directed to appropriate recycling streams. Marine biofouling material and kelp offcuts recovered during maintenance or harvest will be managed as a resource rather than a waste, with material directed to Ocean2Earth's EPA-approved marine composting and bioproduct processing facility co-located at the Edrom site. This approach supports circular economy outcomes and avoids disposal to landfill or return of organic material to the marine environment. No wastewater discharges to the sewer network or receiving waters are proposed. Any water used for equipment cleaning or processing support will be managed within existing site drainage systems and reused where practicable, including incorporation into composting processes, in accordance with relevant environmental controls.

Hazardous materials are not routinely required for kelp aquaculture operations. Where small quantities of fuels, lubricants, or cleaning agents are used for vessel or equipment maintenance, they will be stored, handled, and disposed of in accordance with manufacturer specifications, relevant Australian Standards, and EPA guidelines, with spill response equipment maintained on-site and on vessels at all times.

Conclusion

The Eden-1 Kelp Aquaculture Farm will activate extensive, underutilised infrastructure in Eden and Edrom without placing pressure on existing public or private assets. No new land-based infrastructure will be required, as all operational, logistical, and staging needs are fully accommodated by existing facilities including Snug Cove Wharf, Eden-based buildings, the Edrom Multi-purpose Wharf (if utilised), and associated Pentarch properties.

Marine vessel movements associated with the farm will represent less than 4% of total estimated annual vessel traffic in Twofold and Disaster Bay, and vehicle movements generated by staffing and logistics are modest in comparison to existing uses. Road access is via high-capacity freight corridors—the Princes Highway and industrial-grade access roads—which are specifically designed for heavy vehicle and munitions transport and do not service significant residential populations. Kelp aquaculture generates no organic waste, requires no artificial feed, and has negligible water and power demands, with fresh water sourced primarily from existing dams and rainwater tanks and electricity drawn from the local grid. The Project's low-impact, regenerative profile, combined with its integration into state-prioritised marine infrastructure and regional economic development strategies, justifies its 'low' risk ranking for land-based infrastructure.

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9.2.3 Structural Integrity and Stability – Longline Infrastructure

Risk Table 6: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – structural integrity and stability of the longline infrastructure (modified from Fletcher et al., 2012, 2018; Vom Berg, 2009, DAWE/FRDC, 2020, FAO & UNEP, 2021).

Issue	Will severe weather significantly impact on the structural integrity and stability of the longline infrastructure?			
Comments for consideration	• How will structural integrity of the longline infrastructure be ensured? • Will the longline infrastructure be able to withstand severe weather events? • Is it possible that parts of the infrastructure may break free and become navigation hazards?			

Description	• Anchoring and bridal system
	  • Screw anchors
	  • Polypropylene rope (diameter of 25 to 35 mm)
	  • 55 - 85 litre impact-resistant polypropene marine floats
	  • Note: Kelp produces limited drag and wear on longlines
	• Marine Environment
	  • Gradual increase in water depth
	  • Predominant wave swell direction = south to southeast
	  • Mean wave height = 0.75m
	  • Maximum recorded mean wave height = 7.15m
	  • Maximum recorded wave height = 13.3m (100-year)
	  • Wave period = Peak 12.22 sec, Mean 10.79 sec (100-year)
	  • Maximum wave height through test farm = 13.0m (July 2025)			

Proposed Management – Mitigation and Monitoring	• Adhere to approved Monitoring and Maintenance Plan
	  • Regular inspections and maintenance
	  • Inspections and maintenance immediately after severe weather
	  • Long lines will be checked for damage after being cleaned
	• Design and modifications
	  • Use of existing and proven technologies
	  • Suitably qualified personnel to oversee the installation of screw anchors and longline infrastructure
	• Buoys and corner markers, will be labelled with the lease designation			

Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	4	4	Low

Justification of Ranking

The Eden-1 Kelp Aquaculture Farm will utilise longline infrastructure tailored for the high-energy marine environment of Disaster Bay. Each longline unit consists of a pair of screw anchors driven 3-6 metres into the seafloor, connected via heavy-duty polypropylene mooring ropes (25–35 mm) and pivot lay-flats to maintain tautness. These moorings support a tensioned backbone line from which *Ecklonia radiata* droppers are suspended. Buoyancy floats are spaced along the backbone to accommodate the biomass while ensuring load distribution. The cultivated species, *Ecklonia radiata*, exhibits low drag, neutral buoyancy, and high residual strength.

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Long-term testing conducted from 2022 to late 2025 demonstrated the species' exceptional storm resilience and ability to withstand extreme weather events. Notably, infrastructure with populated kelp lines remained structurally intact during multiple high-energy events, including storm events from April 2024 through July 2025 that generated significant wave heights (Hs) of 6.56 m and 5.43 m, respectively. The maximum individual wave heights (Hmax) of 13.0 m.

These four major storm events were studied with cultivated kelp and ocean longlines observed at various growth levels. The kelp biomass was photographed, measured and weighed prior and post these storm events to analyse accurate benchmarks for *Ecklonia radiata* resilience and rig loading analysis depending on swell height, direction, duration and frequency.

Significant weather events were detailed as follows:

Event	Date	Direction	Duration	Swell Hmax
Storm 1	3 June 2024	90-150 degrees	18 hours	9.8m
Storm 2	16 June 2024	90-170 degrees	72 hours	10.2m
Storm 3	28 July 2024	60-100 degrees	85 hours	10.1m
Storm 4	30 March 2025	60-160 degrees	48 hours	12.4m
Storm 5	1 July 2025	60-120 degrees	72 hours	13.0m

Table 18: Significant weather events monitored by Auskelp from Manly Hydraulics EDENOW Waverider Buoy situated ~5 km offshore from Disaster Bay.

Ocean wave and swell data was derived from the Manly Hydraulics Laboratory Eden Offshore Waverider Buoy (EDENOW) which is located directly offshore less than ~2 nautical miles from Disaster Bay. This directional wave buoy provides high-resolution, real-time measurements of significant wave height (Hs), maximum wave height (Hmax), wave direction, wave period, and sea surface temperature.

Originally deployed in February 1978, EDENOW has amassed over 45 years of continuous historical wave data, making it one of the longest-running coastal wave monitoring stations in New South Wales. In December 2011, EDENOW was upgraded to a Datawell Directional Waverider buoy, which significantly improved the accuracy of wave direction and spectral energy distribution measurements by capturing both vertical and horizontal motion. The data from EDENOW is essential for informing the engineering design, safety, and operational planning of offshore structures, including the Eden-1 Kelp Aquaculture Farm, by providing site-specific wave climate information under both normal and extreme oceanographic conditions.

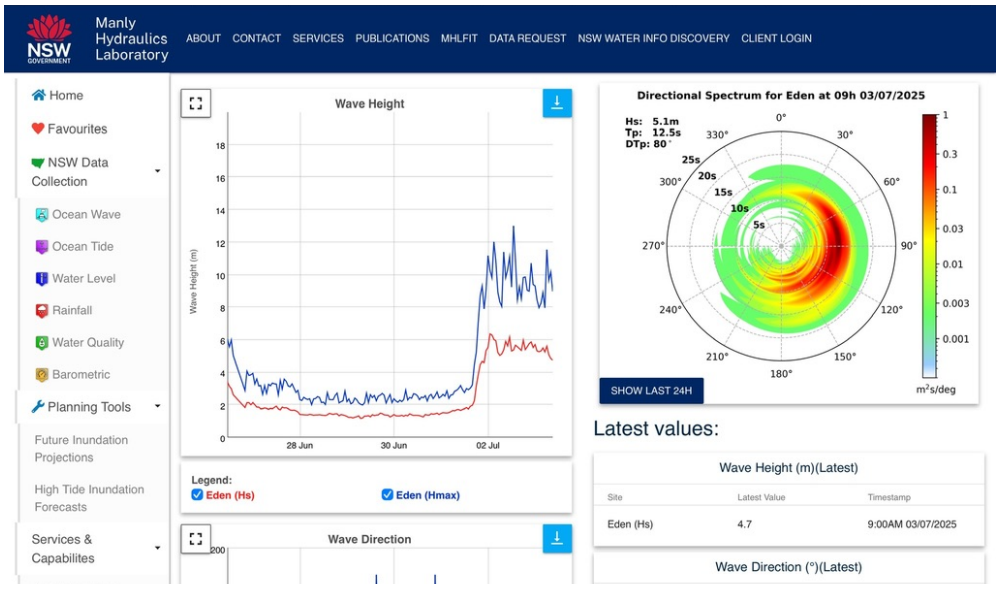

Figure 34: Example report derived from NSW Government Manly Hydraulics EDENOW Waverider Buoy situated ~5 km offshore from Disaster Bay (Credit: Manly Hydraulics 2023).

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Wave Climate and Environmental Loads

Disaster Bay is characterised by a predominant swell direction from the south to southeast, with a mean wave height of approximately 0.75 m under ambient conditions. According to BMT's calibrated spectral wave ray tracing (SWRT) model, the 100-year return period significant wave height (Hs) is 7.15 m, with a peak wave period of 12.22 seconds and mean wave period of 10.79 seconds. These values were used to inform the engineering specifications of all infrastructure.

Anchor and Rope Load Specifications:

The Eden-1 Kelp Aquaculture Farm longline infrastructure will be aligned parallel to the predominant south to southeast swell direction, as determined by wave climate modelling and empirical observations in Disaster Bay. This orientation minimises drag and lateral loading on the system by allowing swell energy to pass along the length of the lines rather than perpendicularly across them. Each 100 m longline backbone will be secured by one screw anchor connection point on the ocean-facing (seaward) side and a screw anchor connection point on the shoreward side. This anchoring configuration is perfectly suited to the gradual increase in depth away from shore and the wave energy gradient across the lease area. Each anchor is installed to a depth of approximately 4 metres and is rated to resist peak loads exceeding 35 kN in sandy sediments like Disaster Bay.

Attached along each longline are modular polyethylene buoyancy floats, spaced at regular intervals and tied ~1 m above the main backbone using flexible rope loops and slip knots that allow for easy adjustment and reconfiguration. This system enables the repositioning of floats for cleaning, maintenance, or adjustment of buoyancy if kelp biomass accumulates and increases the load on the backbone. The floats are designed to maintain optimal tension in the backbone, while their streamlined, low-drag profile ensures minimal hydrodynamic resistance. This float configuration allows for the integration of additional buoyancy if needed during peak kelp growth periods, ensuring system stability and resilience throughout seasonal cycles. The infrastructure is designed to meet or exceed international standards for mooring systems in high energy, open-ocean aquaculture use.

The screw anchors are developed to eliminate need for chain, making the quiet and less likely to fail due to corrosion. The longline rope is bolted through a polymer thimble to the lay-flat (with plastic shield) which is bolted to the screw anchor. Because the screw anchor is 3-6m into seafloor the metal helix has reduced corrosion due to lower oxygen levels. The blue plastic shield surrounding the lay-flat rope prevents chafing, and the screw anchor design has an expected 30-year lifespan if installed and maintained correctly.

Details are as follows:

- Screw Anchors: The minimum sized helical screw anchors proposed for Eden-1 are rated for static load capacity of 25t and torque verification of 35 kN in fine grain sand, embedment depth of 4 m, and helix diameter 450-650 mm. Larger screw anchors can be utilised and depth can be increased to 6m if required. In fine sandy substrates typical of Disaster Bay, BMT assessment confirms that anchors installed at 3.5-4 m depth can achieve theoretical holding capacities of 80-100 kN (Brown, D.A., 2013).
- Polypropylene Rope (25-35 mm): The minimum breaking strength (MBS) of marine-grade 3-strand polypropylene rope ranges from ~58 kN (25 mm) to ~106 kN (35 mm), as per standards reported by Cordage Institute (CI-1303-04). The working load limit (WLL) with a standard safety factor of 5:1 equates to ~11.6 kN (25 mm) and ~21.2 kN (35 mm) respectively (Cordage Institute, 2004; Samson Rope Technologies, 2019).
- Floats are expected to be either 55 litre or 85 litre impact-resistant, non-crushing, polypropene marine floats in carbon black capable of operating at working depths of up to 45 m, which may be interspersed with orange floats for navigation purposes.
- Specified load margins are sufficient to resist anticipated dynamic and static loads even under peak swell and maximum drag/weight conditions. Dynamic wave loading, including drag from kelp biomass and vertical surge, was incorporated into the mooring design using conservative

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assumptions for biomass load (>30 kg/m dropper line), buoyancy-induced uplift, and wave/current drag. It is expected that kelp will be harvested at <5kg/m, therefore well under load limits.

Auskelp will continue to refine and optimise the standard 1-hectare Ocean Rig design throughout the life of the Project to enhance operational performance, safety, structural resilience, and navigation visibility, while ensuring minimal visual impact from shore-based viewpoints. As part of this adaptive engineering approach, detailed specifications—including anchor types, rig geometry, mooring tensions, buoy configurations, and line depths—may evolve in response to lessons learned from storm events, site-specific monitoring data, and updated requirements or guidance issued by NSW DPIRD Fisheries, AMSA, Transport for NSW – Maritime, the Port Authority of NSW, or other relevant authorities. Any design modifications will be undertaken within the approved environmental envelope and in accordance with the Marine Fauna Interaction Plan, Navigation Risk Assessment, and Environmental Management Plan.

Importantly, regardless of optimisation or refinement, the total cultivated farm footprint is expected to remain approximately 50% of the AL21/004 lease area, preserving substantial open-water corridors for navigation, ecological processes, and recreational use. Design evolution will prioritise durability, debris minimisation, low entanglement risk, and compliance with national and international best practice for offshore seaweed aquaculture. All updates to rig design will be documented, reported to regulators where required, and incorporated into ongoing monitoring and management frameworks to ensure safe, sustainable, and low-impact farm operations.

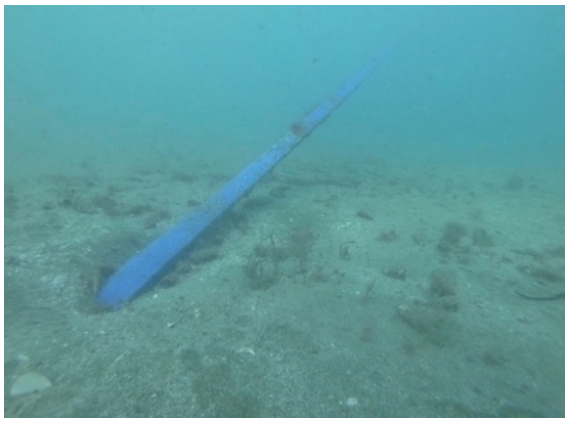

Figure 35: Typical screw anchor shaft with helix and pivot point (Credit: Blue Harvest 2025).

Figure 36: Installed screw anchor lay-flat pivot, located Jervis Bay, NSW (Credit: Marine Services New Zealand 2025).

Figure 37: Example of impact-resistant, non-crushing, polypropene marine floats (Credit: QE Group NZ Limited 2026).

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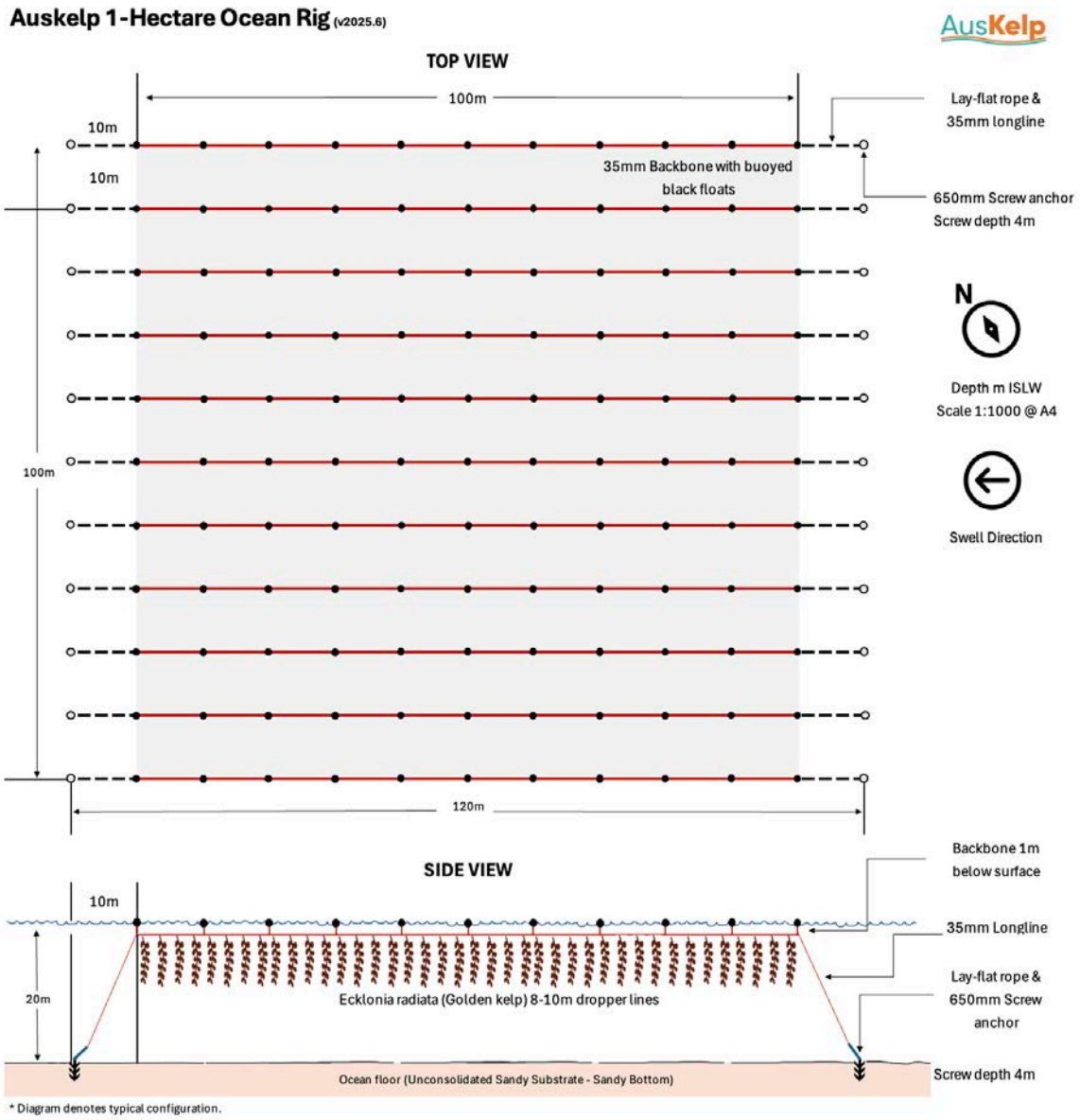

Figure 38. Auskelp 1-Hectare Ocean Rig (Credit: Auskelp 2025).

International Benchmarks and Comparative Analysis

High-energy kelp farms are operational in several parts of the world, notably in the North Sea, North Atlantic, and along the Norwegian and Chilean coasts. These environments experience significant wave heights similar to or below those recorded in Disaster Bay:

- In the North Sea, Buck and Buchholz (2004) reported longline kelp farming in sites with typical Hs values of 4–6 m (11.16 m Hmax), using submerged and tensioned systems to maintain stability.
- On the Norwegian coast, Camus et al. (2019) described wave climates with Hs values regularly reaching 6–7 m (13.02 m Hmax), with engineering adaptations such as wave-submerged longlines and deep anchor penetration to mitigate lateral movement.
- In Scotland's Outer Hebrides, Sanderson et al. (2012) documented the successful operation of kelp farms in Atlantic-facing sites with wave heights up to ~4.3 m Hs (8m Hmax), using reinforced rope and flexible mooring configurations.

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- In Chile, aquaculture systems in semi-exposed environments withstand Hs values of 3–5 m (9.3 m Hmax), with mooring lines designed for biofouling, drag loading, and current-driven displacement (Buschmann et al., 2017).
- In comparison, *Ecklonia radiata* testing at the Eden-1 site has endured Hs values up to 6.56 m (12.21 Hmax) without structural or biological failure.

The standard length of longlines used in offshore aquaculture varies depending on environmental exposure and the species being cultivated. In Western Australia's pearl oyster farming industry, where infrastructure must withstand cyclonic storms and tidal ranges of up to 10 metres, longline lengths typically range between 100 and 500 metres to accommodate site-specific conditions (Smith et al., 2023). Similarly, mussel farming operations in Twofold Bay and Jervis Bay, New South Wales, utilise longlines commonly around 200 metres in length, with flexibility depending on lease layout and hydrodynamics (NSW DPI, 2000).

Longlines are generally spaced 10 to 30 metres apart, a configuration that allows for optimal water flow, efficient feeding, and unimpeded vessel access across the lease area (NSW DPI, 2000). This spacing also helps prevent entanglement and mitigates excessive mechanical loading caused by currents and wave action. To reduce structural fatigue and interference with natural coastal processes, longlines are aligned parallel to the predominant wave direction—a method proven to reduce lateral forces and extend infrastructure longevity in high-energy environments (Wang et al., 2023). From certain angles, such as side-on or end-on perspectives, the systems appear as neat rows of buoys, though visual uniformity may vary when viewed from other orientations due to wave dynamics and ocean motion.

Monitoring and Maintenance Program

A comprehensive structural integrity and Monitoring and Maintenance Program will be implemented, including:

- Weekly visual inspections – on-water (weather permitting)
- Monthly visual inspections (binoculars, drone or camera recording) – Greenglades Beach (if on-water visual inspections are not possible)
- Diver-assisted infrastructure and biofouling checks every 12 months
- Annual servicing of connection points, mooring lines, and flotation devices
- Immediate post-storm inspections to identify wear or structural fatigue
- All corner markers and buoys are clearly labelled

All activities will be conducted under permit in accordance with the NSW Fisheries Management Act 1994. Permit holders are required to maintain infrastructure to a high standard and are responsible for the recovery of any displaced components. A DPIRD Fisheries NSW security bond of $1,000 per hectare (for a Class A permit holder with a Class 2 (Algae) licence area) ensures costs are recoverable should infrastructure fail and not be retrieved.

In the unlikely event of a longline detachment at the Eden-1 Kelp Aquaculture Farm, the design and environmental conditions suggest that any dislodged infrastructure would drift shoreward toward Greenglades Beach, rather than into open ocean or high-traffic maritime zones. This is due to the prevailing south-to-southeast swell direction and the farm's proximity to the coastline. The longline system's orientation, parallel to the dominant swell, minimises lateral loading and reduces the risk of structural failure. The farm employs individual longlines rather than interconnected arrays, a configuration that enhances resilience by isolating potential failures and preventing cascading effects across the system. This approach aligns with findings from Bui et al. (2023), who reported that systems aligned with incident wave directions experience reduced mooring tensions and structural stresses in high-energy environments.

All infrastructure components, including buoys and corner markers, will be clearly labelled with the lease designation, facilitating prompt identification and recovery. In accordance with regulatory requirements,

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Auskelp is committed to the immediate collection of any detached infrastructure to mitigate environmental impacts and navigational hazards.

Conclusion

The Eden-1 Kelp Aquaculture Farm longline infrastructure system is designed using proven international methodologies adapted to the specific conditions of Disaster Bay. By applying empirical wave data, long-term site testing (with wave heights during testing exceeding 6.3m Hs), and engineering design informed by high-energy aquaculture systems in Europe and South America, the infrastructure is capable of withstanding wave climates with Hs values well in excess of maximum expected wave heights of 7.15 m. The growth of *Ecklonia radiata* — a neutral-buoyancy, drag-tolerant native species — produces minimal mechanical strain, contributing to longline longevity and performance. Independent anchor load studies and published tensile strength standards confirm that all components of the mooring system far exceed the load requirements expected under operational and extreme conditions. Based on these factors, the risk of infrastructure failure is assessed as 'low'.

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9.2.4 Navigation and Interactions with Other Waterway Users

Risk Table 7: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – impacts of kelp aquaculture farming on navigation and other waterway users (modified from Fletcher et al. 2018; Vom Berg, 2009, DAWE/FRDC, 2020, FAO & UNEP, 2021).

Issue	Will Kelp Aquaculture Farming have a significant impact on navigation and other waterway users in Disaster Bay or Twofold Bay?
Comments for consideration	• Will the leases be a navigation hazard for other waterway users? • Will the longlines be visible? • Are the leases in a high use area or area of restricted navigation? • Will the boundaries of the leases be marked with buoys and/or lights? • How will waterway users be informed and notified about the installation of the longline infrastructure? • Can other waterway users enter and anchor in or near the lease area? • Will the leases exclude other waterway user groups (e.g. dive operators, sailors, recreational and commercial fishers, dolphin/whale watching operators) from using an area they previously had access to? • Will recreational fishers be excluded? • Will commercial fishers be excluded, and how will this affect them? • How will the security of the leases be maintained?
Description	• Area of Kelp Aquaculture Farm = 200 ha (5% of Disaster Bay) • Presence of longline rigs = 100 ha (2.5% of Disaster Bay) • At least four navigational marks will be delineate each lease • Other waterway users include recreational fishers, commercial fishers, dive operators, commercial prawning, abalone and urchin divers, sailors, whale watch operators, navy • Longlines will be marked and visible due to evenly spaced surface buoys • Not located in a high traffic area • Located over mobile sandy substate with low habitat complexity • Located more than 25 km from Twofold Bay • Restrictions to net and longline fishing within Kelp Farm boundaries • Access available to recreational fishers and other users

Proposed Management – Mitigation and Monitoring	• Location = marine embayment
	  ○ Limited access to Disaster Bay
	  ○ Outside recognised navigation channels or shipping port approaches
	  ○ Does not obstruct recognised or significant commercial or ecological areas
	• Situated over unvegetated sandy substrate with no biological assemblages, diving sites or whale/dolphin watching area
	• Staff will be required to have relevant licences and qualifications, undergo regular training and abide by NSW Maritime regulations
	• Four or more flashing navigational markers will delineate the lease corner marks in accordance with the requirements of government departments
	• Clearly identifiable lease infrastructure to enable safe navigation
	• Disaster Bay users will be informed about general boating rules in the vicinity of the leases – keep safe distance, no mooring to kelp infrastructure
	• Australian Hydrographic Office will be notified, a 'Notice to Mariners' will be issued and AMSA and official marine charts amended

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	• Relevant publications and maps will be amended to include the Kelp Aquaculture Farm • Use IALA standard corner markers • Comply with the Australian Aquaculture Code of Conduct

Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	6	6	Low

Justification of Ranking

The degree of impact of aquaculture infrastructure on the safe navigation of vessels and other waterway users in an area depends on its placement in relation to features such as narrow channels, established navigation channels, identified anchorages, recreational, Naval and commercial fishing areas, as well as how clearly marked and visible the structures are to other waterway users, particularly during severe weather.

A balanced approach is required when considering navigational safety and visual amenity for the Eden-1 Kelp Aquaculture Farm. While reducing visual prominence from land-based viewpoints is an important design objective, safety must remain the primary consideration. All offshore aquaculture infrastructure must be clearly identifiable to passing vessels to prevent collision, enable safe navigation, and comply with maritime regulations. This necessitates the use of appropriately visible surface markers, compliant buoy colours, and navigation lighting where required. Although such measures may marginally increase visibility from shore, ensuring that marine users can reliably detect the farm's presence — under all weather and sea conditions — is essential. In achieving this balance, the Project prioritises maritime safety while applying design principles that minimise visual impact wherever safe and practicable.

Disaster Bay is a remote offshore marine embayment located on the far south coast of New South Wales designated by NSW DPIRD Fisheries as located predominantly within Site Code: I10-29 and I10-20 (see Figure

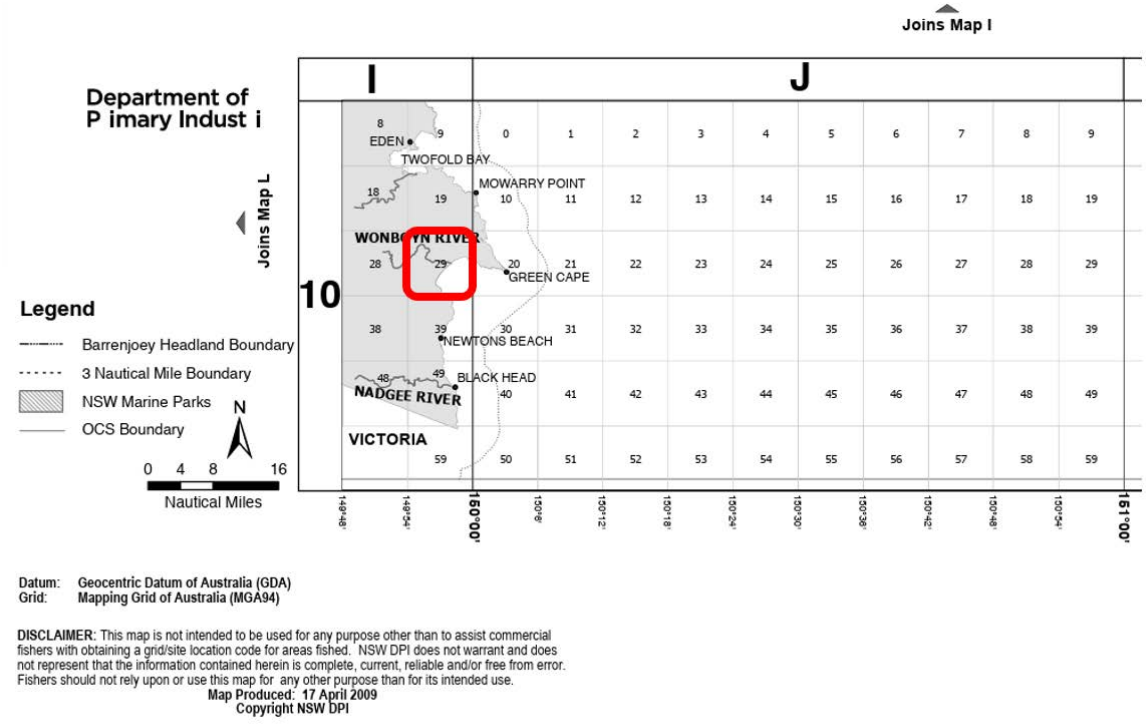

Figure 39: NSW DPI Fisheries MGA94 Mapping Grid of Australia, area location grid of proposed AL21/004 kelp farm identified in red (Source: NSW DPIRD Fisheries).

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General waterway usage in Disaster Bay and the proposed lease area is minimal, primarily due to the difficultly of access for recreational marine users. Despite this, vessel movements in Disaster Bay may include recreational boaters, recreational fishers, commercial whale-watching operators (unlikely), SCUBA diving operators (unlikely), sailing vessels (unlikely), abalone and sea urchin divers (around bay perimeter), commercial fishers (longline, gillnet fishers and prawn trawls or seine nets) and Naval vessels (possible but unlikely). Marine vessels that access Disaster Bay will most likely be launched or based at Twofold Bay (25 km north), however smaller vessels may may enter Disaster Bay from Wonboyn Lake (4.4 km west), but vessels are restricted to smaller motorised recreational vessels of less than 7m.

The Wonboyn Lake entrance is recognised as a hazardous and dynamic coastal feature, posing significant challenges for safe passage and navigation. Characterised by shallow crescent-shaped sandbars inside the entrance itself and strong surf conditions outside breaking on a shallow bar, the entrance itself is subject to rapid tidal movement up to 5 m/s. The bar itself is often subject to breaking waves that render it dangerous for all but the most experienced boaters. Safe passage is typically limited to periods of the highest tides (for access), and even then, conditions can be unpredictable. This natural volatility restricts reliable marine access from Wonboyn to adjacent coastal areas, including Disaster Bay. Historically, Wonboyn Lake functioned as a Wave-dominated Barrier Estuary. However, in September 2004, the entrance closed completely for the first time since records began in the 1940s, following a severe storm and this event led to a reclassification of the lake as an Intermittently Closed and Open Lake or Lagoon (ICOLL). Since the early 2000's, the entrance has experienced multiple closures, notably in 2009 and 2019 and the entrance remains shallow due to significant sand accumulation and scouring inside the moon-shaped entrance, inhibiting access except at the highest of tides.

To the south of Wonboyn, there are no vessel launch points for a far south as Mallacoota, in Victoria (37.5 km south). Ocean access in Victoria is via the Bastion Point Boat Ramp (1.5 km south of Mallacoota township), however access to the ocean can be challenging with Gippsland Ports advising that large swells may occur even when conditions are assessed as good, and night navigation is considered extremely dangerous and should not be attempted.

Figure 40: Regional map of Wonboyn and Disaster Bay with the proposed 200 ha Kelp Aquaculture Farm outlined in white [1.1 km from the high-water mark of Greenglades Beach at the closest corner] and location of prawn farming area (Source: Google Maps).

Disaster Bay has no navigation markers, designated channels, port approaches, moorings, designated diving locations, or whale or dolphin aggregation areas. Disaster Bay holds no sailing events or regattas and is

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outside Naval mooring, transiting, training and restricted areas, and has no current designated aquaculture areas with the exception of >45 ha of oyster farms located inside the Wonboyn River system (see Figure 40, below), located approximately 2.9km from the designated lease area.

Recreational Fishers

Recreational fishers will not be excluded from entering or using the 200-hectare Project area. Public access will remain unchanged, and recreational fishing can continue throughout Disaster Bay so long as vessels and lines do not connect to, interfere with, or moor to the kelp farm infrastructure. This is a standard safety requirement that applies to all fixed marine installations and is intended to protect both fishers and the equipment. Given the footprint of the farm in comparison to similar fishing grounds available across Disaster Bay, no material reduction in recreational fishing opportunities is expected.

Figure 41: Nearest Aquaculture leases (Oysters) in yellow [2.9 km distance as the crow flies and 3.9 km distance by water] to the proposed Kelp Aquaculture Farm in green (Source: Google Maps). Insert Wonboyn Oyster Lease Locations in purple (Wonboyn Oyster Farmers EMS 2011).

Commercial Fishers

Commercial fishing activity within Disaster Bay includes localised fishing operations originating from Twofold Bay. According to NSW DPIRD Fisheries Catch Information confirms that less than six fishing businesses have fished in Disaster Bay in the last 10 years (NSW DPIRD 18 Nov 2025). Due to privacy restrictions, DPIRD Fisheries are unable to release aggregated catch information for Disaster Bay [Site Code: I10-29] from fewer than six individual fishers for a particular area. What is known is that an Eden-based prawn trawler fishes school prawns (*Metapenaeus macleayi*) during late autumn and early winter, targeting a seafloor depression at the northern end of Wonboyn Beach. There is no expected overlap (>2.5 km) between traditional prawn farming areas and the proposed Kelp Aquaculture Farm. Longline fishing for gummy sharks is known to occur in Disaster Bay, however the exact frequency and catch numbers are unknown. Requests were made to the gummy shark operator to detail the total number of fishing days spent in Disaster Bay over the last 5 years, and also for details regarding the number of lines shot that transect the proposed lease area, but these requests were denied. Commercial net fishing is also permissible in Disaster Bay.

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Exclusion of Commercial Fishers

Commercial longline and netting activities are incompatible with the presence of fixed aquaculture infrastructure, and therefore commercial fishers will be excluded from operating within the 200 ha farm footprint, if approved. This exclusion affects approximately 5% of the total area of Disaster Bay. While some commercial operators may lose access to 5% of their traditional grounds in Disaster Bay, this impact should be considered against the following:

1. The farm's spatial extent ensures that 95% of Disaster Bay is available for commercial purposes.
2. Kelp aquaculture is expected to enhance local fish habitat, possibly increasing fish abundance and improving catch rates in adjacent waters due to shelter provision and ecological stimulation.
3. Coexistence between aquaculture and commercial fishing is common in NSW and globally, and government regulators must determine if the proposed kelp farm footprint is reasonable against the loss of available fishing area.
4. Approval of a limited area in Disaster Bay may enable a long-term, regenerative industry that provides regional employment, diversification, and the possibility of improved ecological resilience.
5. Gummy shark longlining is a highly mobile fishery, and operators routinely shift grounds along the entire south coast of Australia.
6. The proposed aquaculture lease is located over mobile sandy substrate with low habitat complexity, meaning the area provides no unique ecological features that would disproportionately impact fishing productivity compared with adjacent available grounds.
7. The footprint avoids key commercial fishing zones, such as the nearshore salmon gillnet grounds and deeper offshore areas.
8. Navigation and safety benefits of restricting longlines and nets within the farm footprint ensure the protection of both aquaculture infrastructure and commercial vessels, reducing entanglement risk.
9. The regulatory framework requires ongoing monitoring and adaptive management, meaning any unforeseen negative impacts on commercial fisheries can be identified in the future and mitigated in consultation with NSW DPIRD Fisheries.

Shipping Density Mapping

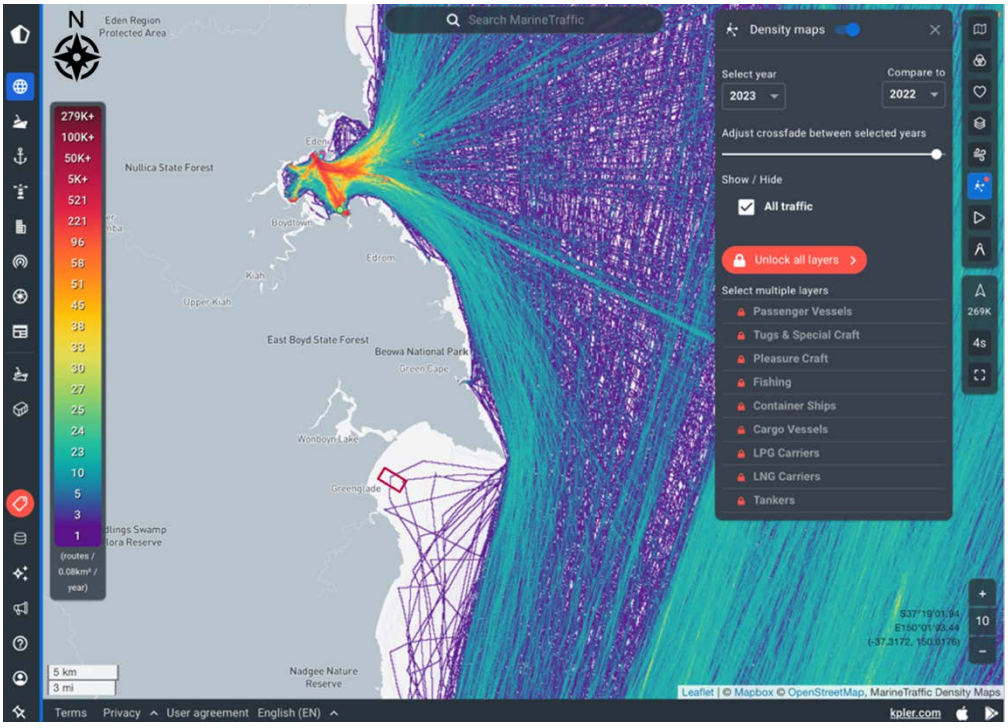

Figure 42: Shipping traffic density map for all vessels 2022-2023 (Source: MarineTraffic, 2023). AL21/004 approximate lease area marked in red.
https://www.marinetraffic.com/en/ais/home/centerx:150.1/centery:-37.2/zoom:11

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Shipping density mapping for vessels equipped with Automatic Identification System (AIS) transponders, showed that AIS equipped marine vessels infrequently passed through Disaster Bay (see Figure 42: Shipping traffic density map for all vessels 2022-2023 Source: MarineTraffic, 2023). During 2022-2023, less than four AIS equipped vessels passed through Disaster Bay, and all were <500 Gross Tonnes. Only three AIS equipped vessels passed through the designated Kelp Aquaculture Farm area AL21/004 over this two-year period. Therefore, it is assessed that the proposed aquaculture lease is unlikely to have a significant impact on AIS equipped vessel routes in the region.

The above MarineTraffic Maps covers the following categories of vessels provided they are equipped with AIS (automatic identification system) transponder:

1. Commercial Cargo Ships
    - Bulk carriers
    - Container ships
    - General cargo vessels
2. Tankers
    - Crude oil tankers
    - Chemical/product tankers
    - LNG/LPG carriers
3. Passenger Vessels
    - Cruise ships
    - Ferries
    - High-speed passenger vessels
4. Fishing Vessels (if fitted with EIS)
    - Inshore, offshore, and long-range commercial fishers

    Note: In Australia, larger vessels (typically ≥15–24 metres) are required by law to carry AIS
5. Tugboats and Service Vessels
    - Harbour tugs
    - Supply and utility boats
    - Pilot vessels
6. Military and Government Vessels
    - Maritime Police
    - Coast guard
    - Naval support (some are visible, others are restricted)
7. Pleasure Craft and Yachts
    - Included if fitted with AIS
8. Research and Survey Vessels
    - Oceanographic ships
    - Hydrographic survey boats

Lease Boundary Marking and Identification

In accordance with the Fisheries Management (Aquaculture) Regulation 2024, the NSW Marine Waters Sustainable Aquaculture Strategy, Transport for NSW (TFNSW) requirements and International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) standards, the extremities of the Eden-1 lease will be marked by appropriately designed navigational buoys positioned at the corners of the lease area. Light visibility will be set to a nominal range of 1 nautical mile (approximately 1.8 km), consistent with maritime safety requirements for offshore aquaculture infrastructure. Each of the four cardinal markers will incorporate the prescribed buoy colour combinations, day shapes, and light flash characteristics in accordance with NSW Maritime and IALA standards.

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Corner markers will be equipped with radar reflectors to enhance detectability by vessels in reduced visibility conditions. Lease and permit identification numbers will be clearly displayed in contrasting colours to ensure legibility and regulatory compliance. Together, these measures ensure that the lease area is identifiable to commercial, recreational, and government maritime users while maintaining alignment with established navigational safety protocols.

Figure 43: Navigation corner marker ("Special Mark Buoy"), used to mark the boundaries of aquacultural leases. (Source: Adortech).

Access to Lease Area

Recreational fishers are permitted to enter and anchor near or within the Eden-1 Kelp Aquaculture lease area, provided they do not interfere with the kelp infrastructure or operational activities of the lease. Under NSW aquaculture legislation, lease areas are not exclusive-use zones, meaning passive navigation and proximity anchoring are legally allowed; however, anchoring on or mooring to the aquaculture structures themselves is prohibited. To ensure navigational safety and minimise the potential for conflict, the lease boundaries will be clearly marked with signage and navigational buoys in accordance with NSW Maritime and IALA standards and a recommended speed limit within the designated lease area is recommended.

Collision with aquaculture infrastructure is a conceivable risk; however, the likelihood is lowered due to the farm's remote offshore location and the nature of marine use in Disaster Bay. The Eden-1 lease area is situated in a low-use maritime zone, more than 4.4 km from the nearest public launch point (Wonboyn) and is not part of established recreational boating routes. Disaster Bay is widely recognised as an exposed, high-energy environment with limited shelter, meaning only experienced and highly competent vessel operators typically navigate the area. Recreational inshore vessels, kayakers, and small craft are unlikely to be present due to the hazardous sea conditions, unpredictable weather, and lack of protected access points.

In addition, the Eden-1 Kelp Aquaculture leases will not exclude any waterway user groups — such as dive operators, sailors, recreational or commercial fishers, or dolphin and whale watching operators. While no formal restrictions will be placed on access, vessels will be encouraged to maintain a safe distance from the longline infrastructure in accordance with NSW maritime safety guidelines.

Integration into Navigational Charts and Notices

Under the Marine Safety Act 1998 (NSW), Transport NSW requires that all aquaculture leases be marked on official navigational charts to aid in safe navigation. A Notice to Mariners will be issued to inform the maritime community of the new lease area, ensuring that commercial and recreational vessels are aware of the aquaculture operations. The Australian Hydrographic Office (AHO) will be notified of the lease location, leading to the publication of a "Notice to Mariners" and updates to official nautical charts to reflect the lease area. This ensures all marine navigational systems are up to date.

See: https://hydro.gov.au and https://hydro.gov.au/notices/notices.htm.

Survey and Coordinate Standards

All surveys for the Eden-1 aquaculture lease will adhere to the Surveyor General's Direction No. 13, utilising the Geocentric Datum of Australia 2020 (GDA2020) and Map Grid of Australia 2020 (MGA2020) Zone 56

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coordinates. This standardisation ensures consistency and accuracy in the documentation and mapping of the lease area.

Lease Maintenance and Development Plan

As part of the aquaculture permit application, a lease Monitoring and Maintenance Plan must be submitted, detailing how the lease will be maintained in accordance with the NSW Marine Waters Sustainable Aquaculture Strategy. This includes descriptions of lease marking, infrastructure condition, and maintenance schedules to ensure ongoing compliance and navigational safety.

Navigation Safety and Marine User Awareness

Navigation safety in the vicinity of commercial the proposed Kelp Aquaculture Farm will be maintained through stringent compliance with Port and Maritime authorities, maritime regulations and proactive engagement with other marine users and commercial fishing operators. Navigation warning signs will be erected at Twofold Bay and Wonboyn boat ramps to inform marine users of navigation rules and restrictions.

Vessel Operator Competency

All personnel involved in marine vessel operations are required to hold appropriate licenses and qualifications, including those specified under the Australian Maritime Safety Authority (AMSA) standards—such as the Coxswain Grade 1 Near Coastal or Master up to 24 metres Near Coastal. Operators undergo regular training and adhere to best-practice safety protocols. For further information, see:

https://www.amsa.gov.au/marine-qualifications/national-system-qualifications

Code of Conduct

The aquaculture operation aligns with the Australian Aquaculture Code of Conduct, which encourages the respect the safety and rights of other waterway users, promote methods to minimise conflict, consult with stakeholders, and provide educational outreach. The Code aims to foster cooperation, transparency, and good community relations. More details available at:

https://www.australianseafood.com.au/uploads/Seafood-Industry-Code-of-Conduct.pdf

Conclusion

The risk of safe navigation and other waterway users being significantly impacted by the Kelp Aquaculture Farm and its operation is considered to be 'low'. The lease occupies 5% of the bay (2.5% by infrastructure footprint) and is situated outside recognised navigation routes, port approaches, and high-use recreational or ecological areas. Commercial fishers will lose access to longline areas, but this is not expected to materially impact overall commercial fishing operations. Disaster Bay is used infrequently by large or AIS-tracked vessels, with less than four transits through the proposed lease area over a two-year period (2022-2023), and there are no permanent moorings or marked navigation channels present. While a residual risk of vessel collision can never be fully eliminated in any offshore operation, the Eden-1 longlines and surface float systems are designed to be readily visible under most sea and weather conditions and radar for reflectors will enhance detectability by vessels in reduced visibility conditions. Visual markers in accordance with IALA standards — including flashing yellow navigation buoys — will define the lease boundaries, and the area will be included in updated nautical charts and official Notices to Mariners via the Australian Hydrographic Office. Access for small-scale recreational fishers remains permitted, and the aquaculture operation will adhere to the Australian Aquaculture Code of Conduct.

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9.2.5 Decommissioning

Risk Table 8: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the following – decommissioning of kelp longline infrastructure (modified from Fletcher et al., 2012; Vom Berg, 2009).

Issue	Will the Kelp Aquaculture Farm Lease areas be significantly degraded that rehabilitation will be required to restore its pre-existing state if the leases were decommissioned?			
Comments for consideration	• Will the lease areas need rehabilitation if decommissioned? • Will the pre-existing state of the environment return after aquaculture activity cease? • How long will it take for the environment to return to its pre-existing state, notably the benthic environment? • What surety is there that the areas will be rehabilitated? • Will any infrastructure remain if the farm is removed?			
Description	• Proposed duration for leases = undefined • If decommissioned, all infrastructure would be removed i.e. longlines, mooring systems and anchors • Lease abandonment			

Proposed Management – Mitigation and Monitoring	• Site selection
	  o Habitat – fine unconsolidated sandy sediment (unvegetated sandy substrate with no biological assemblages)
	  o Well, flushed bay
	• Minimal disturbance to seabed i.e. anchors only
	• Regenerative aquaculture = no feed inputs
	• Kelp biomass – no biodeposits or enrichment
	• Appropriate stocking densities ensure hydrology and light are not critically affected
	• Aquaculture Lease Security Arrangement (Bond)
	• Remove all infrastructure when decommissioned			

Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	2	2	Low

Justification of Ranking

The proposed decommissioning of kelp longline infrastructure in Disaster Bay is expected to have negligible environmental impact, particularly on the benthic environment. Kelp aquaculture differs significantly from mussel or fish farming in that it is regenerative and does not accumulate organic waste or biodeposits. The cultivation of kelp requires no feed, antibiotics, fertilisers, pesticides or additives, and the dropper lines are suspended >10 metres above the seafloor, thereby minimising shading or smothering benthic habitats. The lease area, situated in a high-energy, well-flushed bay with sandy unconsolidated sediment and no identified sensitive benthic communities, is considered low risk for long-term ecological disruption.

Should decommissioning occur, all infrastructure—including longlines, dropper lines, floats, moorings, and screw anchors (where possible) – will be removed. Each screw anchor is expected to disturb only a small surface area of the seabed, approximately 1 m, and the mobile nature of the sandy substrate means that

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wave action and current flow will naturally redistribute sediments, leading to passive site recovery. The absence of organic loading means that there will be no long-term enrichment of sediments or alteration of benthic fauna structure. Furthermore, lease conditions under the NSW Fisheries Management Act 1994 stipulate that all materials must be removed upon lease expiry, cancellation, or surrender, and an Aquaculture Lease Security Arrangement (Bond) is in place (for Class A permit holders with a Class 2 Algae licence) if the operator is unwilling or unable to carry out the work.

Site selection has intentionally targeted low-sensitivity areas to minimise risk, and longline spacing ensures that natural light penetration and hydrology are not critically affected. Monitoring will be implemented to detect any unforeseen impacts on the water column or benthos, and appropriate management responses such as adjusting stocking densities or dropper line length will be enacted if necessary.

Water quality and benthic monitoring are not proposed as part of the environmental management framework for kelp aquaculture farming in Disaster Bay, due to the negligible environmental risk associated with this form of aquaculture. Unlike finfish or shellfish farming, kelp cultivation involves no artificial feed, nutrient inputs, or waste discharge, and international studies have consistently demonstrated that it has minimal to no adverse effects on the surrounding environment. For instance, Visch et al. (2020) found no significant differences in sediment composition or benthic community structure between kelp farm sites and control areas in Sweden, concluding that such farms do not alter benthic conditions. Similarly, Hancke et al. (2021) in Norway observed only temporary and highly localised changes in benthic biodiversity following extreme biomass accumulation events (>8 kg/m2) — conditions that would be highly unlikely in Disaster Bay due to the hydrology and high-energy environment—and noted full recovery within three months post-dispersal. A broader review by Carranza et al. (2024) also confirmed the ecological resilience of benthic systems following kelp cultivation and harvest, noting that no enduring impacts were detected across multiple international case studies. Importantly, the kelp species cultivated in Norway and Sweden are predominantly members of the Laminaria genus, including *Saccharina latissima*, which belong to the same family (*Laminariaceae*) as *Ecklonia radiata*—a colonial kelp species native to Australian waters. These species share highly similar growth forms, ecological niches, and reproductive strategies, making international findings directly relevant and transferable. Given this taxonomic and ecological alignment, and supported by strong empirical evidence, routine benthic and water quality monitoring is not considered necessary for kelp farming operations in Disaster Bay.

This approach is further supported by evidence from previous studies of longline bivalve (shellfish with a two-piece hinged shell) aquaculture in Australia and New Zealand. For instance, Heasman et al. (1998) found that scallop farming in Jervis Bay caused no significant increase in organic material in sediments. Similarly, Lasiak and Underwood (2002) reported no measurable impact on benthic fauna under mussel lines in Twofold Bay, and Cardno Ecology Lab (2012) confirmed no significant increases in total organic carbon (TOC) beneath mussel farms over several years of monitoring. Crawford et al. (2003) found that shellfish farms in Tasmania did not significantly alter sediment chemistry or benthic fauna, even under conditions of low current flow and high silt content. Keeley et al. (2009) reviewed the effects of shellfish aquaculture in New Zealand and observed only minor sediment enrichment and localised shell debris beneath leases, with effects dissipating rapidly within 20–50 metres of the structures. These studies consistently found that when bivalve farms are appropriately stocked and located in well-flushed areas, environmental impacts are limited, highly localised, and often temporary.

Therefore, whilst mussel or shellfish farms can generate biodeposits and contribute to sediment enrichment, kelp aquaculture contributes no organic waste or biodeposits, thereby reducing this risk almost entirely. The structural simplicity and low impact of kelp infrastructure—combined with its operation in well-flushed, sandy environments—further mitigate ecological risks. Additionally, because kelp farming occurs in deeper water (~20 m) with minimal benthic shading and no nutrient discharge, its potential to alter seafloor habitat is negligible. Kelp does naturally shed blades or detach during storm events and this is a normal ecological process in temperate marine environments. Detached kelp is highly transportable, often moving with currents before depositing on beaches or drifting to the seafloor and deeper waters. It is common to observe kelp wrack along shorelines and scattered across soft sediment areas, where it forms an important part of the benthic ecosystem. This "storm-cast" material provides habitat and food for a variety of marine organisms, including crustaceans, worms, and juvenile fish. As it decomposes, kelp detritus contributes to nutrient cycling,

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supporting productivity in adjacent habitats. These ecological roles are well documented and highlight how natural kelp deposition supports biodiversity and enhances benthic complexity, particularly in otherwise featureless substrates. As such, the natural shedding and movement of kelp fragments can be regarded as an integral and beneficial process that complements the local environmental function.

Conclusion

The environmental risk associated with decommissioning of kelp aquaculture infrastructure in Disaster Bay is assessed as 'negligible'. The lack of organic waste or biodeposits, negligible substrate disturbance, and high natural flushing of the site all contribute to a strong likelihood that the environment will not be degraded, and the site will certainly return to its pre-existing condition after infrastructure removal. The application of a financial bond by NSW Fisheries DPIRD provides a financial guarantee that decommissioning will be completed. Based on historical evidence from comparable aquaculture operations locally and internationally, the intrinsic low-impact nature of kelp farming requires no active rehabilitation measures during operations or post infrastructure removal.

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9.3 IMPACT ON COMMUNITY

9.3.1 Visual Amenity

Risk Table 9: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – visual amenity (modified from Fletcher et al., 2012, 2018).

Issue	Will Kelp Aquaculture Farming have a significant impact on Visual Amenity in and around Disaster Bay?			
Comments for consideration	• Will the longlines be visible from the shore and/or any advantage points? • Can the longlines be designed to minimise their visibility from a distance e.g. colour, profile and size? • Will the work vessels be different to existing vessels that use the bay? • Will the farm area be visible from any residential homes?			
Description	• Land base viewpoints: o Greenglades Beach o Merrica Beach o Nadgee Nature Reserve o Baycliff o Wonboyn Entrance/Beach o Greencape Lighthouse • Distance to nearest landmarks: o Greenglades Beach = 1.1 km o Nadgee Nature Reserve = 1.1 km o Merrica Beach = 1.6 km o Baycliff = 2.1 km o Wonboyn Entrance/Beach = 2.6 km o Greencape Lookout = 4.6 km o Greencape Lighthouse = 6.2 km • Navigation lights may be visible at night • Not visible from Wonboyn village • Not visible from any residential property • Surrounded by Nadgee Nature Reserve and Beowa National Park			
Proposed Management – Mitigation and Monitoring	• Design features that minimise visibility e.g. dark coloured materials (floats), low profile and sub surface longline infrastructure • Vessels used will be similar to existing vessels that frequent Twofold Bay and occasionally in Disaster Bay • Periods of operation = late autumn, winter & spring • Hours of operation = predominately daylight • Navigation lights = low intensity flashing white strobe lights with a low profile • Limited scale operations 2.5% of Disaster Bay deployed			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	6	6	Low

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Justification of Ranking

Visual impacts are subjective and difficult to quantify as perceptions and attitudes vary considerably (O'Hanlon, 2004). Marine aquaculture facilities are often placed in open waters where there are no permanent man-made structures. The installation of aquaculture infrastructure can alter views from passing vessels and potentially adjacent land areas.

To minimise visual impact, a number of design features will be used to reduce the visibility of the longline infrastructure, including the use of dark coloured buoys, the streamlining of surface elements, and maximising subsurface infrastructure. The Kelp Aquaculture Farm infrastructure will consist of longline systems with a single backbone from which multiple single dropper lines will be connected and suspended (Figure 43). The anchoring and mooring system will not be visible from the surface except for where the lengths of polypropylene mooring rope comes to the surface and attach to the end buoys. The end and support buoys will be partly visible above the surface of the water and will be submerged as swell rolls through the farmed areas. Whilst the mainline will be suspended 1-1.5 m metre below the ocean surface, the floatation buoys will be approximately 30 cm above the water level in flat seas at low tide, and some buoys may be submerged during very high tides. A minimum of four yellow navigation buoys, including flashing lights, will be secured at the corners of the farmed areas, which will be visible from Greenglades beach and North Wonboyn beach, and specific coastal vantage points, but not from any residential zones.

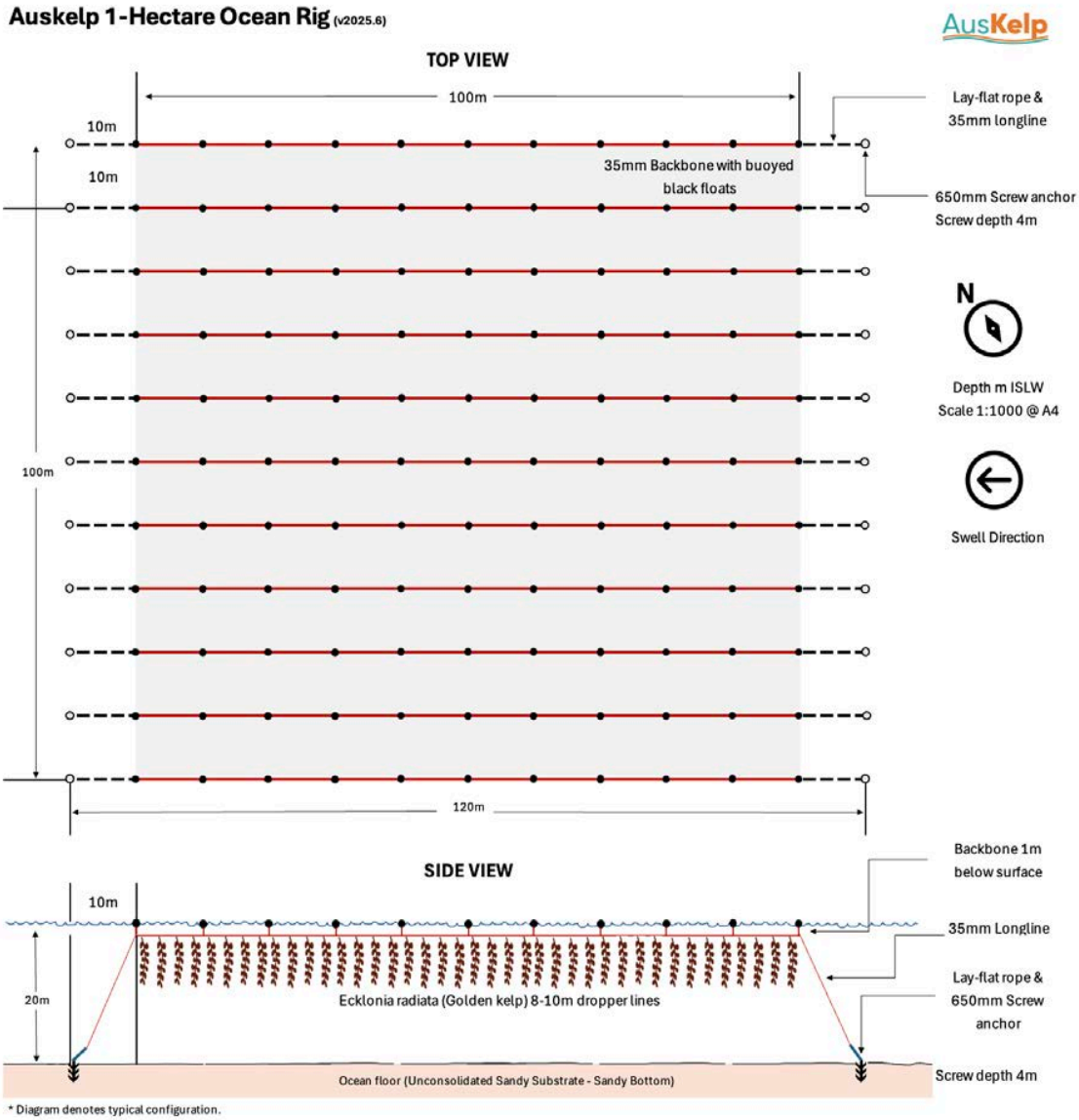

Figure 44: Auskelp 1-Hectare Ocean Rig (Credit: Auskelp 2025)

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The visual impact of the Kelp Aquaculture Farm is limited due to a combination of geographic remoteness, infrastructure design, and limited visual exposure. The proposed longline infrastructure will be located offshore, with the nearest land-based viewpoints including Greenglades Beach (1.1 km), Nadgee Nature Reserve (1.1 km), Baycliff (2.1 km), Wonboyn Entrance/Beach (2.6 km) and Greencape Lighthouse (6.2 km). Greenglades Beach and Nadgee are difficult to access, with unsealed roads of 5–7 km leading to coastal lookout points such as North Greenglades and Baycliff. As a result, daily visitation to these areas is restricted, and the Kelp Aquaculture Farm is not visible from any residential or commercial properties, or from the village of Wonboyn. There is no publicly available information specifying the average daily number of visitors to Nadgee Nature Reserve or Greenglades Beach. However, the area's remote location and challenging access routes restricts visitor numbers. South Greenglades Beach, for instance, is accessible only via a 5 km unsealed dirt road, which likely deters casual visitors. The NSW National Parks and Wildlife Service describes Nadgee Nature Reserve as a place where "you won't be bothered at all by crowds," highlighting its seclusion. This characterisation and decades of local experience and feedback indicate that daily visitation to Greenglades Beach is minimal, with fewer than ten visitors per day on average, and potentially lower visitor numbers during colder periods (winter and outside school holidays).

Figure 45: View of existing Kelp Aquaculture Test Farm (Section 37) in Disaster Bay, located 950 m offshore (at the nearest point) from Greenglades Beach. Visibility good, ocean swell approximately 1.1 m. Corner markers visible. Photograph taken with 3 x Zoom. (Credit: Auskelp 2025)

The ocean vessels used to service the Eden-1 Kelp Aquaculture Farm will be similar in size and appearance to existing prawn, fishing, and mussel vessels that operate out of Twofold Bay and occasionally transit Disaster Bay, ensuring visual consistency with existing maritime activity. Importantly, kelp farming operations will not generally be conducted at night (except in emergency situations and during or due to unusual weather events). Visual impacts are additionally mitigated by the surrounding environment: the site is bordered by Nadgee Nature Reserve and Beowa National Park, both of which provide natural screening via trees, coastal dunes, vegetation, and topographical elevation.

Peer reviewed studies have demonstrated that aquaculture infrastructure—particularly low-profile systems like kelp longlines—have negligible visual impact when constructed using dark, non-reflective materials and located significantly offshore (Buck et al., 2017; O'Hanlon, 2004). According to NOAA (2021), the visual horizon from a 1.85-metre eye level is approximately 4.7 km; however, a 30 cm high black float can be difficult to distinguish from over 2 km away across the ocean, with a geometric visibility limit of up to 4.7 km when combining the viewer's and object's horizon distances (NOAA, 2021). However, practical visibility is more limited; studies show that low-profile objects like buoys are difficult to detect beyond 1–2 km under real ocean conditions, especially in choppy or swell conditions, or low contrast environments (Prytz et al., 2017). Detection

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is certainly possible above 2 km in ideal conditions—clear skies, calm seas, and strong contrast—but is at the limit of human visual acuity (Palmer, 1999).

The Eden-1 infrastructure is located on average 1.1 km from any plausible viewing point and may be as far as 2.7 km and employs minimal surface elements [with the exception of the yellow corner marker buoys], its visibility is relatively constrained.

Observations of Mussel Aquaculture Farms in Twofold Bay indicate that such infrastructure is noticeably visible at very close distances (less than 500 metres), with visual detectability decreasing rapidly beyond 1–2 km. Because Disaster Bay is a secluded and ecologically pristine area, it is possible that some may perceive any form of development in Disaster Bay—regardless of scale or visual impact—as unwelcome. This sentiment, while possibly grounded in a deep appreciation for untouched natural environments, can lead to opposition based not on measurable impacts but on the principle of maintaining wilderness in its absolute state. While such perspectives are certainly valid, they should be balanced against the broader context of sustainable resources, local employment and environmentally friendly economic benefit.

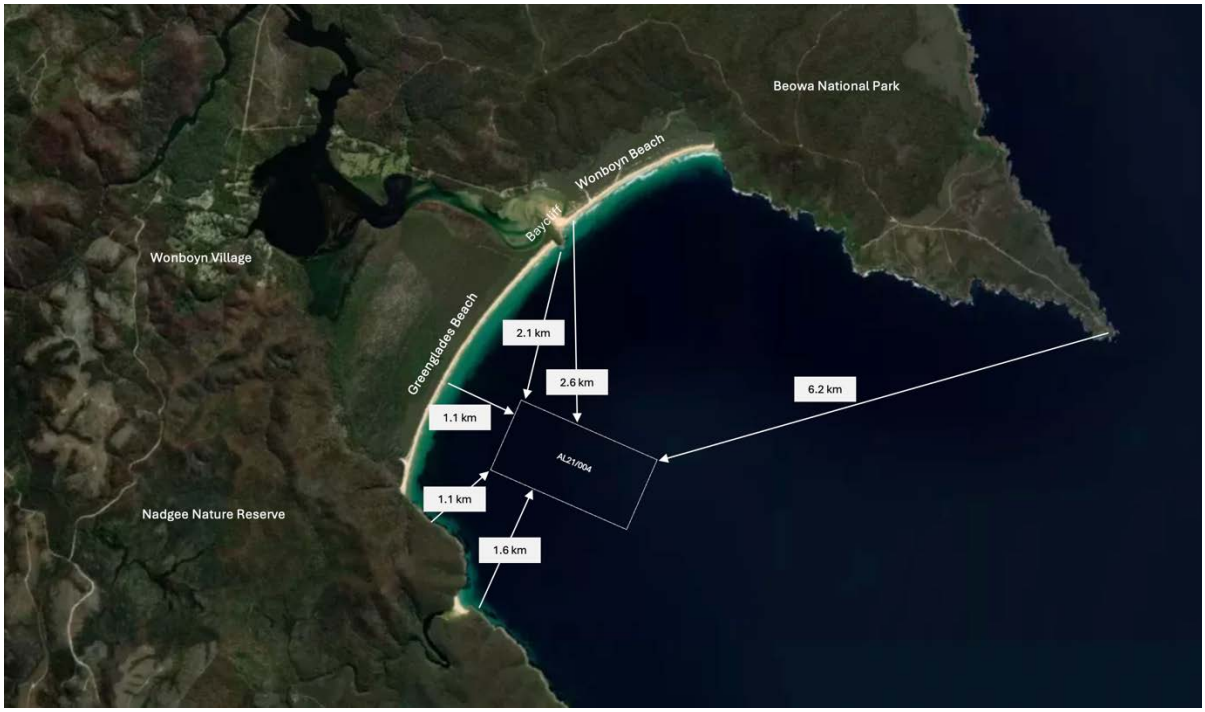

Figure 46. Regional map of Wonboyn and Disaster Bay with the proposed 200 ha Kelp Aquaculture Farm indicated in green [1.1 km from the high-water mark of Greenglades Beach at the closest corner] (Source: Google Maps).

Unlike intensive finfish or shellfish farming, kelp aquaculture is passive in nature and involves minimal daily human activity. Operations focus on seasonal cycles of seeding, periodic monitoring, and eventual harvesting. As such, vessel activity will be infrequent and scheduled, usually aligned with biomass assessments, maintenance, or harvest events. On typical days, no vessels will be present. Furthermore, the farm is designed to be unoccupied for approximately four months each year—generally post-harvest and through summer periods, prior to reseeding—which further reduces both visual and operational impacts. This regenerative marine farming model, consistent with restorative aquaculture principles (Theuerkauf et al., 2019), contributes positively to the environment without introducing disruptive levels of activity, noise, or artificial lighting.

Conclusion

The Eden-1 Kelp Aquaculture Farm is unlikely to result in significant impact on visual amenity, but it may be visible from shore under certain conditions. Offshore infrastructure will be located 1.1 to 2.1 kilometres from parts of the Nadgee Nature Reserve Declared Wilderness Area. The design and layout of the farm have been developed to minimise visual intrusion in recognition of the high sensitivity of the community and visitors to

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visual change within wilderness landscapes. The proposal incorporates low-profile infrastructure, muted, non-reflective colours (except as required for marine navigation safety purposes), and a best-practice layout that minimises visual contrast with the surrounding seascape. Visual exposure from land-based viewpoints is limited to surface buoys and intermittent vessel presence, with no large or continuous structures visible above the waterline. No infrastructure will be visible from any residential location.

Vessel activity associated with the Project will be intermittent and seasonal, and consistent with the pattern and scale of existing commercial and recreational marine traffic historically present in the region. While components of the farm may be visible from elevated or exposed coastal viewpoints under clear weather conditions, the offshore location, high-energy marine setting, and absence of regular public viewing locations limit visual prominence and duration. On this basis, and having regard to the sensitivity of the surrounding wilderness environment, the visual amenity impact of the Eden-1 Kelp Aquaculture Farm has been assessed using the risk assessment framework as 'low', with impacts expected to be minimal, localised, and compatible with the character of the surrounding seascape.

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9.3.2 Marine Vessel and Vehicular Transport

Risk Table 10: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – marine vessel and vehicular transport associated with the operation of the Kelp Aquaculture Farm (modified from Fletcher et al., 2012, 2018).

Issue	Will marine vessel and vehicular transport associated with the operation of the Kelp Aquaculture Farm have a significant impact on the communities and visitors of the Disaster Bay/Eden/Edrom region?			
Comments for consideration	• Will there be a significant increase in the number of marine vessel movements in Disaster Bay and Twofold Bay due to general operations and maintenance? • Will there be a significant increase in the number of road vehicle movements around the Eden/Edrom region due to daily operations and maintenance? • Is the expected increase in marine vessel and vehicle movements likely to pose navigation and/or congestion issues in the waterways or roads of Disaster Bay, Wonboyn, Eden or Edrom?			

Description	• Marine vessel movements:
	  ○ 0-3 trips per day
	• Vehicular movements:
	  ○ 0-3 trips per day
	• Snug Cove Wharf
	• Edrom Multi-purpose Wharf
	• Edrom Land-based Facilities (Pentarch)			

Proposed Management – Mitigation and Monitoring	• Limited increase in vehicle and marine vessel movements relative to existing traffic • Staff will be required to obtain relevant licences, qualifications, regular training and abide by regulations • NSW Roads and Maritime Services will be notified when longline installation is to commence • Movements of vehicles will be limited to predominately normal working hours utilising existing roads and facilities • Partnership with existing aquaculture organisations • Partnership with Pentarch Group for Edrom access, infrastructure deployment and staging, kelp processing facilities and waste management removal • Appropriate flags, symbols and signs will be displayed • Approved Traffic Management Plan			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	4	4	Low

Justification of Ranking

The Eden-1 Kelp Aquaculture Farm is uniquely positioned to leverage a significant group of underutilised land- and ocean-based infrastructure originally developed to support Eden's once-thriving commercial fishing and forestry industries. This infrastructure is underused due to a reduction in active fishing operations, providing an ideal, low-impact opportunity for the establishment of a regenerative offshore aquaculture project with minimal community or marine and land-based transport disruption.

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Marine Vessels

Purpose-designed and built vessels will be used for the operation and maintenance of the Kelp Aquaculture Farm. The Daily Operating Vessels will be purpose-built with a length of about 18 m (see Figure 46) – very similar in design and function to mussel farming vessels currently used in Twofold Bay – which will be permanently moored at either Snug Cove Wharf or on swing moorings adjacent to Pentarch slipway in Edrom. Support/emergency vessels will be ~9m purpose-built vessels able to handle rough ocean conditions (see Figure 47). Support vessels are utilised for weekly farm infrastructure inspections and deployment during emergency situations (due to their smaller size, seaworthiness, speed and manoeuvrability).

The Daily Operating Vessels are fitted with equipment for the cleaning and maintenance of the longline infrastructure, moorings and droplines, plus a functional crane for lifting and weighing kelp lines, multiple lifting winches, as well as systems for seeding and harvesting kelp, and conducting other general duties (i.e. transporting divers etc). Additional specialist vessels may be contracted out for short periods, in addition to the Operating Vessels and Support Vessels, to assist with specialised activities such as the installation of screw anchors, longline infrastructure and the installation of corner navigation marker buoys.

Figure 47: Daily Operating Vessel: Malkarra (owned by Southcoast Mariculture, located in Eden) mussel boat used for kelp testing in Twofold Bay and Disaster Bay (Credit: Auskelp 2025).

Figure 48: Indicative all weather support vessel proposed for seeding and ocean farm infrastructure inspections (Credit: Tuco Marine).

Twofold Bay is an active maritime zone on the far south coast of New South Wales, supporting a diverse and continuous mix of commercial, recreational, and operational vessel movements. Based on available data and sector analysis, it is conservatively estimated that Twofold Bay experiences between 80 and 120 vessel movements per day, equating to approximately 58,000 to 88,000 vessel movements annually (including both arrival and departure). This activity includes recreational boating and fishing, regular movements by bulk

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carriers loading woodchips and logs at the Edrom chip mill (estimated at 20–30 large ship movements annually), Royal Australian Navy support vessels at the Edrom Multi-purpose Wharf, and cruise ships, with Eden receiving 41 cruise liners during the 2023–24 season and 47 scheduled for 2025–26. Total estimated large ship movements in Twofold Bay are estimated at 100–150 movements annually.

In addition, Twofold Bay supports a small but active commercial fishing fleet, including trawlers, longliners, netters, cage fishers, and aquaculture service vessels, with daily activity from mussel farming operations and seasonal abalone and sea urchin divers. Recreational boating is significant during holiday periods, with charter fishing, whale watching tours, private yachts, and local boaters increasing traffic during weekends and holidays. These activities are centred around key maritime infrastructure such as Snug Cove Wharf, Quarantine Bay, Snug Cove Marina, and swing moorings throughout the bay.

By comparison, the Eden-1 Kelp Aquaculture Farm will generate on average 3 x vessel movements per day to Disaster Bay—two service trips and one small-scale support or logistics trip (weather dependant) — amounting to around 1,095 movements per year. This represents 2.5% to 3.7% of the total estimated vessel activity in the area.

No impact to marine traffic levels is expected in Wonboyn river and lake system.

Current Maritime users

Commercial Fishing Vessels:

- Trawlers: Utilised for harvesting prawns.
- Longliners: Employed in targeting gummy sharks, flathead and whiting.
- Trap and Pot Vessels: Used for catching species such as lobster and crab.
- Netters: Engaged in gillnetting or trawling for species like Australian Salmon.

Diving Operations:

- Abalone Divers: Commercial divers harvest blacklip abalone from rocky reefs using surface-supplied air (hooker) or scuba gear.
- Sea Urchin Divers: Divers collect species like the red sea urchin and purple sea urchin from rocky substrates using surface-supplied air (hooker).
- Private Dive Operators.

Aquaculture Support Vessels:

- Mussel Farming Boats: Operate in the western part of Twofold Bay, servicing up to 37.5 ha of mussel lines across four lease areas.

Industrial and Commercial Shipping:

- Woodchip Carriers: Large vessels transport woodchips from the chip mill at Jews Head to international markets.
- Naval Vessels: The Royal Australian Navy utilises the multi-purpose wharf for various operations, including the loading and unloading of munitions.
- Cruise Ships: The Eden Cruise Wharf accommodates cruise liners up to 370m in length, contributing to the local tourism industry (47 Cruise Ships booked for 2025-2026 Season).

Recreational and Other Vessels:

- Police and Maritime Vessels – located permanently at Eden.
- Private Yachts and Sailing Boats: Frequent the bay for leisure and tourism purposes.
- Charter Fishing Boats: Offer recreational fishing experiences for tourists and locals.

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- Whale Watching Vessels: Operate seasonally, providing tours during whale migration periods.
- Tugboats: Three large tugboats assist in manoeuvring larger ships within the port facilities.

A number of management measures will be implemented to ensure the safety of staff and other waterway users while partaking in marine vessel transport. Staff will be required to have relevant licences and qualifications, undergo regular training, abide by NSW Maritime regulations and consult the weather forecast for NSW coastal waters before departing for daily operations and maintenance. Appropriate flags, symbols and signs will also be displayed on marine vessels, such as the Diver Down flag. NSW Roads and Maritime Services will be contacted immediately if any pollution is detected. In the very unlikely event of a large scale and/or severe pollution incident, the event will be managed in accordance with the NSW State Waters Marine Oil and Chemical Spill Contingency Plan.

Conclusion – Marine

The risk of the marine vessel transport associated with the Kelp Aquaculture Farm having a significant impact on other recreational or commercial waterway users was assessed to be 'low'. Operations are not expected to impede safe navigation and/or access to wharf, mooring and jetty facilities when considered in context with the relatively minor increase in marine vessel movements.

Vehicular Movements

Based on projected staffing and operational logistics, the Eden-1 Kelp Aquaculture Farm is expected to generate a limited number of vehicle movements annually from the Edrom or Eden locations. With up to 30 staff employed across administrative, marine operations, hatchery and processing roles, and assuming a standard five-day work week over 48 weeks per year, approximately 16,800 staff-related vehicle movements (including both arrival and departure) can be expected annually. In addition, the operation will generate (at maximum yield) approximately two truck movements to Edrom per day associated with the transport of kelp biomass and associated by-products, amounting to roughly 500 truck movements per year, with the majority being vehicles with a GVM of 4.5 tonnes. Combined, the total estimated vehicle movements attributable to the Eden-1 Project are approximately 17,300 per year.

This figure is relatively small when compared to the existing traffic volume at Edrom and Eden, where an estimated ~183,000 vehicle movements occur annually on Edrom Road. These movements are primarily related Pentarch operations, naval work, and the export of woodchips and hardwood logs from Pentarch's forestry operations and other operations, which involve high-volume truck logistics, port activities, and industrial support services. The site also supports activity at the Edrom Multi-purpose Wharf, which is operated by Pentarch on behalf of the Royal Australian Navy and is used for naval vessel berthing and logistics, and other uses.

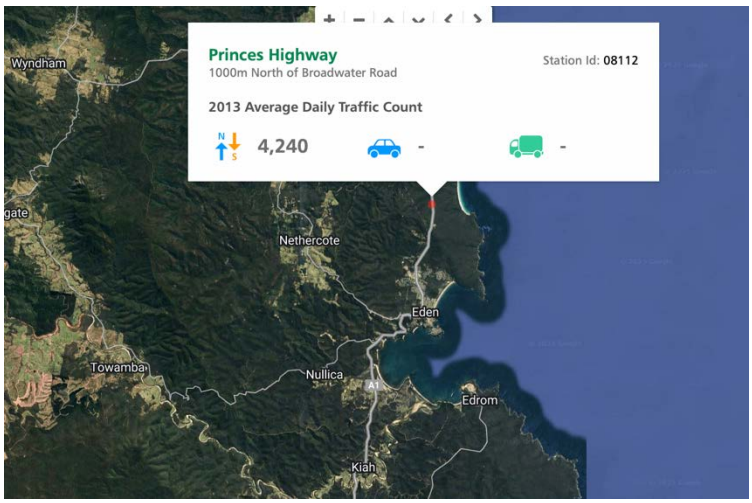

Figure 49: Transport for NSW indicates that average daily traffic count for the Princes Highway 1 km north of Eden in 2013 was approximately 4240 vehicles per day (Credit: Transport for NSW 2025).

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Importantly, access to Eden and Edrom is via the Princes Highway, a federally designated arterial route that services the NSW South Coast. Road use monitoring conducted by Transport for NSW via the online Traffic Volume Viewer indicates that the Princes Highway north of Eden has traffic volumes of approximately 4,240 vehicles per day (2013). This Princes Highway is engineered to accommodate high flow volumes, including heavy vehicles, and connects directly to Edrom Road and William Allen Road, that lead to Edrom. Both these roads have been specifically designed and maintained to support large-scale forestry haulage and munitions transport, given the area's industrial zoning and proximity to naval operations. These roads are not regularly used by the general public and only serve limited residential areas (Edrom House, Wonboyn Resort and North Wonboyn homes – approximately 30 residents). As such, the roads have substantial existing capacity and are ideally suited to accommodate the low-impact, infrequent transport requirements of the Auskelp aquaculture operation. In this context, the additional traffic associated with the Eden-1 Kelp Aquaculture Farm represents a 21% increase of vehicle traffic on Edrom Road compared solely to local forestry use and is not anticipated to place any measurable pressure on road capacity, site logistics, or public infrastructure.

All marine operations will be conducted exclusively via private or commercial port infrastructure; no public boat ramps will be used. All vessel launchings, retrievals, and servicing will be conducted from private or industrial maritime infrastructure, including the Pentarch slipway at Edrom and commercial berths at Snug Cove Wharf.

No impact to traffic levels is expected in Wonboyn or Nadgee Nature Reserve related to the Project.

Nadgee Nature Reserve will not be used for commercial access related to the Eden-1 Kelp Aquaculture Farm. The only anticipated requirement for entry relates to occasional visual observation following extreme storm events, and only in circumstances where safe ocean access from Eden or Edrom is unavailable. Under such scenarios, no vehicles will be permitted off designated public roadways within the reserve, and access to Greenglades Beach will be strictly by foot using designated public pathways. Observations will be limited to the inspection of beach conditions for (i) potential loss of longline infrastructure, (ii) the observation of storm-cast kelp, or (iii) the launching of drones from the waterside to support farm inspection for vessel or marine mammal safety. Access for this purpose is expected to occur fewer than twelve times per year and only under extreme conditions. Any detached infrastructure requiring removal will be retrieved from Disaster Bay directly, and not through the reserve, unless such recovery can be demonstrated to have no impact on pathways, roads, or vehicle access within the reserve. In the highly unlikely event of a catastrophic injury to a crewmember, emergency circumstances may necessitate coming ashore in the proximity of Wonboyn as the most expedient course of action; while this outcome is not anticipated, it is recognised as a contingency solely for the purposes of protecting human life.

Beowa National Park will not be used for any commercial access of any kind associated with the Eden-1 Kelp Aquaculture Farm.

Wonboyn Lake Entrance will not be used for commercial access associated with the Eden-1 Kelp Aquaculture Farm – all services will be conducted via Eden/Edrom. In the unlikely event of injury to a crewmember, vessel strike, mammal entanglement or other emergency circumstances access via the Wonboyn Entrance may be required if this is deemed the most expedient course of action (if safe access over the Wonboyn bar can be achieved). While these scenarios are not anticipated, it is recognised as a contingency for the purposes of emergency access, managing injuries, or protecting human life.

Conclusion – Road Vehicles

The Eden-1 Kelp Aquaculture Farm will generate an increased number of vehicle movements annually; however, only providing a small addition to existing capacity of the industrial road network servicing Edrom and Eden. The use of light commercial vehicles and infrequent truck trips, coupled with reliance on established industrial infrastructure such as Edrom Road, William Allen Road, and the Princes Highway—roads specifically designed for heavy freight—ensures that minimal burden will be placed on public roadways or residential areas. No public boat ramps will be used, with all marine operations confined to private or commercial port infrastructure. Given the low frequency, industrial compatibility and established access, the risk of vehicular movements impacting local traffic flow, safety or infrastructure integrity is assessed as 'low'.

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9.3.3 Aboriginal, European and Environmental Heritage

Risk Table 11: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – Aboriginal and European heritage items and areas (modified from Fletcher et al., 2012, 2018).

Issue	Will Kelp Aquaculture Farming have a significant impact on Aboriginal or European heritage items or areas?			
Comments for consideration	• Are there any Aboriginal or European Heritage items and/or Heritage areas in Disaster Bay? • Are there any shipwrecks and plane wrecks in Disaster Bay? • Will the Kelp Aquaculture Farming and associated activities have an impact on any heritage items?			

Description	• Aboriginal Cultural Heritage Assessment Report (ACHAR) 2024 – completed for Eden-1 Project by Biosis 2024
	• Original inhabitants of Disaster Bay area = Bidwell-Maap Aboriginal heritage
	  o Greenglades (artefacts have been recorded – hearth, scatter, stone tool manufacture locations)
	  o Baycliff (dense artefact scatter)
	• European settlement of Wonboyn Lake and Disaster Bay = circa 1870s
	• European heritage building: Greencape Lighthouse
	• European heritage wreck sites:
	  o City of Sydney = wrecked 1862 (4 km NNE)
	  o Ly-ee-Moon = wrecked 1886 (5 km NE)
	  o New Guinea = wrecked 1911 (6 km NE)
	• Farm located min 1.1 km offshore in high energy exposed environment
	• 14.2 km of underwater drone footage taken			

Proposed Management – Mitigation and Monitoring	• Consultation and database search results support the assessment that no items or areas of Aboriginal or European heritage exist in the proposed lease areas • Significant buffer zone between land-based heritage sites/areas, marine heritage sites/areas (e.g. shipwrecks) and the Kelp Aquaculture Farm • Comply with approved Cultural Heritage Response Plan			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	0	1	0	Negligible

Justification of Ranking

In 2023, Biosis Pty Ltd where engaged as a specialist heritage consultancy, to prepare an Aboriginal Cultural Heritage Assessment Report (ACHAR) for the Eden-1 Kelp Aquaculture Farm proposed in offshore waters of Disaster Bay, New South Wales. The purpose of the report was to assess the likelihood of Aboriginal cultural heritage being present within the Project area and to ensure compliance with legislative requirements under the NSW National Parks and Wildlife Act 1974 and relevant Commonwealth heritage protections. The ACHAR, finalised in April 2024, included a review of the environmental context, extensive background research using

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the NSW Aboriginal Heritage Information Management System (AHIMS), desktop assessments, and a field survey conducted by Biosis heritage specialists in consultation with local Aboriginal community representatives.

Elgin Associates were engaged in 2025 to undertake a supplementary seabed assessment of the proposed Eden-1 Kelp Aquaculture Farm lease area, including side-scan sonar surveys and underwater drone video inspections, to characterise seafloor conditions and determine the presence of any Aboriginal, European, or environmental heritage values. The assessment confirmed that the lease area is dominated by unconsolidated sandy substrate with mobile bedforms and exhibits no evidence of submerged Aboriginal cultural heritage, European maritime heritage (including shipwrecks), or environmentally sensitive heritage features such as reef systems, seagrass, or biogenic structures. No intact cultural artefacts, historic structures, or heritage-listed items were identified within the proposed farm footprint. The findings reflect the exposed, high-energy nature of Disaster Bay, where strong wave and current regimes limit long-term preservation of cultural material on the seabed. Based on these results, it is concluded that the proposed lease area does not contain heritage constraints that would limit or preclude kelp aquaculture development.

Aboriginal Heritage Background

The following quote by DCCEEW in 2010 provides an excellent basis for considering Aboriginal connection to land and sea: "Aboriginal communities have an association and connection to the land. The land and water within a landscape are central to Aboriginal spirituality and contribute to Aboriginal identity. Aboriginal communities associate natural resources with the use and enjoyment of foods and medicines, caring for the land, passing on cultural knowledge and strengthening social bonds. Aboriginal heritage and connection to nature are inseparable from each other and need to be managed in an integrated manner across the landscape" (DECCW, 2010).

Relevant NSW and Commonwealth Legislation – Aboriginal Heritage

New South Wales Legislation

1. National Parks and Wildlife Act 1974 (NSW)
2. Aboriginal Land Rights Act 1983 (NSW)
3. Environmental Planning and Assessment Act 1979 (NSW)
4. Heritage Act 1977 (NSW)
5. Crown Land Management Act 2016 (NSW)

Commonwealth Legislation

1. Aboriginal and Torres Strait Islander Heritage Protection Act 1984
2. Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
3. Native Title Act 1993

Under the National Parks and Wildlife Act 1974, Aboriginal objects and Aboriginal places in NSW are protected and any proposed activity that may harm an Aboriginal object or a declared Aboriginal place must be investigated and assessed.

9.3.3.1 Aboriginal Heritage in Disaster Bay

Based on the Aboriginal Cultural Heritage Assessment Report (ACHAR) conducted by Biosis for the Eden-1 Kelp Aquaculture Farm (2024), the Disaster Bay region—including the Eden-1 lease area—is situated within the traditional lands of the Bidwell Aboriginal people, which borders with the Yuin nation to the north. The Bidwell people, also known as the Bidhawal or Bidawal, are an Aboriginal group traditionally associated with the far southeastern regions of Australia, encompassing parts of East Gippsland in Victoria and extending into the southern coastal areas of New South Wales. Their ancestral lands spanned from Cape Everard (now Point Hicks) and the Cann River area in Victoria, reaching northward to Green Cape and Disaster Bay in New South Wales. This territory includes diverse landscapes such as coastal headlands, river valleys, and forested ranges. The Bidwell people adapted to these environments through semi-nomadic hunter-gatherer lifestyles, utilising seasonal movement patterns and extensive knowledge of local flora and fauna. Their language, referred to as

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"muk-thang" or "good speech," is considered to have influences from neighbouring groups like the Ngarigo and Thawa. Despite overlaps and interactions with neighbouring groups, the Bidwell are recognised as a distinct cultural group with unique territorial and linguistic heritage. Archaeological and ethnographic evidence confirms Aboriginal occupation of the Disaster Bay area for thousands of years, supported by cultural sites such as middens, hearths, stone artefact scatters, and tool-making areas.

Due to its offshore location, no known Aboriginal cultural heritage sites occur within the proposed Eden-1 offshore lease area, and this conclusion is based on a combination of desktop reviews (including a search of the NSW Aboriginal Heritage Information Management System [AHIMS]) and a detailed field survey. These investigations found no surface evidence of Aboriginal artefacts or culturally significant areas within the offshore lease boundaries, and the separation distance between known heritage sites and the farm infrastructure ensures there is no risk of disturbance.

Consultation with Aboriginal communities was led by Biosis in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010). This process included direct engagement with registered Aboriginal parties (RAPs), including local traditional owner representatives. RAPs were provided with detailed project information and opportunities to comment on potential impacts. While no objections were raised concerning the offshore location of the Eden-1 kelp farm, RAPs requested to be kept informed of all approvals and notified of any unexpected heritage finds. This commitment is reflected in the inclusion of a Cultural Heritage Response Plan, which outlines appropriate protocols should heritage items be discovered during farm construction or operations.

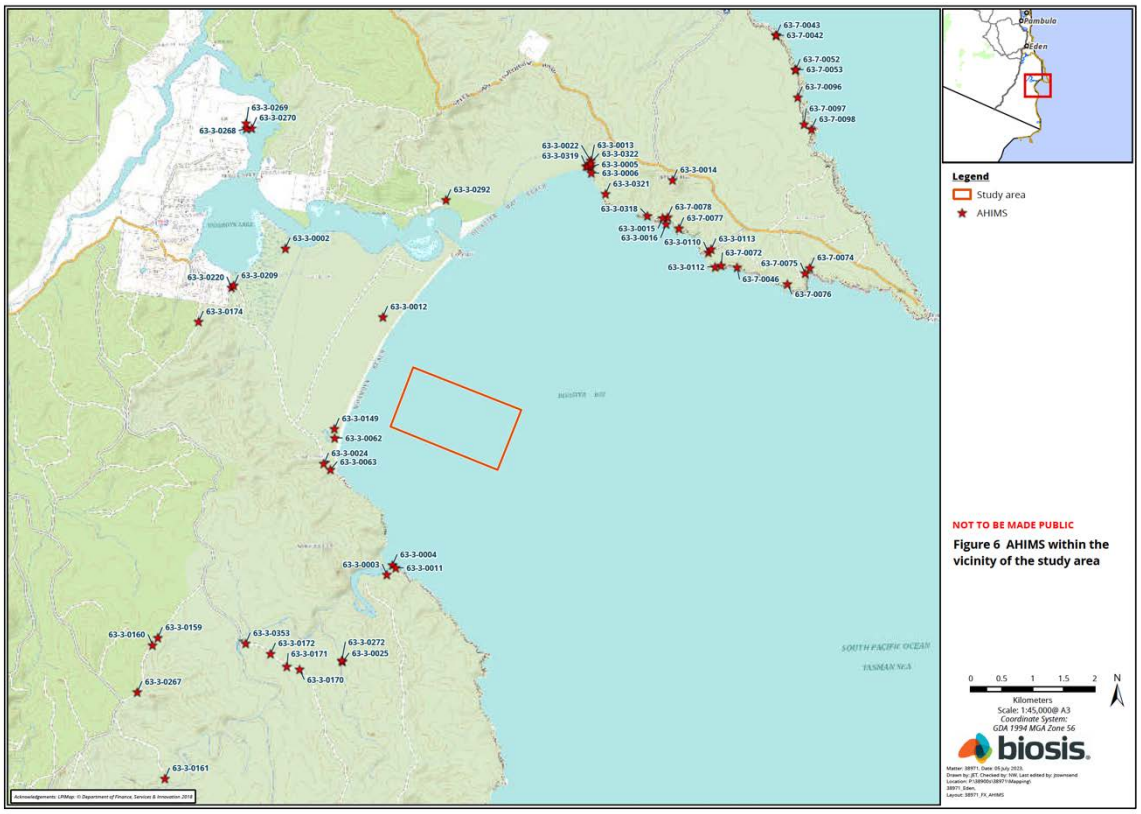

Figure 50: AHIMS Database managed by Heritage NSW records of known Aboriginal cultural heritage sites and objects across New South Wales. (Source: Bio-sys 2024).

Disaster Bay is characterised by its high-energy marine environment, with the NSW Office of Environment and Heritage (OEH, 2018) and Bureau of Meteorology (BOM, 2023) recording offshore mean wave heights regularly exceeding 3.5 metres, and storm surges occasionally reaching 6–8 metres during extreme weather events. These intense hydrodynamic conditions, coupled with strong longshore currents and mobile sandy sediments, create an environment unsuitable for the long-term preservation of Aboriginal cultural heritage material in subtidal or intertidal zones. Organic and lithic artefacts such as hearths, middens, or tool scatters are unlikely

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to survive in such unstable and abrasive substrates over extended periods. Consequently, there is a negligible likelihood that any intact or in situ Aboriginal cultural heritage items remain within the offshore lease area of the Eden-1 Kelp Aquaculture Farm.

Importantly, the Biosis Aboriginal Cultural Heritage Assessment (2024) determined that no Aboriginal cultural heritage items are likely to survive in the offshore lease area of the Eden-1 Kelp Aquaculture Farm, due to the dynamic and erosive nature of the high-energy marine environment in Disaster Bay. The area is subject to constant oceanic swell, wave action, and sediment movement, which precludes the long-term preservation of surface or subsurface cultural materials. As outlined in the report, the offshore seabed comprises predominantly soft sediments and lacks the stable geological conditions necessary to retain archaeological deposits. Additionally, Aboriginal cultural heritage in south-eastern New South Wales is traditionally associated with terrestrial and coastal sites—such as shell middens, hearths, and artefact scatters—typically located along dune systems, headlands, and sheltered estuarine areas. Given the offshore setting, absence of landforms suitable for occupation or use, and environmental conditions that would quickly erode or bury any material remains, the Biosis study concluded there is no potential for intact Aboriginal cultural heritage to exist within the boundaries of the proposed kelp farm infrastructure. This finding is supported by both the field inspection and a comprehensive review of the NSW Aboriginal Heritage Information Management System (AHIMS), which did not identify any known sites within or near the lease area.

Conclusion – Aboriginal Heritage

The Aboriginal Cultural Heritage Assessment Report (ACHAR) confirmed that there are no recorded Aboriginal heritage sites within the proposed offshore lease area and found no evidence that Aboriginal objects or areas of cultural value are likely to occur within the dynamic, high-energy marine environment of Disaster Bay. Accordingly, the Aboriginal heritage risk associated with the Eden-1 site has been assessed as negligible. Ongoing communication with Registered Aboriginal Parties (RAPs), together with the adoption of appropriate mitigation measures, is ensured through the implementation of a Cultural Heritage Response Plan, which forms part of the Project's environmental management framework and establishes clear protocols to protect Aboriginal cultural heritage in the unlikely event that any First Nations related artifacts are encountered during operations.

9.3.3.2 European Heritage in Disaster Bay

Disaster Bay and its surrounding areas, including Wonboyn and Green Cape, hold significant European heritage, much of it shaped by maritime history and early coastal industries. European settlement in the Wonboyn Lake and Disaster Bay region began in the 1870s, driven by the exploitation of marine resources and forestry. Historical records indicate oyster farming operations began as early as the early 1800s in Wonboyn, marking the region as one of the earliest aquaculture areas in New South Wales. Concurrently, Twofold Bay became a hub for the whaling industry, with extensive shore-based operations from the 1830s. Prominent historical figure Ben Boyd, a Scottish entrepreneur, established Boydtown in 1843, constructing port facilities and promoting commercial ventures in the region. Though his endeavours were short-lived, they left a lasting mark on Eden's European heritage.

Relevant NSW and Commonwealth Legislation – European Heritage

<u>New South Wales Legislation</u>

1. National Parks and Wildlife Act 1974 (NSW)
2. Environmental Planning and Assessment Act 1979 (NSW)
3. Heritage Act 1977 (NSW)
4. Marine Estate Management Act 2014 (NSW)

<u>Commonwealth Legislation</u>

1. Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
2. Underwater Cultural Heritage Act 2018

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Historic shipwrecks located in Disaster Bay are protected under both New South Wales and Commonwealth legislation. At the Commonwealth level, the Underwater Cultural Heritage Act 2018 (Cth) provides automatic protection to all shipwrecks and associated relics that are 75 years or older. This Act applies to Commonwealth waters (beyond 3 nautical miles offshore) and requires permits for any interference, including diving, salvage, or removal of material. These protections are administered by the Department of Climate Change, Energy, the Environment and Water and are supported by the Australian National Shipwreck Database (ANSD), which lists all known protected sites. Additionally, the Environment Protection and Biodiversity Conservation Act 1999 (Cth) offers protection to shipwrecks that are formally recognised on the National or Commonwealth Heritage Lists and mandates environmental assessments if proposed activities may impact such sites.

Within New South Wales waters (0–3 nautical miles), the Heritage Act 1977 (NSW) provides legal protection to historic shipwrecks listed on the State Heritage Register. Under Section 57 of the Act, any activity that may damage, move, or disturb a heritage item—including a submerged wreck—requires formal approval from the NSW Heritage Council. Further protections are supported by the Marine Estate Management Act 2014 (NSW), which incorporates cultural heritage into broader marine spatial planning and conservation strategies. While the National Parks and Wildlife Act 1974 (NSW) is aimed at protecting Aboriginal cultural heritage, it also offers secondary protections for European heritage relics located within declared reserves such as Nadgee Nature Reserve. Together, these frameworks ensure that historic shipwrecks in Disaster Bay—such as the Ly-ee-Moon, City of Sydney, and New Guinea—are protected from unregulated interference, with non-compliance subject to prosecution and substantial penalties under both state and federal law.

Shipwrecks in Disaster Bay

One of the most enduring aspects of Disaster Bay's European history is the number of tragic shipwrecks along its rugged coast, which contributed to the bay's ominous name. Three major wrecks are of particular significance:

- **City of Sydney**, wrecked in 1862 approximately 4 km north-northeast of the Eden-1 lease area;
- **Ly-ee-Moon**, wrecked in 1886 about 5 km northeast near Green Cape, with over 70 lives lost—one of Australia's worst maritime disasters; and
- **New Guinea**, wrecked in 1911 roughly 6 km northeast of the proposed aquaculture farm.

Figure 51: Approximate location of heritage shipwrecks in Disaster Bay (Credit: Google & Australasian Underwater Cultural Heritage Database 2025).

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These wrecks illustrate the perilous conditions of early coastal navigation in the region and led to the establishment of Green Cape Lighthouse, which was completed in 1883. It became the first concrete lighthouse tower in Australia and remains a heritage-listed structure. The lighthouse was constructed to reduce the maritime risks posed by the treacherous southern NSW coast, particularly for vessels rounding Green Cape in poor weather and heavy seas.

Disaster Bay is characterised by its high-energy marine environment, with the NSW Office of Environment and Heritage (OEH, 2018) and Bureau of Meteorology (BOM, 2023) recording offshore mean wave heights regularly exceeding 3.5 metres, and storm surges occasionally reaching 6–8 metres during extreme weather events. Frequent exposure to gale-force winds—have historically contributed to both the occurrence of shipwrecks and the subsequent degradation of those wrecks over time. Vessels such as the City of Sydney (wrecked 1862), Ly-ee-Moon (wrecked 1886), and New Guinea (wrecked 1911) were shipwrecked on Greencape headland, but the intense energy of the coastal system has led to minimal to no structural remains being visible today. The Australian National Shipwreck Database notes that no wreck structures are recorded within or directly adjacent to the Eden-1 lease site. Continuous seabed mobility, combined with mechanical and biological erosion, effectively destroys, disperses or buries wreckage within short periods, further reducing the potential for archaeological recovery or interference from aquaculture activities.

Side-scan sonar, underwater drone, aerial drone, and seabed inspection surveys undertaken between 2022 and 2025 (Auskelp 2022, Auskelp 2023; Auskelp 2024; Elgin 2025) confirm that no European maritime heritage features are present within the proposed lease area. All known heritage-listed shipwrecks are located more than 5 km outside the lease boundaries, with substantial spatial buffers maintained between recorded heritage sites and proposed aquaculture operations. The exposed, high-energy offshore environment of Disaster Bay has also limited the preservation of intact shipwreck structures in the region. Collectively, these investigations confirm that no intact maritime structures or cultural heritage features occur within the proposed farm footprint.

Conclusion – European Heritage

Based on archival research, consultations, and multiple field assessments—including historical records, side-scan sonar surveys, underwater drone inspections, overhead drone surveys, and detailed seafloor scanning and video mapping—it has been determined that the Eden-1 lease area is unlikely to contain any European heritage items. All known heritage-listed shipwrecks are located well beyond the lease boundary, with substantial spatial buffers maintained between recorded heritage features and the proposed aquaculture operations. The exposed, high-energy offshore environment of Disaster Bay further limits the long-term preservation of submerged cultural material. A detailed Cultural Heritage Response Plan has been developed and adopted as part of the Project's environmental management framework to establish appropriate protocols in the unlikely event that European heritage is encountered. Accordingly, the risk of impact from kelp aquaculture activities on European heritage values is assessed as negligible.

9.3.3.3 Environmental Heritage in Disaster Bay

Disaster Bay is recognised for its exceptional environmental heritage, characterised by its relatively undisturbed coastal ecosystems, high conservation values, and ecological connectivity with two of NSW's most significant protected areas: Nadgee Nature Reserve and Beowa National Park. Together, these reserves form the southern anchor of the NSW South Coast conservation network and protect a continuum of pristine beaches, dune systems, estuaries, coastal heathlands, and nearshore marine environments. The bay's environmental heritage is defined not only by its natural features and habitats, but by the ecological processes, species assemblages, and scenic values that contribute to its status as one of the most intact and remote marine-coastal landscapes in the State.

Marine Ecosystems and Habitat Integrity

The offshore waters of Disaster Bay exhibit high water quality, minimal anthropogenic impact, and a predominantly soft-sediment seabed interspersed with isolated nearshore reef patches. These ecological attributes support a diverse assemblage of marine fauna, including small pelagic fish, demersal species,

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seabirds, cetaceans, and occasional pinnipeds. Importantly, the lease area is located in a low-sensitivity benthic environment where sediment mobility, wave energy, and depth reduce the potential for long-term ecological disturbance or accumulation of heritage-significant features. The absence of mapped seagrass, macroalgae beds, or threatened benthic communities further confirms the low likelihood of impacting sensitive marine ecosystems.

Connection to Protected Landscapes

Disaster Bay forms an ecological corridor between the marine environment and the adjacent terrestrial conservation estates. Nadgee Nature Reserve, the only declared wilderness area on the NSW coast, supports over 40 threatened flora and fauna species and contains some of the most intact dune and heath systems in the State. Beowa National Park to the north protects a diverse assemblage of coastal and marine habitats, including littoral rainforest remnants, sea cliffs, and rocky headlands. Although the Eden-1 site is located well offshore and does not interact with these terrestrial ecosystems, its position within this broader conservation landscape underscores the importance of ensuring that marine activities do not compromise the ecological values, water quality, or scenic amenity of the region.

Water Quality, Ecological Processes, and Scenic Values

The environmental heritage of Disaster Bay is strongly tied to its exceptional water quality, natural coastal vistas, and the integrity of ecological processes that support marine life. Nutrient cycling, upwelling, and seasonal productivity contribute to a dynamic ecosystem that supports recreational fishing, foraging seabirds, and migratory species such as humpback whales. The offshore location of the Eden-1 Project ensures the protection of key visual and ecological values, with modelling and visual assessments confirming minimal visibility from major vantage points and no anticipated impact on coastal processes or natural viewsheds.

Environmental Heritage Sensitivities and Risk Context

Environmental heritage considerations in Disaster Bay focus on maintaining water quality, preserving natural character, protecting biodiversity, and ensuring that human activities do not degrade the region's wilderness attributes. Given that the Eden-1 kelp farm occupies only a small area within a large open bay, avoids all sensitive coastal or intertidal habitats, and employs low-impact infrastructure designed for high-energy environments, the Project presents minimal risk to the environmental heritage values of the region. Routine monitoring, adaptive management triggers, and debris-prevention measures will ensure the ongoing protection of marine habitats and coastal ecosystems.

Conclusion – Environmental Heritage

The Project has been designed to protect the ecological, scenic, and cultural-environmental values that characterise Disaster Bay and its surrounding landscapes, including the adjacent Nadgee Nature Reserve and Beowa National Park. The offshore lease is located beyond sensitive coastal habitats and does not directly disturb or negatively affect terrestrial or intertidal environments. Environmental surveys indicate that the seabed within the lease area comprises low-sensitivity soft sediment habitat, and the Project's low-impact anchoring system, debris-prevention measures, and ongoing monitoring reduce the risk of environmental harm. By enhancing water quality through nutrient uptake and establishing additional marine structure that supports local biodiversity, the Project is expected to contribute positively to the bay's environmental heritage. Accordingly, the risk of impact from kelp aquaculture activities on Environmental heritage values is assessed as 'negligible'.

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9.3.4 Noise During Operation

Risk Table 12: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – noise during the operational stages of Kelp Aquaculture Farming (modified from NOAA Fisheries – Marine Mammals and Underwater Noise, 2025; and Fletcher et al., 2004; Vom Berg, 2008).

Issue	Will the Kelp Aquaculture Farming have uncharacteristic noise levels generated during the operational stage (i.e. level, type and/or duration) and is it likely to have a significant effect on land or marine communities?			
Comments for consideration	• What types of machinery will be employed during the operational stage? • Will there be a significant increase in noise levels during the operational stage of the Project? • Is the noise uncharacteristic for the sites or exceed acceptable levels? • Will the noise affect the marine environment and marine mammals? • Will the noise affect residential areas, fisherman or beachgoers? • What time of day will the daily operations and maintenance be carried out? • What mitigation and management measures are available to minimise the level of noise generated?			
Description	• Types of machinery = Boat engines, outboard motors, diesel/petrol generator, hand and small power tools • Operational noise will not be uncharacteristic for embayment (e.g. vessels.)			
Proposed Management – Mitigation and Monitoring	• Comply with Protection of the Environment Operations Act 1997 (POEO Act) and Protection of the Environment Operations (Noise Control) Regulation 2017 • Comply with industry best practice and noise management • Hours of operation = predominantly daylight hours • Oceans rigs will not use metal-to-metal latches • No pile driving, hammering or dredging • Site located away from whale migration routes and shorebird nesting areas • Screw anchors deployed outside whale migration periods • Limited increase in vehicle and vessel movements (1 trip per day per vessel) • Vessels used will be similar to existing local recreational and commercial fleet – noise will not be uncharacteristic of the general area • Noise calculations (attenuation with distance) conclude minimal impact on any residential areas, fishers or beachgoers			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	4	4	Low

Justification of Ranking

In New South Wales, regulation of noise emissions from marine-based activities such as the Eden-1 Commercial Kelp Farm falls under the jurisdiction of the NSW Environment Protection Authority (EPA), as established by the Protection of the Environment Operations Act 1997 (POEO Act). The EPA is the primary regulatory authority for scheduled and non-scheduled activities that may generate environmental noise, including from vessels and aquaculture operations within state waters. Additionally, the Protection of the Environment Operations (Noise Control) Regulation 2017 sets out specific provisions regarding noise from marine vessels and equipment. While the EPA leads regulatory oversight, operational compliance may also be supported by the NSW Department of Primary Industries (Fisheries NSW), particularly where environmental

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impacts intersect with marine biodiversity or aquaculture licensing. Together, these agencies ensure that all activities remain within acceptable acoustic thresholds and adhere to best environmental practices.

Overview

The Eden-1 Commercial Kelp Farm is situated offshore in Disaster Bay, approximately 25 km south of Eden and 4.4 km from the township of Wonboyn. The lease area is located 1.1 km from the shoreline (at the nearest point), surrounded by Beowa National Park and Nadgee Nature Reserve, areas devoid of permanent human habitation. The remote nature of the site, coupled with its distance from populated areas, suggests minimal risk of noise impact on human receptors. When assessing the impact of noise generated during the operational stages of commercial kelp farming, consideration has been given to the offshore location of the farm, prevailing ambient sea noise conditions, the absence of residential receptors, and the low frequency and intensity of operational activities.

When assessing the potential impacts of kelp farming on marine fauna, it is necessary to consider a range of interrelated biological and acoustic factors that influence how marine species may respond to anthropogenic activity. Key considerations include the acoustic sensitivity of marine mammals—such as whales, dolphins, and seals—particularly in regions that overlap with known migratory pathways or seasonal breeding and calving areas. The nature of vessel traffic associated with farm operations, including its frequency, duration, and speed, may also influence marine fauna behaviour, especially where activities coincide with periods of heightened biological activity. In addition, the sound propagation characteristics of aquaculture infrastructure—such as ropes, buoys, and anchoring systems—must be evaluated to determine their potential to transmit or amplify underwater noise. The timing of deployment, maintenance, and harvesting activities is also relevant, particularly in relation to sensitive periods such as whale migration, as is the potential for cumulative effects where kelp farming occurs alongside other marine uses. Collectively, these considerations inform a robust and precautionary assessment of the potential interactions between kelp aquaculture and marine ecosystems.

Justification of ranking

The risk associated with noise emissions from the operational phase of the Eden-1 Commercial Kelp Farm has been assessed as low based on a range of environmental, technical, and contextual factors. This ranking is derived from a qualitative analysis of the likelihood of impact and the potential consequence of that impact on both human receptors and marine fauna.

During the operational stages of the Eden-1 Commercial Kelp Farm, an assessment of noise generation and its potential impacts has been undertaken, addressing both terrestrial and marine environments. The site is located over 1.1 km offshore (at the nearest point) in Disaster Bay, approximately 25 km south of Eden and 4.4 km from the nearest township, Wonboyn. The surrounding coastline comprises national parks and nature reserves with no permanent residential receptors, and the area is only infrequently visited due to its remoteness. Acoustic modelling confirms that noise generated by daily operational activities—including vessel trips, equipment use and general maintenance—is unlikely to be detectable at any shoreline location, including the Wonboyn Lake entrance located 2.6 km to the northwest.

Operational noise sources are limited and include vessel engines, hydraulic lifting devices, winches, and low-decibel mechanical tools used onboard. Peak noise levels are estimated to range between 65–85 dB(A) at the source, but these attenuate with distance due to the offshore location and prevailing ambient sea noise. Critically, no pile driving, hammering, or other percussive construction methods are employed at any stage. All infrastructure—including screw anchors, rope-based drop lines, and surface buoys—is designed to minimise underwater acoustic transmission. The kelp farm operates in a largely static configuration, with minimal daily vessel activity (typically one round-trip service visit per day) and no operations during high swell or adverse weather conditions. Installation of screw anchors is scheduled outside of whale migration periods to further minimise any potential for acoustic disturbance to migratory marine megafauna.

An additional quantitative assessment of potential noise impacts during the operational phase of the Eden-1 Kelp Aquaculture Project has been undertaken, consistent with the approach adopted in comparable NSW aquaculture Environmental Impact Statements (Jervis Bay Mussel Farm EIS) conducted by NSW DPIE Fisheries

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in 2024. This assessment considers airborne and underwater noise generated during routine farm operations, including vessel transits, winches, hydraulic handling equipment, and general maintenance activities. Unlike the construction phase, no hydraulic drilling or anchor installation occurs during operation, and there are no impact-based or high-energy noise sources associated with ongoing farming activities.

Noise from the offshore works to the nearest land-based location at Greenglades Beach—located approximately 1,100 metres from the closest point of drilling activity—was estimated using the online modelling program noisetools.net utilising a 'Sound Propagation Level Calculator' that applies the ISO 9613-2 calculation algorithm to estimate attenuation of sound pressure levels with distance.

The ISO 9613-2 methodology accounts for:

- Geometric spreading of sound over distance
- Atmospheric absorption
- Ground and surface effects, including hard reflective surfaces such as open water
- Conservative meteorological conditions, including moderate downwind propagation and temperature inversion effects

These assumptions represent conditions most conducive to sound transmission toward the shoreline. Based on the modelling undertaken, airborne noise associated with operational activities, for which the maximum source noise level is approximately 84 dB(A), is predicted to attenuate to approximately 18–20 dB(A) at Greenglades Beach under conservative conditions. This level is consistent with natural ambient sound conditions commonly experienced in exposed coastal environments, including wind, distant surf, and background environmental noise, and is effectively imperceptible. Accordingly, operational noise is not expected to alter the acoustic character of the surrounding wilderness coastline or result in any discernible noise impact.

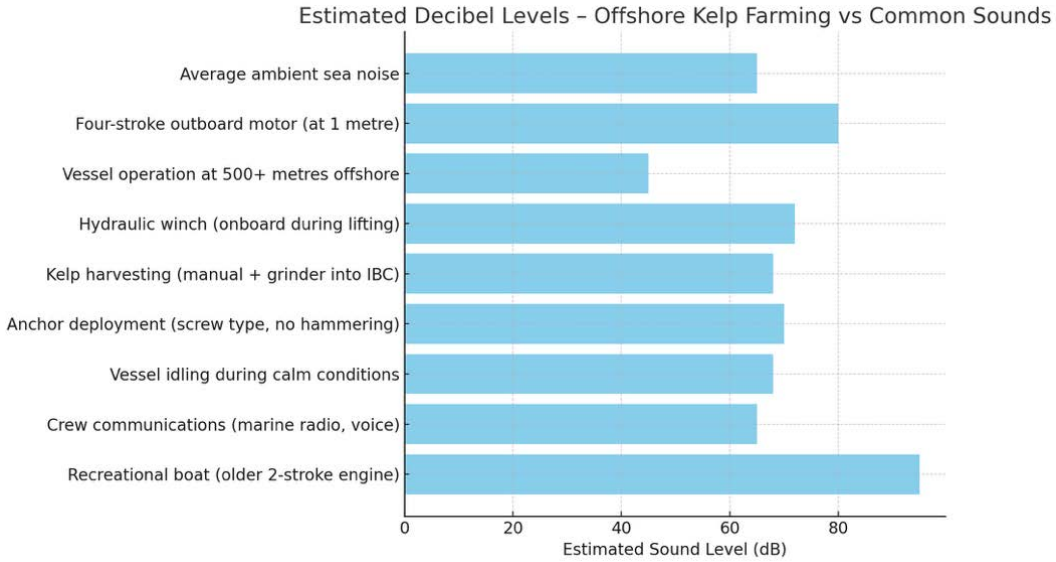

Figure 52: Estimated Decibel Levels – Offshore Kelp Farming vs Common Sounds (Source: NSW Department of Primary Industries & Environment Protection Authority (EPA NSW) and manufacturer specifications).

Importantly, the harvesting of kelp is an inherently quiet process. Kelp blades are gently retrieved onboard and processed by grinding into IBC (Intermediate Bulk Container) units for storage and transport. Unlike shellfish farming, there are no hard surfaces, and the kelp material itself generates no noise when handled. There is no need for high-pressure washing, mechanical cracking, or de-shelling, all of which are sources of significant operational noise in bivalve aquaculture systems.

With respect to marine fauna, potential effects of noise include short-term behavioural responses or temporary masking of biologically relevant signals, particularly among cetaceans and pinnipeds. However,

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the absence of high-intensity or continuous noise sources, combined with the non-metallic, rope-based nature of the infrastructure, greatly reduces the risk. Recent studies (Cox et al., 2023) have shown that kelp forests can attenuate vessel noise by up to 6.1 dB over 60 metres, particularly within the frequency bands most relevant to marine mammal communication. Furthermore, the deployment of farm modules in discrete one-hectare clusters provides physical and acoustic separation, further limiting any localised impact. To further reduce noise effects, operations will only be conducted during daylight hours, except in exceptional circumstances or emergencies.

Management Measures

- Operations schedule: primarily during daylight hours.
- Static farm configuration: Minimal daily activity—typically one trip per day per vessel.
- Weather limitation policy: No marine operations in high swell, strong winds, or storm conditions, unless in emergencies.

Mitigation Measures

- Rope and buoy-based infrastructure only – minimise metal-to-metal latches, or metal components that could increase acoustic resonance.
- Use of well-maintained sound suppression devices (e.g. barriers, baffles and mufflers) when operating equipment.
- Use of marine radios to communicate between vessels.
- Maintenance of all marine equipment (winches, hydraulic gear) to manufacturer-recommended standards to reduce vibrational and mechanical noise.
- Soft handling procedures for ropes, floats, and harvest infrastructure to avoid impulsive underwater sound.

Monitoring Measures

- Fauna interaction log: All operators will be trained to observe and report unusual behaviour or proximity of marine mammals during noise-generating activities.
- Stakeholder communication: Marine Park authorities, NSW EPA, and DPIRD Fisheries will be notified of any exceedances or significant fauna interactions.

Conclusion

The risk of the noise associated with the operation of the Kelp Aquaculture Farm having a significant impact on either land-based communities or marine fauna is assessed as ‘low’. This conclusion is supported by the Project’s remote offshore location, the absence of nearby residential receptors, and the nature of kelp farming itself, which is inherently quiet. The use of four-stroke or diesel engines, rope-based infrastructure, and non-percussive installation methods ensures that both airborne and underwater noise remain minimal throughout the operational phase. Harvesting processes, which involve manually lifting kelp and placing it into containers, produce limited sound, especially when compared to other aquaculture sectors like commercial fishing and shellfish farming. Furthermore, operational scheduling avoids high swell conditions reducing the likelihood of disturbance to sensitive marine species. The design of the farm—comprising spaced one-hectare modules—further limits the potential for cumulative acoustic effects.

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9.3.5 Work Health and Safety

Risk Table 13: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – Work, Health and Safety (WHS) hazards for Kelp Aquaculture Farming (modified from NOAA Seaweed Aquaculture Overview, 2025 and AgriFutures Australia's Marine Seaweed Aquaculture Risk Assessment, 2023).

Issue	Will the Kelp Aquaculture Farming have Significant WHS hazards associated with their installation and/or operation?			
Comments for consideration	• What are the WHS risks associated with the ocean farming (e.g. manual lifting of heavy ropes and objects, crane use, rope maintenance, fatigue, collisions, and effects of working in an open ocean environment)? • How will WHS risks associated with the installation and operation of the farms be mitigated, monitored and managed? • How will WHS risks be mitigated, monitored and managed?			
Description	• Potential WHS hazards o Pre-assemblage and installation activities o Service and maintenance activities o SCUBA diving o Interactions with marine organisms o Waste disposal o Navigation			
Proposed Management – Mitigation and Monitoring	• Approved Environmental Management Plan o Job safety analyses (JSAs) and Safe Work Method Statements (SWMS) for high-risk tasks (e.g., SCUBA diving, vessel operations, kelp handling). o Maintain a detailed marine operations risk register, updated quarterly. o Require all staff and contractors to complete WHS inductions before engaging in ocean-related work. o Marine fauna awareness training. o Appoint a dedicated WHS Officer responsible for compliance, reporting, and continuous improvement. o Ensure emergency response plans are in place for marine incidents, weather events, entanglements, and WHS scenarios. o Limit vessel operations to daylight hours where possible to reduce navigational and fatigue-related risks. o Appropriate Public Liability Insurance			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	6	6	Low

Justification of Ranking

The primary legislation governing workplace health and safety in New South Wales is the Work Health and Safety Act 2011 (NSW). This Act establishes a consistent framework for securing the health and safety of workers and workplaces across the state. These standards underpin safe practices for offshore kelp farming, particularly in high-energy marine environments such as Disaster Bay.

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WHS hazards identified in relation to the Eden-1 Kelp Aquaculture Farm include marine vessel operations, underwater installation activities, harvesting and maintenance, environmental monitoring, handling organic biomass, and marine navigation risks. Additional risks stem from exposure to weather extremes, biofouling removal, deployment of infrastructure, and interaction with other marine users.

SCUBA divers and ROV operators will be involved in periodic underwater inspections, installation, and maintenance. Hazards associated with SCUBA diving include decompression illness, entanglement, fatigue, and marine fauna interactions. All underwater personnel will be required to hold appropriate diving certifications, complete WHS inductions, and follow an approved WHS Management Plan. Safe Work Method Statements (SWMS) will be developed for diving operations. Operating in the offshore marine environment presents inherent risks associated with marine fauna, including sharks, whales, and venomous species such as the blue-ringed octopus. While the likelihood of direct interaction is low, the presence of large marine mammals — particularly migrating whales — poses a potential hazard during vessel operations and infrastructure deployment. Similarly, shark activity, particularly near bait schools or during certain seasonal conditions, can present a safety risk to divers and surface workers. Additionally, venomous species such as the blue-ringed octopus, though rarely encountered, require caution during both underwater activities and when handling kelp. To manage these risks, Auskelp will implement marine fauna awareness training as part of its WHS induction, maintain observation protocols for whale activity prior to in-water operations, and equip all personnel with protective gloves and dive suits. All underwater work will follow strict buddy protocols, and any sightings or interactions will be recorded and reviewed to support adaptive risk management strategies.

The pre-assembly and deployment of longline infrastructure, including rope systems and buoy arrays, involves the use of mechanical lifting equipment (winches, cranes), loading and offloading of materials, and vessel navigation and deployment in dynamic marine conditions. These tasks present risks such as crush injuries, slips, manual handling strains, and potential collisions. All marine crew and land-based staff will be trained in relevant safety protocols, including PPE use, fatigue management, and equipment handling.

Routine operations will involve vessel trips between the construction base at Edrom/Eden and the lease area in Disaster Bay. Duties include monitoring environmental conditions, inspecting moorings, maintaining kelp lines, harvesting and transferring biomass into IBCs, and unloading kelp biomass. Hazards include vessel motion-related injuries, onboard equipment operation, long working hours, and chemical handling (e.g. fuel or oils for engines and hydraulics). Appropriate training, regular drills, and WHS oversight will be maintained throughout.

The remote nature of Disaster Bay presents a distinct operational risk, particularly in relation to emergency response times, limited access to immediate medical assistance, and communication reliability. Located over 30 km by sea from Eden and lacking permanent nearby infrastructure, the site's isolation increases the importance of robust risk management protocols. To mitigate these challenges, all field teams will be equipped with mobile communication devices and marine VHF radios, ensuring reliable contact with shore-based coordination teams at all times. Emergency response plans will include clearly defined emergency procedures, designated response vessels on standby during high-risk activities, and coordination with emergency services based in Eden. First-aid certified personnel will be present on all vessels, and medical kits tailored for marine operations will be routinely checked and restocked. Scheduled check-ins, weather monitoring, and remote tracking of vessel locations will form part of daily operational controls to ensure safety in this low-access environment.

Auskelp's Emergency Response Plan will include spill response coordination with state authorities (e.g. Transport NSW), who maintain a trained oil and chemical spill response capability. Staff inductions will cover the WHS Act 2011, job-specific risks, environmental hazards, incident reporting procedures, and required safety gear. All personnel must complete induction before engaging in any work associated with marine operations. WHS responsibilities will be clearly defined in project documentation.

Auskelp management will be required to induct staff before they are permitted to undertake any activity associated with on-water marine operations. During induction, details of obligations under the Work Health and Safety Act 2011 for risks and hazards associated with Kelp Aquaculture Farms (including the use of personal protective equipment (PPE) and incident reporting procedures) will be described. Risk levels

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associated with Kelp Aquaculture Farming hazards and mitigation measures are also described in further detail in the following sections:

- Decommissioning (Section 9.2.5)
- Marine Vessel and Vehicular Transport (Section 9.3.2);
- Navigation and Interactions with Other Waterway Users (Section 9.2.4);
- Structural Integrity and Stability – Longline Infrastructure (Section 9.2.3);
- Resource Use and Waste (Section 9.4.9).

To protect other waterway users, the farm lease areas will be marked with navigation-compliant cardinal markers and listed on maritime notices and charts. The tensioned rope design and clear floatation markers reduce collision risks to other marine users. Public safety awareness will be promoted through community outreach and nearby boat ramp signage. Recreational fishers, divers, and boaters will be advised to avoid anchoring within the lease area to reduce personal injury risk, reduce entanglement risk, and prevent infrastructure damage. Interfering with lease infrastructure or stock is prohibited under the Fisheries Management Act 1994 (NSW). Lease holders will carry public liability insurance and promote safety awareness among visitors and stakeholders.

Conclusion

The WHS risk associated with the construction, deployment, harvesting and operation of the Eden-1 Kelp Aquaculture Farm is assessed as 'low', when considered in context with the strategies incorporated in the Environmental Management Plan. Auskelp will ensure that all staff and personnel are made aware of their obligations under the WHS Act 2011 and other related legislation to manage, train and protect staff, and also protect public users.

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9.3.6 Social and Economic

Risk Table 14: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – Economic impacts (modified from NSW Seaweed Prospectus 2024, and BECRC Regenerative Aquaculture Farming on the New South Wales South Coast – Investigation of Business Cluster, 2024).

Issue	What will the economic impacts of Kelp Aquaculture Farming have on the local and regional economy? What will the social impacts of Kelp Aquaculture Farming be on the local community?			
Comments for consideration	• Will Kelp aquaculture farming contribute to the local economy? • How many people will Kelp Aquaculture Farming employ, either directly or indirectly? • Will a steady supply of kelp biomass improve regional job creation? • Is kelp biomass critical to other industries? • Will kelp farming negatively impact commercial fishing? • What products will be delivered? • Will locals (Wonboyn residents and visitors to Disaster Bay) be socially affected, and how? • Will there be positive social effects of kelp farming?			
Description	• Value of infrastructure, goods and services to be sourced from regional and NSW suppliers = approximately $840k - $1.2m (services, ocean infrastructure etc) • Provision of jobs o Approximately 30 FTE Direct Jobs o Approximately 8-15 Indirect Jobs o Induced jobs as a result of expenditure in the community from wage earners and through linkages with offtake providers, product sales and tourism o Induced jobs via education related synergies with Kelp Farming (e.g. Eden Marine High School, UOW, UTS, UON etc) o Induced jobs via tourism (diving on kelp leases and recreational fishing opportunities) o A new sustainable industry will be created			
Proposed Management – Mitigation and Monitoring	o Goods and services will be obtained locally where possible o Locally skilled personnel will be employed where appropriate o Jobs will be located in Eden area wherever possible – to ensure highest possible levels of regional employment o Tourism activities will be encouraged, without compromising aquaculture farm operations and safety o Kelp biomass will be locally wholesaled to support adjacent bio–friendly small businesses o Limit marine kelp lease areas to 5% of Disaster Bay o Liquid fertiliser products will improve local farming yields o Partnerships with local educational institutions will be encouraged o Measure ongoing community support o Community Engagement Strategy			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	1	1	Low

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Justification of Ranking

The Eden-1 Kelp Farm is Projected to generate substantial regional economic value with minimal to no adverse consequences on existing industries, land uses or demand for community infrastructure. The kelp farm's integration with existing marine infrastructure, supply chains, and regional development plans means economic benefits are likely, while risks to competing industries or stakeholders are negligible.

Based on the NSW Seaweed Industry Prospectus (2024), the outlook for kelp farming in New South Wales is exceptionally promising, offering transformative benefits to regional economies, environmental sustainability, and industrial innovation. Despite this potential, no commercial kelp farming industry currently exists in Australia with only a small number of cottage-scale enterprises collecting beach-cast seaweed for low-volume, artisanal products. The NSW Prospectus identifies seaweed aquaculture as a major untapped economic opportunity, with projections indicating that a mature Australian industry could be worth $8 billion nationally by 2040 and support over 9,000 direct and indirect jobs across farming, processing, logistics, research, and bioproduct manufacturing.

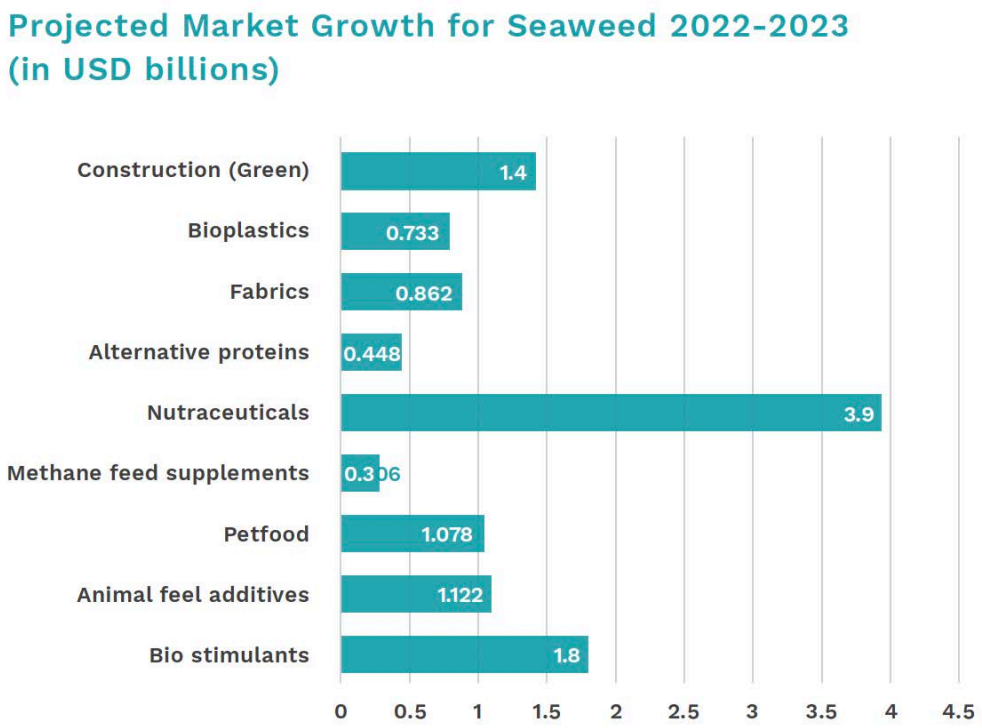

Figure 53. Projected Market Growth for Seaweed 2022 to 2030 (World Bank, 2023).

New South Wales is especially well-positioned to lead the development of kelp biomass due to its expansive coastline, favourable growing conditions (on its southern coastline), and existing port and aquaculture infrastructure. Critically, demand for high-quality, sustainably grown kelp biomass already exceeds supply, both in Australia and globally, limiting the growth of emerging industries in fertiliser, food, nutraceuticals, cosmetics, animal feed, and bioplastics. Establishing kelp farms such as Eden-1 will not only address this shortfall but enable NSW to capture early-mover advantages in domestic and export markets, stimulate regional job creation, and provide the reliable biomass inputs necessary to build a climate-aligned blue economy.

Summary of Economic Factors and Proposed Management Response

Kelp aquaculture farming presents a unique and timely economic opportunity for regional communities in southern New South Wales. The Eden-1 Project will contribute to direct employment, regional investment, and the emergence of new markets and products derived from kelp biomass.

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1. Direct and Indirect Employment

The development is expected to generate approximately 12–18 Full Time Equivalent (FTE) jobs during the construction and installation phase, including roles in marine installation, logistics, vessel operations, and specialist engineering support. Once operational, the Project is projected to support >30 direct FTE positions and 8–15 indirect FTE positions across farming operations, maintenance, hatchery support, processing, transport, logistics, education, and research partnerships. These estimates correlate with workforce modelling outlined in the NSW Seaweed Industry Prospectus (2024) and the BECRC Regenerative Aquaculture Workforce Framework (2024), which describe staffing requirements per hectare of offshore kelp infrastructure, vessel hours per tonne of biomass, and employment multipliers for emerging blue-economy industries. Together, these figures demonstrate that the Eden-1 development will deliver meaningful regional employment benefits throughout both construction and long-term operations.

- Create new industry that generates >$9m per annum in sustainable products.
- >30 full-time equivalent (FTE) direct jobs will be created in the Bega Valley for cultivation, harvesting, processing, logistics, and management roles.
- An additional 8-15 indirect jobs are expected through supply chains (e.g. marine contractors, maintenance services, transport operators, rope and screw anchor suppliers, Research and Development roles etc).
- Induced employment effects are also anticipated through increased regional spending and the stimulation of ancillary businesses (e.g. cafes, accommodation, tradespeople).
- Further employment may arise through tourism and education-related synergies, such as dive tourism on kelp farms and marine science curriculum tie-ins with Eden Marine High School, and associated universities.

2. Infrastructure Investment

The Eden-1 Kelp Farm will inject an estimated $4.5 million in infrastructure, ocean gear, vessel upgrades/servicing, and land-based support. Where possible, local and regional suppliers will be prioritised to maximise value capture within the South Coast economy.

3. Support for Adjacent and Emerging Industries

- Kelp biomass will supply food grade products, bio-fertiliser, animal feed, and nutraceutical sectors, linking aquaculture to local agriculture and bioproduct markets.
- Partnerships will be established with local eco-friendly businesses to further process or retail kelp-derived products, including cosmetics and food supplements.
- The anticipated supply of high-volume, consistent-quality kelp will underpin the viability of emerging industries reliant on reliable biomass input.

4. Commercial Fishing Access and Habitat Impacts

Concerns have been raised by some stakeholders regarding the negative financial impact of kelp aquaculture on commercial longline fishing operations. A review of the spatial and operational characteristics found the following:

- **Spatial Occupation:** The Eden-1 Project will occupy 5% (200 hectares) of the total area of Disaster Bay (>5,000 hectares), ensuring that 95% of the bay remains accessible for fishing and other marine uses.
- **Overlap:** While the lease area is sometimes used by commercial fishing operators — particularly when strong westerly winds make offshore fishing less viable — the Eden-1 lease avoids the most

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sheltered zones close to shore. While there is some overlap, the lease layout has been designed to preserve ample navigable and fishable areas.

- **Compatibility:** Kelp farming infrastructure consists of fixed, taut longline systems secured to the seabed with rope and screw anchors, avoiding nets or entangling gear. Marine users will be provided with navigation updates and marine chart notices, ensuring full awareness of lease locations.
- **Ecological Synergies:** Kelp farms are known to support marine biodiversity, including fish species that are targeted by local fisheries. The infrastructure provides shelter and habitat, which may increase fish density in surrounding waters, offering potential benefit to adjacent longline operators.
- **Economic Displacement:** Globally and nationally, there is no precedent of aquaculture displacing commercial longline fisheries. Instead, there are increasing examples of integrated marine use, where aquaculture and fishing coexist with mutual benefits.

5. Kelp Decline, Fish Stocks, and the Role of Aquaculture

There is currently declining economic value in coastal fisheries due to the widespread loss of wild kelp forests in New South Wales waters. Kelp forests—particularly those formed by *Ecklonia radiata*—are foundational marine ecosystems that support the productivity of fish, crustaceans, and other commercially valuable species. However, natural kelp beds in NSW have suffered significant degradation due to rising ocean temperatures, nutrient pollution, and overgrazing by expanding populations of sea urchins. This decline has been strongly linked to reduced fish abundance and marine biodiversity in coastal zones, threatening the long-term viability of dependent fishing sectors (Vergés et al., 2016; NSW DPI, 2024).

Kelp aquaculture offers a practical and scalable solution to help reverse this trend by reintroducing three-dimensional habitat complexity to barren or degraded seafloors. Studies have shown that kelp farms provide enhanced habitat for juvenile and adult fish, as well as for invertebrates, leading to higher biomass and biodiversity than equivalent non-vegetated areas (The Nature Conservancy, 2023). In addition to supporting ecological resilience, cultivated kelp sequesters carbon, buffers ocean acidification, and can enhance water quality, contributing to broader climate and sustainability targets. As such, kelp farming has the potential to restore lost ecological functions, while also reinforcing the economic foundation of regional fisheries and blue economy industries.

6. New Product Streams and Market Expansion

- Fresh and dried food-grade kelp.
- Kelp-based animal feeds and soil conditioners.
- Kelp extracts for cosmetics and wellness products.
- High-grade kelp for nutraceutical development.

7. Regional Economic Diversification

- Kelp farming aligns with state and federal strategies promoting blue economy development, climate-aligned investment, and sustainable agriculture.
- The National Marine Science Plan 2015 projects that seaweed aquaculture could contribute $100 billion to Australia's economy and deliver 25,000 regional jobs over the coming decades.

8. Management and Reporting Requirements

To ensure economic outcomes are maximised and transparently managed:

- Auskelp will publish annual report outlining employment and business performance.
- A local procurement and training plan will be developed to maximise workforce participation from Eden and surrounding areas.

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- Ongoing engagement with regional business chambers, TAFEs, and local governments will be pursued to identify additional synergies.
- Report on fish abundance in Disaster Bay every three years against baseline 2025 results.

Social Concerns

While the Eden-1 Project presents clear environmental and economic benefits, several local concerns have been raised regarding potential negative impacts. Some residents are worried that introducing commercial aquaculture infrastructure into a largely pristine and undeveloped part of the coastline may alter the natural character of Disaster Bay, even though the farm is located a minimum of 1.1 km offshore. Visual amenity concerns relate to the presence and number of surface floats, navigation markers, and vessel activity, which some fear could detract from the bay's wilderness feel and its proximity to the Nadgee Nature Reserve. Others have expressed concern about potential risks to marine mammals—particularly whale migration and resting behaviour—and whether longlines could increase entanglement risk despite mitigation measures. A portion of the community is also apprehensive about the broader commercialisation of offshore waters, reduced wilderness values, the precedent it may set for future marine development, and uncertainty about long-term ecological outcomes, including fears of increased shark presence, changes to fish behaviour, and potential marine debris if infrastructure were to fail. These concerns reflect a desire to preserve the remoteness, quietness, and untouched qualities that make Disaster Bay culturally and environmentally significant to both residents and visitors.

Social Benefits

The Eden-1 Kelp Aquaculture Project is expected to deliver significant social benefits to the Bega Valley region by establishing a new, regenerative, and climate-resilient coastal industry that creates long-term, year-round employment and diversifies the local economy beyond traditional sectors vulnerable to bushfire, flood, pandemic disruptions, or market volatility. As a fully marine-based enterprise, kelp farming is naturally bushfire-proof, flood-proof, and largely storm-resilient, offering a rare form of economic stability for coastal communities facing increasing climate uncertainty. The production of sustainably grown kelp biomass supports healthier, low-impact food, fertiliser, and bioproduct industries, aligning with community values around environmental stewardship and access to natural, climate-positive products. The Project strengthens regional identity by positioning Eden as a leader in nature-based innovation, enhances youth opportunities through training and education pathways, and creates flow-on benefits for tourism, local procurement, and research collaboration. By improving water quality, enhancing marine habitat, and supporting biodiversity, kelp farming also contributes to the long-term environmental wellbeing of Disaster Bay—reinforcing community pride, resilience, and confidence in a sustainable future for the region.

Conclusion

The economic impacts of the Kelp Aquaculture Farming have been assessed as 'negligible', due to the positive nature of anticipated outcomes and the absence of any identifiable negative economic effects on existing industries, communities or land use. Unlike developments that may compete for scarce resources, displace workers, or impact sensitive land-based economies, kelp farming in Disaster Bay is additive, not extractive. It introduces a new and sustainable industry into a region whilst displacing minimal existing economic activity, and instead offers tangible gains in employment, infrastructure investment, and supply-chain development. Furthermore, there is no existing commercial kelp aquaculture industry in Australia, and demand for sustainably grown kelp biomass – driven by fertiliser, food, feed, cosmetic, bioplastics and climate-linked sectors – significantly exceeds supply.

From a social perspective, the Eden-1 Project presents low risk with strong community benefits. Although some residents expressed concerns about visual changes, the presence of commercial infrastructure, proximity to Nadgee Nature Reserve, potential whale interactions, and impacts on wilderness values, these risks are limited in scale and largely addressed through project design. Public access remains unrestricted, recreational fishers are not displaced, and only a small section of commercial fishing activity is affected, with potential ecological improvements such as increased fish abundance and better water quality. At the same time, the Project delivers significant social benefits: new year-round jobs, youth training pathways, a climate-resilient and

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bushfire-proof industry, and strengthened regional identity around regenerative marine innovation. With commitments to local hiring, education partnerships, and transparent engagement, the Project offers high social value with minimal social impact.

Importantly, declining wild kelp forests along the NSW coastline have contributed to the loss of habitat and reduced fishery productivity, with associated negative impacts on the economic value of coastal fisheries (Vergés et al., 2016; NSW DPI, 2024). Kelp farming presents an opportunity to reverse this ecological trend while introducing economic resilience in marine-dependent regions. The offshore and marine-based nature of the kelp Aquaculture Farm has no impact on land-based economic activities, and the Project's commitment to local employment, training, and procurement further reduces any risk of social or economic displacement. With strong alignment to federal and state economic priorities—particularly those targeting regional employment, climate action, and the circular economy—the Project presents a 'negligible' economic risk with a 'significant' regional economic opportunity.

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9.4 ENVIRONMENT

9.4.1 Marine Habitat, Water Quality and Sedimentation

Risk Table 15: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – Impacts on Marine Habitat, Water Quality and Sedimentation in Disaster Bay and the wider region (modified from Chung et al. 2011 and Duarte et al. 2017 and Buschmann et al. 2008).

Issue	Will Kelp Aquaculture Farming have a significant impact on marine habitats in Disaster Bay and the wider region, including water quality and sedimentation?
Comments for consideration	• What habitats are present in the direct and wider study area? • Could Kelp Aquaculture Farming cause changes in benthic communities e.g. via sedimentation, turbidity or removal of nutrients? • Will the kelp farm caused microplastics? • Have impacts on benthic habitat been found to be far-reaching or localised for other long-line Kelp Aquaculture Farms globally? • Will the proposed stocking densities be likely to affect other marine habitats? • How will stocking density and its effects be monitored and managed? • Is Kelp Aquaculture Farming likely to cause any negative effects to marine habitats? • Will Kelp Aquaculture Farming remove food for other marine species? • How will cumulative impacts on marine habitats be monitored and managed?
Description	• Direct marine habitats = unvegetated sandy substrate • Lease area benthic habitat = TYPE 3 minimally sensitive key fish habitat • Adjacent marine habitats = rocky reef with local kelp communities • Additions to marine environment = biofouling • Removal of nutrients from marine environment (e.g. nitrogen, phosphorus, carbon, potassium, calcium, magnesium, iron, zinc, copper, manganese, boron • Kelp Aquaculture Farming has no biodeposits, dissolved metabolic product, faeces, pseudofaeces or sedimentation (e.g. which is produced from other forms of aquaculture such as mussel and fish farming) • Environmental benefits of nutrient removal e.g. reduction of eutrophication, improved dissolved oxygen, supports shellfish • Does dredging occur in the area? • Will dredging be required or is there expected to be disturbance to marine sediment?

Proposed Management – Mitigation and Monitoring	• Site Selection
	  ○ No environmentally sensitive or unique marine areas
	  ○ Classified TYPE 3 - minimally sensitive key fish habitat
	  ○ Habitat: unvegetated sandy substrate with low natural complexity and no biological assemblages
	  ○ Excellent flushi1ng rates
	• Operation scale of farmed area (5% of Disaster Bay)
	• Nutrient modelling conducted – appropriate stocking densities – below ecological carrying capacity
	• Ongoing monitoring of wild kelp beds:
	  ○ Reduce stocking densities if impact detected
	• Kelp Aquaculture = No feed or nutrient input
	• Benthic survey completed: fine to medium grade sand
	• Baseline water quality values established (Elgin 2025)
	• Fish assemblage baseline established (Elgin 2025): report every 3 years

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	• Baseline benthic survey established: report every 3 years • Annual log of significant beach-cast deposits of *Ecklonia radiata* • See Elgin Benthic Ecology, Fish Assemblage and Seabed Habitat Assessment (attached as Appendix A9)

Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	0	2	0	Negligible

Justification of Ranking

The seafloor within the proposed Eden-1 kelp farm footprint is characterised by unvegetated, fine–medium sandy substrate with variable shell grit and no reef, hard structure, or sensitive benthic communities. The lease area is classified as TYPE 3 minimally sensitive key fish habitat (Elgin 2025), which is the least sensitive marine environmental classification under the FM Act. These types of soft-bottom habitats are common along this section of the NSW coastline and typically support burrowing invertebrates and small demersal fish, but lack the structural diversity of rocky reef or seagrass systems.

The potential environmental risk posed by kelp aquaculture farming at the Eden-1 site in Disaster Bay has been assessed as 'negligible' in relation to marine habitat disturbance, changes in water quality, and sedimentation effects. This conclusion is based on established scientific literature, site-specific environmental reporting, and the characteristics of the proposed farming operation. The risk profile is supported by three primary justifications: the non-extractive and non-polluting nature of kelp farming, the outcomes of nutrient modelling specific to the region, and the low ecological sensitivity of the proposed aquaculture site and surrounding area.

1. Non-Extractive, Non-Polluting Nature of Kelp Farming

Unlike other forms of aquaculture such as finfish, kelp cultivation does not require the input of feed, antibiotics, chemicals, or artificial nutrients. And unlike finfish or mussel farming, there are no outputs of metabolic waste, faeces, pseudofaeces, or associated particulate matter, which are common contributors to benthic enrichment, oxygen depletion, and altered microbial communities in sediment-heavy systems. The absence of nutrient addition or biological discharge ensures that kelp farming is not a source of localised pollution, and instead acts as a nutrient sink, improving ambient water quality. Kelp also plays a beneficial role in carbon sequestration, helping to mitigate climate change and ocean acidification while enhancing dissolved oxygen levels.

2. Water Quality Values

The expected water quality characteristics for Disaster Bay reflect an exceptionally clean, well-flushed marine system with minimal pollutant inputs and strong ecological resilience. The bay is bordered almost entirely by protected lands—Nadgee Nature Reserve, Beowa National Park, and undeveloped coastal forest—which prevents agricultural runoff, urban stormwater inputs, and industrial discharge. Freshwater inflows from the Wonboyn Estuary and Merrica River are limited and typically low in nutrient load, contributing to stable salinity and pH conditions consistent with natural oceanic waters. Disaster Bay's high-energy environment, dominated by southerly swells and strong tidal exchange, provides continuous flushing that maintains low turbidity, high dissolved oxygen, and low suspended solids.

The Elgin water-quality snapshot documented:

- Well-mixed water column with minimal stratification;
- High dissolved oxygen (~102%, 8.5 mg/L);
- Low turbidity (0.2 NTU);

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- Winter temperature ~14°C;
- Salinity ~34.6 PSU, consistent with clean oceanic waters;
- Nutrients typical of naturally upwelled systems influenced by the EAC.

Some nutrient parameters exceeded ANZG default values [dissolved inorganic nitrogen (DIN), particularly nitrate (NO_3^-), and Silicate (SiO_2)]; however, the report notes these are normal and natural seasonal conditions for the Twofold Shelf bioregion, particularly during upwelling periods (and are not indicative of pollution or degradation). Kelp aquaculture is not expected to degrade water quality and may enhance conditions through nutrient uptake and oxygen production.

The Eden-1 kelp farm is not expected to have a negative effect on water quality in Disaster Bay. Based on global evidence and the passive nature of kelp aquaculture, no adverse change to water quality is anticipated as kelp farming does not introduce nutrients, chemicals, feed, or waste into the environment. On the contrary, kelp systems are known to absorb dissolved nitrogen, enhance oxygenation, and improve water clarity, reinforcing the high natural quality already present in Disaster Bay. The combination of clean catchments, minimal anthropogenic pressure, and robust hydrodynamic mixing ensures the ecosystem will continue to support kelp farming with no expected deterioration in environmental condition.

Parameter	Test/Method	Purpose	Expected Range / Benchmark
Temperature	In-situ sensor or CTD profiler	Growth rate, metabolic processes	10–23 °C (optimum: ~15–20 °C for *E. radiata*)
Salinity	CTD probe or refractometer	Osmotic balance, species tolerance	33–36 PSU (practical salinity units)
pH	Electrode probe (calibrated in marine conditions)	Acidification effects, nutrient speciation	8.0–8.3 (natural seawater range)
Dissolved Oxygen (DO)	Winkler titration or optical DO sensor	Ecosystem health, respiration	≥ 6 mg/L
Nitrate (NO_3^-)	Colorimetric or ion chromatography (filtered sample)	Nutrient availability for kelp	1–10 µM (seasonal variability; ≥1 µM supports growth)
Phosphate (PO_4^{3-})	Molybdenum blue colorimetry	Nutrient limitation potential	0.05–0.5 µM
Ammonium (NH_4^+)	Phenate method or ion selective electrode	Alternative nitrogen source, excretion indicator	<1 µM under ambient conditions
Silicate (SiO_4^{4-})	Molybdate colorimetric assay	For diatom and kelp growth (secondary)	2–30 µM
Total Suspended Solids	Gravimetric analysis (after filtration)	Light penetration, fouling risk	<10 mg/L (preferably <5 mg/L offshore)
Turbidity	Nephelometric Turbidity Units (NTU) via turbidimeter	Water clarity, photosynthesis	<5 NTU preferred offshore
Chlorophyll-a	Fluorometry or HPLC	Proxy for phytoplankton biomass, competition	0.2–2.0 µg/L (oligotrophic to mesotrophic offshore)
Total Nitrogen / Total P	Combustion or persulfate digestion	Nutrient loading assessment	TN < 300 µg/L; TP < 30 µg/L offshore
E. coli / Enterococci	Membrane filtration + MPN	Sanitary quality / human health if harvesting food	<10 CFU/100 mL (relevant for food-grade kelp)
Heavy Metals (e.g. Cu, Zn)	ICP-MS or AAS	Bioaccumulation risk / compliance	Cu < 5 µg/L, Zn < 15 µg/L (ANZECC 95% protection)
Hydrocarbons / Oil & Grease	Infrared spectroscopy or GC-FID	Marine pollution risk	Below detection (<0.01 mg/L ideally)

Figure 54: Water quality and range/benchmark for Disaster Bay. (Elgin and Associates, 2025).

3. Microplastics

The proposed kelp farm will use marine-grade polypropylene and nylon ropes and marine-grade plastic floats, which can gradually release trace microfibres through UV exposure and abrasion over many years. However, microplastics from kelp farming are expected to be extremely small compared with major regional and global sources such as synthetic textiles and tyre wear, which together account for more than 70% of all oceanic microplastic emissions. In contrast, predominantly static aquaculture ropes contribute very minor microplastic deposits. The farm's marine-grade nylon droppers (which the kelp is grown on) will be reused, cleaned, and inspected annually to prevent debris loss and fibre shedding.

Importantly, the kelp farm is located offshore in a high-flushing, open-coastal environment, characterised by strong tidal exchange and oceanic circulation. This dynamic hydrology prevents the accumulation or aggregation of microplastics within or near the farm area, ensuring rapid dispersion of any particulates that may be released. By comparison, commercial fishing and the many thousands of oyster baskets and aquaculture ropes already in use within the more enclosed estuary systems in NSW represent a far greater potential for localised microplastics retention. The overall microplastic contribution from the proposed kelp farm is therefore considered negligible and environmentally very low risk.

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4. Sedimentation

The proposed Kelp Aquaculture Farm is not expected to result in any measurable increase in sedimentation or alteration of seabed conditions. As a suspended longline system, kelp cultivation does not involve seabed contact during routine operations and does not generate particulate waste, feed residues, faeces, or pseudofaeces that commonly drive sediment accumulation in other forms of aquaculture. Infrastructure is anchored using low velocity screw anchors, resulting in only highly localised and temporary disturbance at individual anchor points, with no ongoing sediment resuspension once installed. The seabed is characterised by mobile sandy sediments within a high-energy, well-flushed environment where natural wave action and currents dominate sediment transport processes. Any minor sediment disturbance associated with installation or maintenance activities is expected to be quickly dispersed and reworked by prevailing hydrodynamic conditions. Accordingly, the Project is not anticipated to cause sediment build-up, smothering, or changes to benthic sediment composition within or beyond the lease area.

5. Dredging

A review of maritime activity, port operations, and coastal infrastructure within Disaster Bay and the immediate surrounding waters indicates that no dredging programs are undertaken by other users in the area. The Bay is not a commercial shipping harbour, navigation channel, or port approach requiring maintenance dredging, and there are no nearby sand extraction, pipeline trenching, or coastal engineering works that would generate sediment disturbance. Existing maritime activity is limited to low-intensity recreational and commercial fishing use, which does not involve seabed excavation. Accordingly, there is no foreseeable risk of turbidity plumes, sediment resuspension, or contaminant mobilisation from third-party dredging activities that could affect the Project area. This absence of external dredging pressures supports stable water quality conditions and confirms that potential cumulative impacts associated with dredging practices are negligible.

No dredging, seabed excavation, or sediment disturbance activities are proposed or required as part of the Eden-1 Project. Installation of the kelp cultivation system utilises screw anchors and tensioned longlines that are deployed directly into unconsolidated sandy substrate, creating a very small, localised seabed footprint without excavation, trenching, blasting, or spoil removal. Construction and operational activities occur entirely in the water column and above the surface, and do not involve seabed levelling, channel formation, or sediment relocation. As a result, there is no mobilisation of sediments, no increase in turbidity, and no risk of sediment plumes or contaminant resuspension.

6. Beach Cast Ecklonia radiata

There is expected to be a minimal loss of kelp from the proposed kelp lines based on ocean testing results in Disaster Bay between 2023 and 2025. Deep ocean rigs of *Ecklonia radiata* do not suffer the same wave-driven dislodgment rates as subtidal reefs.

High levels of kelp accumulation can, in sheltered or low-energy environments, result in temporary smothering of sandy substrates and localised decomposition that may generate odour; however, such effects are considered unlikely in highly dynamic offshore settings such as Disaster Bay, where strong wave action, twice-daily tidal exchange, and high flushing currents limit prolonged accumulation and promote rapid dispersal of detached biomass. Local accounts indicate that prior to the 1990s very high volumes of naturally occurring kelp (were periodically deposited on Disaster Bay beaches, with large accumulations observed following significant storm events (crayweed - *Phyllospora comosa* and *Ecklonia radiata*), but dispersing rapidly, supporting the conclusion that persistent build-up below the high-water mark is unlikely in the present-day coastal environment.

Auskelp will maintain an annual log of significant beach-cast deposits of *Ecklonia radiata* to determine if the kelp is from farming operations (which can easily be determined by species, kelp age and the presence of holdfasts adapted to ropes or rocky substrates) – findings will be reported annually to NSW Fisheries.

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7. Nutrient Modelling

A specialist technical assessment written by BMT in 2022 (see attached as Appendix A3) indicates that Disaster Bay exhibits excellent hydrodynamic flushing. Wave modelling using the Spectral Wave Ray Tracing (SWRT) method and in-situ calibration against the Eden Waverider Buoy confirmed that wave heights within the bay are moderate, and strong residual and ocean-driven currents, often exceeding 1 m/s at the surface, are regularly observed due to the influence of the East Australian Current and mesoscale eddies. Advanced nutrient modelling undertaken by (PSTEG, 2024, see attached as Appendix A4) confirms that the ambient nitrate concentrations in Disaster Bay are adequate to support kelp farming without inducing ecological stress. This modelling indicates that the uptake of nitrogen by cultivated kelp will remain significantly below the carrying capacity of the bay. Given that the Eden-1 proposal covers less than 5% of Disaster Bay, the scale of the project is demonstrably within safe biogeochemical thresholds.

The bay has a very wide opening of more than 9.8 km and experiences strong northerly and southerly currents, contributing to high flushing rates that prevent nutrient depletion and accumulation of any waste products.

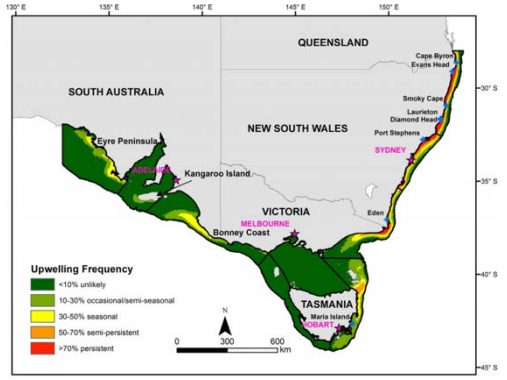

Figure 55: Upwelling Frequency Huang et al. (Geoscience Australia, 2024).

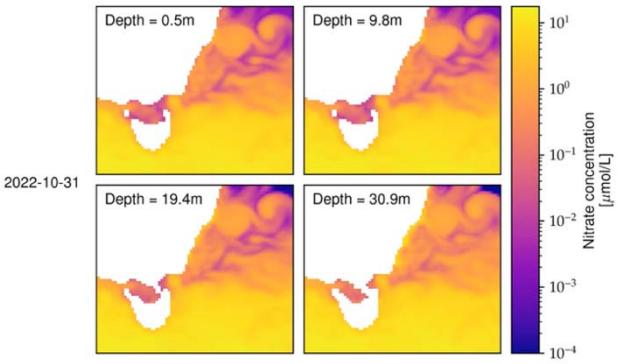

Figure 56: 30-year nutrient modelling, (Stegeman, 2024).

These currents, strongly influenced by the East Australian Current (EAC), flows southward along the eastern coast of Australia and progressively generate mesoscale eddies and upwelling events. Such upwelling brings nutrient-rich deeper waters to the surface, replenishing essential nutrients in the photic zone and supporting primary productivity. The combination of these dynamic oceanographic processes ensures a continuous supply of nutrients and maintains water quality, further supporting the sustainability of kelp farming in the area.

The far south coast of NSW is subject to a unique form of Rossby wave and wind driven upwelling. The Rossby wave is generated from the rotation of the Earth, called a topographic Rossby wave. These deep waves generate exclusively within coastally trapped waters, such as bays and coves. They take the form of a column of fluid which develops anticlockwise rotations if moving towards the shore, and clockwise rotations if moving towards deeper waters. These topographic Rossby waves produce upwelling, moving deeper waters towards the surface while also affecting sea level changes, current variation and the movement of sediments, and produce a significant erosional force (P.G. Baines., 1989).

8. Habitat Sensitivity of Lease Area

The physical environment underlying the proposed Eden-1 Kelp Aquaculture Farm consists of fine to medium-grained unconsolidated sandy sediment, a habitat type that dominates the southern NSW continental shelf and is widely recognised as ecologically low in complexity and sensitivity. These soft-sediment systems lack the vertical structure necessary to support high biodiversity or ecosystem-engineering organisms such as seagrasses, corals, sponges, or kelp forests, which typically occur only on rocky reef or mixed-substrate environments (Jordan et al., 2010; Williams et al., 2019).

Findings from the 2025 Elgin Benthic Ecology Assessment and seafloor mapping confirm that the Eden-1 lease area and surrounding fringe contains:

- Uniform sandy seafloor with no reef outcrops, boulders, hard bottom, or consolidated substrate;

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- No seagrass, macroalgae, or sensitive benthic vegetation;
- Variable bedforms, including flat sands in shallower depths (~17 m) and rippled sands and sand waves at deeper locations (~28 m), consistent with a high-energy, mobile sediment environment;
- Low levels of fine sediment and very low total organic carbon (0.03–0.08%), indicating minimal nutrient trapping and low biological enrichment;
- Benthic infauna of low richness and abundance, with mean taxon richness (12 taxa) substantially lower than nearby embayments such as Merimbula Bay (24 taxa), reflecting the limited habitat complexity of the site;
- No threatened ecological communities, critical habitat, or high-conservation benthic features within or adjacent to the lease footprint. Benthic video surveys identified low abundance and low diversity of demersal fish within the lease area, consistent with unconsolidated sandy substrate. Observed fish species were sparse, widely dispersed, and mobile, with no evidence of site-attached reef-associated assemblages.
- Fish presence was opportunistic and transient, reflecting the low habitat complexity and mobile nature of the sandy seabed.
- The survey results are consistent with regional habitat mapping that classifies the lease area as low-value fish habitat (TYPE 3 – minimally sensitive) under the Fisheries Management Act.

Sediment chemistry sampling across the lease area revealed concentrations of metals and other contaminants well below ANZG (2018) guideline values, demonstrating that the sediments remain in a natural, undisturbed state. No evidence of gross pollution, debris, or anthropogenic alteration was reported. These findings are consistent with earlier seabed mapping by NSW DECCW (2010), which identified this region as dominated by unvegetated, unconsolidated sands with no mapped sensitive habitats. The NSW Marine Estate Management Authority (MEMA, 2018) similarly recognises soft-sediment systems such as this as low sensitivity habitats where the risk of ecological disturbance from suspended-culture aquaculture activities is considered inherently low.

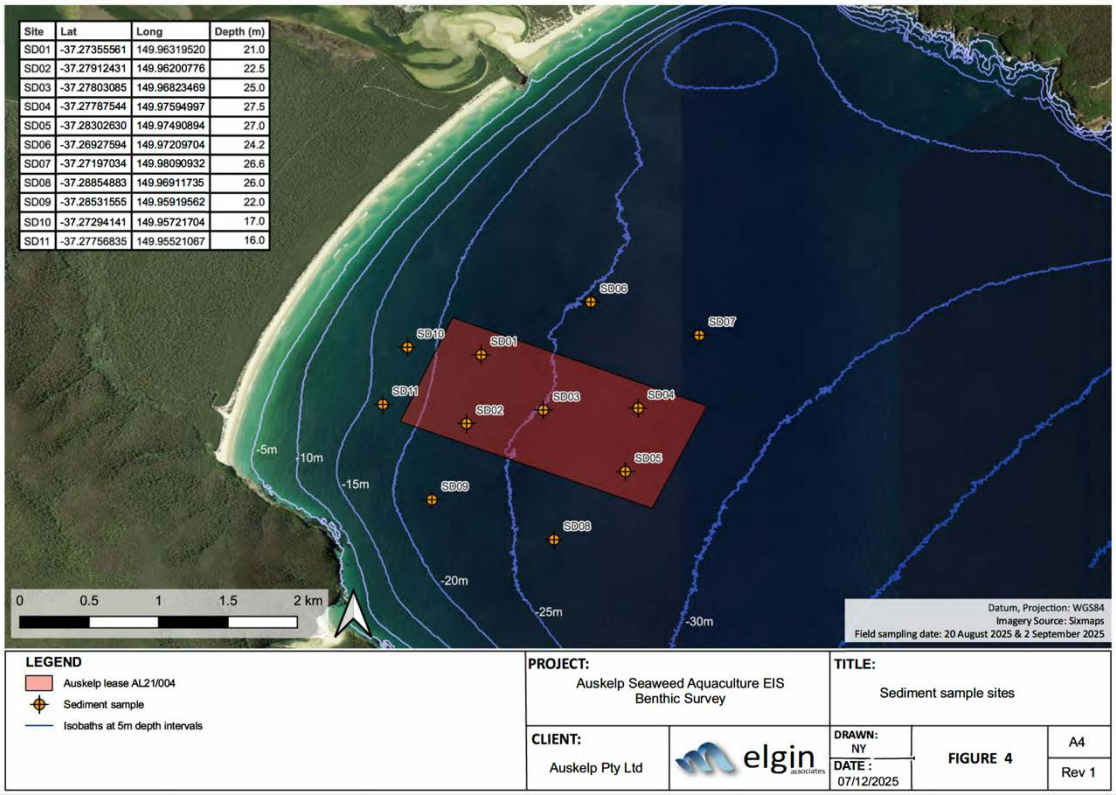

Figure 57: Sediment field sample locations studied (Source: Elgin Associates 2025 Report, attached as Appendix A9).

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9. Photosynthetic macroalgae

Kelp aquaculture farming does not interfere with the primary food sources of whales, such as zooplankton and krill. Baleen whales—such as humpback and southern right whales that migrate along the New South Wales coast—primarily feed on dense aggregations of zooplankton, including copepods and krill, which are mobile animals suspended in the water column. Kelp is a photosynthetic macroalga that derives nutrients through passive uptake of dissolved inorganic compounds such as nitrate (NO_3), phosphate (PO_4^3), and trace elements. These compounds are not consumed directly by whales or other marine megafauna and are instead part of the base nutrient pool that supports primary producers like phytoplankton.

Importantly, kelp does not feed on or filter out zooplankton, larval fish, or any other micro or macrofauna. Unlike filter-feeding organisms such as mussels or oysters, kelp has no feeding structures and no mechanism to consume particulate matter. Therefore, its presence in marine environments does not compete with whales or other animals for food. While kelp does absorb nitrates and phosphates, this nutrient removal typically improves water quality by reducing the risk of eutrophication and supporting broader ecosystem function. These nutrients are taken from the dissolved pool, not from biological organisms. Studies have shown that kelp farming does not deplete nutrients to levels that would negatively affect phytoplankton populations, especially in high-flushing, upwelling-driven systems like Disaster Bay, where nutrient replenishment is continuous.

10. Biofouling Management

During the warmer months, horizontal backbone lines at the Eden-1 Kelp Aquaculture Farm may experience seasonal biofouling, particularly from opportunistic settlement of mussel spat during wild spawning events. To maintain the structural integrity of the farming rigs and minimise hydrodynamic drag, fouled lines will undergo periodic cleaning to remove excess biofouling. This cleaning is conducted using manual methods onboard service vessels, without chemical treatments or antifouling agents. Vertical kelp lines are removed from the water prior to the high-fouling season. This seasonal removal significantly reduces the amount of submerged surface area available for colonisation, helping to maintain the operational efficiency of the infrastructure and reduce hydrodynamic drag.

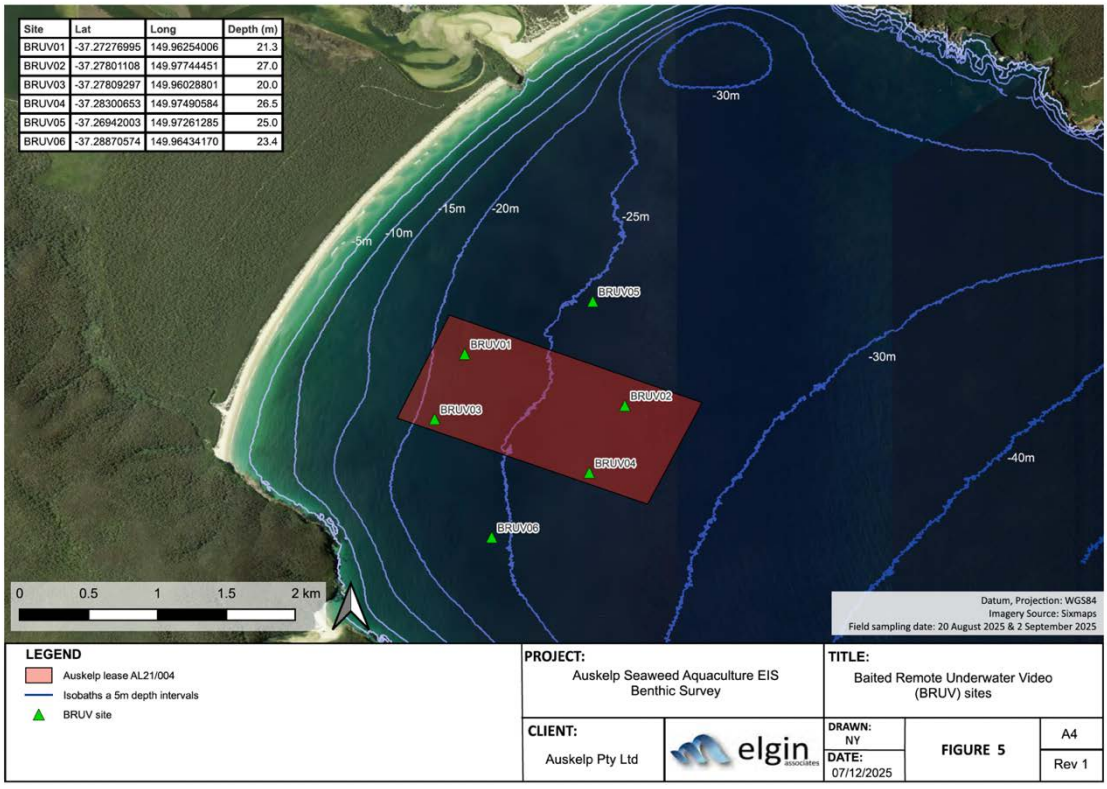

Figure 58: Baited Remote Underwater Video (BRUV) locations studied (Source: Elgin Associates 2025 Report, attached as Appendix A9).

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Any mussel or biological debris dislodged during cleaning operations is expected to be minimal compared to naturally occurring detritus commonly redistributed throughout Disaster Bay during storm events or heavy swell. Given the high flushing rates of the bay – prevailing currents, and its wide (~9.8 km) ocean-facing mouth – these natural or operational discharges are well dispersed and do not accumulate locally.

11. Summary of Environmental Interactions

A. Marine Habitats

- Direct site: Soft sediment habitats with no sensitive benthic communities.
- Surrounding marine area: Some rocky reef habitat within 1.1km of lease area hosts wild kelp beds, considered ecologically significant.
- Addition, not displacement: The kelp farm introduces vertical complexity, enhancing local habitat diversity rather than displacing existing habitat.
- No seabed modification: Farming infrastructure is suspended and avoids ongoing seabed contact, with only discrete, localised anchor points.
- No loss of ecological function: The Project does not affect known nursery grounds, spawning areas, or critical fish habitat.

B. Water Quality

- Nutrient Uptake: Kelp removes nitrogen, phosphorus, carbon, and trace metals such as iron, zinc, copper, manganese, and boron. This results in decreased eutrophication potential and improved dissolved oxygen profiles.
- No Chemical Inputs: No feed, hormones, or pesticides are used in kelp farming, reducing pollutant risks.
- Limited biofouling: ongoing removal of mussel spat from horizontal lines.

C. Sedimentation

- No Waste Output: Unlike bivalve or fish farms, kelp does not contribute to seabed enrichment, sediment depositing or waste accumulation.
- Biofouling Impacts Minimal: While some detritus may result from biofouling, ongoing maintenance and the use of high-energy, well-flushed sites reduce accumulation risks.
- Annual log of significant beach-cast deposits of *Ecklonia radiata.*

D. Global Evidence

Numerous peer-reviewed studies confirm the low marine habitat impact of kelp aquaculture:

- Walls et al. (2017): Kelp farming does not measurably degrade benthic ecosystems under low-to-moderate densities.
- Buschmann et al. (2017): Seaweed farms improve water quality and can support fish recruitment.
- Campbell et al. (2019): Identified nutrient removal and habitat creation as key benefits of macroalgae cultivation in Europe.
- Chung et al. (2011): Using marine macroalgae for carbon sequestration: a review.
- Duarte et al. (2017): Can seaweed farming play a role in climate change mitigation and adaptation?
- Buschmann et al. (2008): Seaweed cultivation and marine ranching.

E. Site Characteristics

- Situated in non-sensitive TYPE 3 benthic area (fine sediment, no reef).
- No known seagrass, coral or threatened habitat in lease footprint.
- High flushing rates reduce risk of localised nutrient depletion.

F. Monitoring and Reporting

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Auskelp will undertake the following monitoring and reporting activities, with results documented and formally provided to NSW DPIRD Fisheries in accordance with licence conditions:

- 3-year fish assemblage BRUV testing (post 50% farm operations) against Elgin 2025 baselines.
- 3-year benthic survey testing (post 50% farm operations) against Elgin 2025 baselines.

Conclusion

Based on scientific research, regulatory context, and site-specific modelling, the Eden-1 Kelp Aquaculture Farm presents a negligible environmental risk to marine habitats, water quality, and sedimentation. The farm does not use feed or chemicals, generates no waste discharge, and operates on soft sediment in a well-flushed, high-energy bay. Nutrient uptake by kelp remains well below ecological carrying capacity, and the infrastructure enhances local habitat complexity. With no sensitive habitats affected and monitoring and management protocols in place, Eden-1 is expected to deliver ecological benefits without impacting current environmental health.

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9.4.2 Genetics, Disease and Introduced Pests

Risk Table 16: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – Genetics, Disease and Introduced Pests in Disaster Bay and the wider region (modified from NSW DPI, 2021; Biosecurity Strategy for NSW Aquatic Industries, NSW DPI, 2017; Aquatic Biosecurity Position Statement, FRDC, 2020).

Issue	Will the cultured kelp stock have a significant impact on the genetic integrity of wild populations, competition and predation levels and/or food chains? Will the Eden-1 have a significant impact on the occurrence of pathogens in wild populations and/or significantly increase the risk of the establishment of pests?			
Comments for consideration	• Are the cultured stock likely to threaten wild stocks by causing increased competition for resources e.g. space, food or food chains? • Are the cultured stock native to the region? • Will the cultured stock have an impact on the genetic integrity of wild • stocks? • Will the Kelp Aquaculture Farm introduce non-indigenous fish and marine vegetation to the coastal waters of NSW? • Are any measures going to be taken to ensure that the genetic composition of broodstock is maintained at an appropriate level? • What processes and regulations are in place to ensure that wild caught and hatchery spat is disease free before secured on the leases? • Are cultured stocks likely to transfer diseases to wild stock? • Does kelp spread disease? • Does the kelp have high levels of lead arsenic and cadmium? • Is it likely that disease from cultured stock may be passed on to other fauna in the region via the passage of pathogens through the water or intermediary hosts? • Will kelp farming reduce instances of algal blooms (such as the one affecting South Australian waters from March 2025)?			
Description	• Cultured species are native to Disaster Bay • Native disease and parasites – negligible risk • Exotic disease and parasites – negligible risk • Kelp farming reduces eutrophication			
Proposed Management – Mitigation and Monitoring	• Comply with NSW Department of Primary Industries (DPI) Aquaculture Management Guidelines • Comply with NSW Biosecurity Act 2015 • Sori derived only from wild Disaster Bay *Ecklonia radiata* (within local area) • Negligible risk of disease, parasite or pests • Minimal stress – stocking densities, water quality • Biofouling management in accordance with approved Monitoring and Maintenance Plan • Strict hatchery management and biosecurity protocols • Wild sori collection is repeated annually to maintain genetic variation			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	0	2	0	Negligible

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Justification of Ranking

The risk associated with the Eden-1 Kelp Aquaculture Farm contributing to adverse effects on the genetic integrity of wild kelp populations, the amplification or introduction of disease, or the establishment of marine pests is assessed as negligible. This conclusion is based on a combination of environmental conditions, operational controls, scientific evidence, and regulatory safeguards that collectively minimise potential risk pathways. The Project will operate in full compliance with the NSW Department of Primary Industries Aquaculture Management Guidelines, the NSW Biosecurity Act 2015, and all relevant biosecurity and aquaculture permit conditions. These frameworks ensure the implementation of appropriate preventative measures, monitoring systems, and response protocols to protect surrounding marine ecosystems from biosecurity-related impacts.

Local Sori

The cultured species, *Ecklonia radiata*, is native to Disaster Bay and already exists in the surrounding marine environment. All sori (reproductive tissue) used for propagation are collected from wild individuals sourced within 10 km of Disaster Bay, ensuring no introduction of non-endemic individuals or unfamiliar genotypes. A minimum of 12 separate wild parent individuals are used, and wild replenishment is . This ensures genetic diversity, reduces the risk of inbreeding depression, and prevents domestication effects. These practices align with best-practice standards recommended by the NSW Department of Primary Industries (DPI) and reflect guidance from international bodies on aquaculture genetic stewardship.

Competitive Displacement

Unlike finfish or bivalve farming, kelp cultivation is non-extractive, non-polluting, and non-competitive in terms of food or substrate. Cultivated kelp occupies midwater columns on taut lines, not reef surfaces or rocky habitats preferred by native kelp beds. There is no competition for nutrients or space that would adversely affect wild populations, and no alteration to natural trophic structures. On the contrary, evidence from global studies (e.g. The Nature Conservancy, 2023) suggests that kelp farms may increase local habitat complexity and provide refuge for juvenile fish and invertebrates, including species of commercial interest.

Non-Indigenous Species

There is zero introduction of exotic species, pathogens, or macroalgae under the Eden-1 Project. Only native *Ecklonia radiata* is propagated, with no translocation across bioregions. This strict genetic containment removes any risk of accidentally introducing invasive macroalgae or marine organisms, a key consideration under NSW Biosecurity legislation and the NSW Marine Pests Plan.

Disease Risk

Kelp species do not possess vascular systems and are not susceptible to communicable diseases in the manner of finfish, bivalves or molluscs. Globally, disease events in kelp aquaculture are extremely rare and generally associated with environmental stress (e.g. warming, nutrient depletion), not contagious agents. The Eden-1 Project utilises hatchery best practices, operates at low stocking densities, and maintains excellent flushing rates, significantly lowering any risk of disease emergence or transfer. There is no evidence that cultured kelp transmits disease to wild *Ecklonia radiata* or any associated marine organisms.

Inputs

One of the most critical factors contributing to the negligible ranking is that kelp aquaculture requires no feed inputs, antibiotics, hormones, or chemical supplements. This entirely removes known vectors for disease proliferation, antibiotic resistance, or microbial imbalance. Additionally, kelp does not produce faeces, pseudofaeces, or mucus byproducts, which are common carriers of disease in animal aquaculture systems.

Heavy Metals

Kelp can absorb trace elements like lead, arsenic, and cadmium from the surrounding seawater, but these occur naturally and reflect the background levels of the local environment rather than being introduced by the kelp itself. In low-pollution waters of Disaster Bay, *Ecklonia radiata* is expected to contain only minimal,

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naturally occurring levels of these elements. Because kelp absorbs and removes these trace elements when harvested, it actually acts as a sink rather than a source of contamination.

Disaster Bay

Disaster Bay is a high-energy coastal environment with strong currents, periodic upwelling, and low rates of water residence time. These factors significantly dilute and disperse any potential biological loading and prevent the accumulation of biofouling or waste material. The conditions are inhospitable to the accumulation of pathogens and do not support stagnant waterborne disease transmission pathways.

Biosecurity and Hatchery

The Eden-1 Kelp Aquaculture Farm adopts stringent biosecurity protocols and hatchery management practices to prevent the introduction or proliferation of diseases, maintain genetic integrity, and ensure that only healthy, local-origin *Ecklonia radiata* stock is cultivated. These practices are essential in protecting both cultured and wild marine flora and fauna, and are aligned with national and international standards for aquatic biosecurity.

Genetic Origin

- All sori (reproductive tissue) used for propagation are sourced exclusively from wild *Ecklonia radiata* individuals within Disaster Bay.
- A minimum of 12 genetically distinct donor individuals are used per batch to maintain genetic diversity. Different plants are cross bred (as would naturally occur in the wild) to determine which combinations are most tolerant to stress and warmer ocean temperatures. Seeded kelp lines tested in Disaster Bay have so far proven to be generally tolerant to higher-than-normal ocean temperatures.
- Spore cultures are never imported from outside the region, and no non-native macroalgal species are cultivated.

Hygiene and Containment

- Hatchery activities take place in a closed, recirculating seawater system equipped with filtration and sterilisation to reduce microbial contamination risks.
- Surfaces, culture containers, and handling equipment are regularly disinfected using food-grade, marine-safe biocides between batches.
- Water sources are filtered before use in cultivation systems.
- Staff follow clean-zone entry protocols and hand disinfection to prevent cross-contamination.

Visual Health Screening

- Each sorus, gametophyte and sporophyte specimen is examined under dissecting microscopes for signs of epiphytic overgrowth, fungal lesions, bleaching, or unusual morphology.
- Any specimen showing signs of stress or disease is excluded from cultivation.
- Propagation tanks are monitored for signs of bacterial or fungal contamination, algal overgrowth, or abnormal spore development.

Traceability

Every batch of cultivated kelp is tagged with a unique identifier that tracks its:

- Parent tissue source.
- Date of collection.
- Deployment location.
- This traceability allows for batch recall, monitoring of growth performance, and identification of any issues that may arise in the field.

Biofouling

- All lines are manually cleaned on a scheduled basis to reduce fouling and associated pathogen risks.

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- Vertical culture lines with no kelp growth are removed before summer, when fouling risks are highest, ensuring minimal build-up of bio-organisms on ropes such as mussels or tunicates.
- Ropes with biofouling debris that are unfit for ongoing ocean operations will be disposed of onshore at an appropriate waste treatment facility.

Wild Replenishment and Genetic Monitoring

- Wild sori collection is repeated annually to maintain genetic variation and avoid any long-term drift in cultured stock.

These above measures, applied rigorously, ensure that the Eden-1 kelp hatchery and cultivation system operates within a closed-loop biosecurity model, substantially minimising the risk of pathogen transfer, genetic erosion, or marine pest introduction. The Project has committed to adaptive management, meaning that biosecurity protocols will evolve as new threats, technologies, or research findings emerge.

Benthic Environment

There is no identified disease risk to the benthic environment associated with kelp aquaculture; rather, kelp is widely recognised as an important component of healthy benthic–pelagic ecosystems. Kelp cultivation does not involve the introduction of pathogens, feed, antibiotics, or chemical inputs, and therefore does not create pathways for disease transmission to sediments or benthic fauna (Buschmann et al., 2008; Buschmann et al., 2017). As a photosynthetic macroalga, kelp enhances benthic conditions indirectly by improving water quality, increasing dissolved oxygen, stabilising nutrient cycling, and contributing organic matter to benthic food webs in a diffuse and natural manner (Campbell et al., 2019; Duarte et al., 2017). Scientific studies demonstrate that the loss of natural kelp forests leads to reduced benthic biodiversity and ecosystem function, while the maintenance or restoration of kelp structure supports benthic resilience rather than degradation (Vergés et al., 2016). Accordingly, kelp aquaculture is considered ecologically benign to beneficial for benthic environments, particularly in soft-sediment systems where baseline habitat complexity is low and ecological function is limited.

Algal Blooms

Since March 2025, South Australia's coastal waters have been experiencing an unprecedented harmful algal bloom (HAB) caused by dinoflagellate algal species in the genus *Karenia* (initially being *Karenia mikimotoi*, then reported to include *Karenia cristata*). The bloom reportedly affected 4,400 km^2 of ocean by October 2025 and up to 20,000 km^2 of South Australin waters by March 2026. *Karenia cristata* is reported to produce brevetoxins, a potent neurotoxin that impairs respiratory and neurological function, which has subsequently led to mass marine die-offs, including fish, dolphins, seals, sharks, rays, crustaceans, and sea dragons. The bloom's proliferation is attributed to elevated sea temperatures, calm weather conditions and nutrient-rich waters, resulting in oxygen depletion and the subsequent release of toxins that disrupt marine ecosystems (EPA SA, 2025; FRDC, 2025; CSIRO, 2026).

Kelp aquaculture presents a promising nature-based solution to potentially mitigate such environmental crises. Kelp species such as *Ecklonia radiata* are highly efficient at absorbing excess nutrients, particularly nitrogen and phosphorus, from the water column. By assimilating these nutrients, kelp cultivation can potentially reduce the likelihood of eutrophication—a primary driver of HABs. Additionally, kelp farming enhances water clarity and oxygenation, creating a more balanced marine environment. Studies have demonstrated that integrating kelp cultivation in eutrophic coastal areas can significantly improve water quality and regulate phytoplankton communities, thereby diminishing the frequency and intensity of algal blooms (Zhou et al., 2020; Zhang et al., 2019).

Historical Incidents

There are no known cases globally where kelp aquaculture has resulted in disease transfer to wild marine flora or fauna. This includes over 50 years of continuous kelp farming in regions like Norway, China, Japan, Korea, and Chile. The absence of precedent underpins the low inherent risk of disease emergence in kelp-based aquaculture systems. The rare occurrences of thallus bleaching or tissue necrosis reported in parts of China and Korea (e.g. *Saccharina japonica*) were attributed to environmental stress, such as elevated sea surface

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temperatures or nutrient depletion—not contagious pathogens. These events were self-limiting and geographically contained.

Summary of Factors:

- Local sourcing of wild sori from Disaster Bay.
- Mixed culture practices to avoid monoculture vulnerability.
- No feed, fertiliser, antibiotics, or faecal-producing livestock, eliminating waste-related disease vectors.
- High-energy, well-flushed site conditions that prevent stagnation or bioaccumulation of disease agents.
- Regular biofouling and marine pest removal. Visual inspections, line rotation, and cleaning protocols ensures farm does not serve as a vector for pest colonisation or pathogenic growth.

Additional References

- NSW DPI (2021) – NSW Aquaculture Management Guidelines – Seaweed
- NSW Government (2015) – Biosecurity Act 2015 (No. 24)
- NSW DPI (2017) – Biosecurity Strategy for NSW Aquatic Industries 2017–2021
- Fisheries Research and Development Corporation (FRDC, 2020) – Aquatic Biosecurity
- NSW Seaweed Prospectus (2024)

Conclusion

The Eden-1 Kelp Aquaculture Farm poses negligible risk to the genetic integrity of wild kelp populations or the introduction and spread of disease or marine pests. It utilises native seedstock, applies strict hatchery and hygiene and biosecurity controls, and operates in a high-energy offshore environment. There are no known global cases of kelp farms transferring disease to wild species, land-based ecosystems, or acting as hosts for invasive pests when operated under such standards.

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9.4.3 Artificial Lights

Risk Table 17: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue –impacts of artificial lights on light sensitive species (modified from Fletcher et al., 2004; Vom Berg, 2008).

Issue	Will the installation of at least four navigation lights on the corners of the Kelp Aquaculture Farm and the use of service vessel lights have a significant impact on any light sensitive species, notably seabirds?			
Comments for consideration	• What type of navigational lights will be installed to mark out the boundary of the leases? • Will the service vessels be operating at night and coming in close proximity to nesting seabird habitat? • Is the lighting or illumination likely to have any impact on any light sensitive species?			
Description	• Possible light sensitive species o Australasian gannet o Hooded plovers o Little penguins (although no breeding colony has been identified) o Wedge-tailed shearwaters o White bellied sea eagle • Four navigation lights on corners of leases o Range ≥ 4 nautical miles o Flashing o Vertical divergence ≥ 9 degrees			
Proposed Management – Mitigation and Monitoring	• Site selection • Hours of farm operation = predominately daylight • Navigation marker lights = low intensity flashing white strobe lights with a low profile • Vessel lights – shielded and concentrated downwards • Compliance with National Light Pollution Guidelines for Wildlife			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	0	1	0	Negligible

Justification of Ranking

The risk of artificial lighting associated with the Eden-1 Kelp Aquaculture Farm navigation having a significant impact on seabirds and other light-sensitive species has been assessed as negligible. This conclusion is based on the farm's offshore location, limited and low-intensity lighting use, and a lack of nearby seabird breeding colonies, combined with best-practice lighting mitigation protocols. The ranking also reflects the temporary and emergency-only nature of night-time operations, minimising consistent exposure.

Overview

Disaster Bay, located on the far south coast of New South Wales, is a remote and largely undeveloped coastal region supporting a diverse array of seabird species. Notably, burrow-nesting seabirds like short-tailed shearwaters (*Ardenna tenuirostris*) and various petrel species are prevalent in this area. These birds are nocturnal and rely on natural light cues for navigation, making them particularly vulnerable to artificial light sources.

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Artificial lighting, such as that from navigational markers and service vessels, can potentially affect some species of seabirds by causing disorientation and stress, particularly during nocturnal navigation or when returning to nesting sites. While the specific response of many seabird species to artificial lighting remains under-researched, there is scientific consensus that some seabirds—especially those with nocturnal habits or that forage at night—are more susceptible to light pollution.

Affected Species

While Disaster Bay has no recorded colonies of little penguins (*Eudyptula minor*), they have been observed in the bay. Small populations of seabirds such as short-tailed shearwaters (Ardenna tenuirostris), sooty oystercatchers (*Haematopus fuliginosus*), and potentially migratory species such as wedge-tailed shearwaters (*Puffinus pacificus*) have been recorded in the wider region. The region is remote and largely undeveloped, with limited artificial lighting currently present due to the absence of nearby towns or infrastructure. Other species potentially present include the hooded plover (*Thinornis cucullatus*), Australasian gannet (*Morus serrator*), and white-bellied sea eagle (*Haliaeetus leucogaster*). These species are generally diurnal or less sensitive to low-intensity, intermittent marine lighting.

Lighting Specifications and Mitigation Measures

- Navigation Lights: The Eden-1 Project will install at least four flashing white navigation strobe lights, mounted on low-profile buoys at the corners of the lease area.
- These flashing lights have a minimum range of 4 nautical miles under clear atmospheric conditions.
- Conform to IALA (2008) standards for cardinal markers, including a flash sequence, light range and vertical divergence of ≥ 9 degrees.
- Are flashing rather than fixed, reducing the likelihood of attracting or disorienting seabirds compared to constant or red-light sources.

Service Vessel Lighting:

- Operations are primarily restricted to daylight hours.
- Night operations will only occur under emergency circumstances.
- Vessel lighting will include only the standard navigational lights and shielded deck lighting directed downward, reducing light spillover and upward illumination.

Compliance with National Guidelines

The lighting design and operational protocols for the Eden-1 Kelp Aquaculture Farm align with the National Light Pollution Guidelines for Wildlife, which provide a framework for assessing and managing the light pollution impacts on protected wildlife, including seabirds. These guidelines recommend minimising artificial light exposure to sensitive species by using low intensity, shielded, and appropriately coloured lighting, and by limiting light usage to necessary periods.

Conclusion

Considering the offshore location of the Kelp Aquaculture Farm (more than 1.1 km from shore at the closet point), the absence of sensitive breeding bird colonies in proximity, and the restricted use of lighting, the risk of adverse light-related effects on seabirds is assessed to be 'negligible'. Mitigation measures including the use of downward-directed lights and flashing corner beacons, further reduce this risk. Continued adherence to best practices and national guidelines will ensure minimal impact on the local seabird populations.

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9.4.4 Entanglement and Ingestion of Marine Debris

Risk Table 18: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – entanglement and ingestion of marine debris (modified from NOAA Fisheries – Entanglement of Marine Life, 2025; National Guidance on the Management of Whale and Dolphin Incidents in Australian Waters 2013; and, Fletcher et al., 2004; Vom Berg, 2008).

Issue	Will the Kelp Aquaculture Farm have a significant impact on the occurrence of entanglements and ingestion of marine debris?			
Comments for consideration	• Is the longline infrastructure likely to result in entanglements of marine fauna? • What species are susceptible to entanglements based on findings from other longline farms in Australian waters? • Will the facility increase the risk of marine fauna ingesting marine debris i.e. will it release any solid waste into the environment? • How will entanglements be mitigated, monitored and managed? • How will an entanglement be dealt with if it occurs e.g. emergency response team? • How will lines be kept taught constantly to ensure the risk of entanglements is minimised?			
Description	• Key Threatening Process = Entanglement and ingestion of marine debris • Backbone, culture, mooring and seed lines = potential entanglement • Infrastructure and operational activities could generate marine debris if not mitigated and managed			
Proposed Management – Mitigation and Monitoring	• Longline design features - minimise entanglement risk o Thick diameter ropes and lines (25-35 mm diameter) • Approved Marine Fauna Interaction Management Plan o Marine Fauna Entanglement Avoidance Protocol • Approved Monitoring and Maintenance Program o All ropes and lines will be kept taut (taut rope policy) • Approved Waste Management Plan			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	4	4	Low

** Risk Ranking has been elevated to ensure increased monitoring and management oversight.*

Justification of Ranking

The Key Threatening Process (KTP) - entanglement and ingestion of marine debris, which is listed under the Biodiversity Conservation Act 2016 (NSW) and the Environment Protection and Biodiversity Conservation Act 1999, is the relevant legislation that applies to the assessment of Kelp Aquaculture Farms in NSW waters.

Entanglement refers to the process in which wild fauna becomes caught in the physical structures of aquaculture facilities (McCord et al., 2008). Marine debris refers to plastics, packaging materials, fishing gear, nets, ropes, lines or buoys, and items from ship waste, the seafood industry, recreational activities and both rural and urban discharges into rivers, estuaries and coastal areas that can be ingested by marine creatures with detrimental effects. Marine animals can become entangled in or ingest anthropogenic debris which can lead to a range of lethal and sub-lethal effects, such as reduced reproductive success, fitness, ability to catch

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prey and avoid predators, strangulation, poisoning by polychlorinated biphenyls, infections, blockages, increased drag, perforations and loss of limbs. A range of marine fauna are vulnerable to entanglement in aquaculture infrastructure and ingesting marine debris, including whales, dolphins, seals, sharks, teleosts, marine turtles and seabirds.

Whales

A range of whale species are known to be located in the coastal waters of southern NSW, particularly in and around Disaster Bay, including humpback whales (*Megaptera novaeangliae*) and endangered Southern Right whales (*Eubalaena australis*). These species often swim close to the coast and rest in embayments (Allen & Bejder, 2008). Humpback whales migrate along the east coast of Australia from May-December each year, with numbers increasing steadily over the last number of decades. Southern Right whales are generally found in protected, shallow coastal waters from May-October when they calve and nurse their young. The eastern population is small (around 300 individuals) and numbers are still well below estimated historic abundance (Smith et al. 2022). While formal surveys have not been undertaken in Disaster Bay, observational data indicates this area is adjacent to their migration route and may serve as resting habitat.

The longline infrastructure of the Commercial Kelp Aquaculture Farm may potentially impact resting habitat availability and pose an entanglement hazard. However, taut rope systems (where ropes are kept tensioned to reduce slack) with thick, high-visibility lines (25–35 mm diameter) significantly reduce this risk (Baker, 2005). Entanglement of large whales is historically very rare in similar aquaculture operations. In over 30 years of longline aquaculture in NSW (e.g., Twofold Bay, Jervis Bay and Port Stephens Bay), there are no recorded entanglement incidents. The only known fatality was in August 1996, a Bryde's whale (*Balaenoptera edeni*) was found dead entangled in a mussel spat catching line at Great Barrier Island, New Zealand. The line was wrapped around the whale's jaw and body. This incident was documented by the New Zealand Department of Conservation in a 2003 report by Brian D. Lloyd, highlighting the potential risks of aquaculture infrastructure to marine mammals. Spat lines, used in mussel farming to collect juvenile mussels, are typically looped along the mainline creating a sling that can contribute to entanglement for large marine animals like whales. The 1996 incident underscores the importance of designing aquaculture equipment that minimises hazards to marine wildlife.

Prior to the introduction of mussel farming in Twofold Bay in the 1990s, the threat of marine fauna entanglement was reviewed and assessed to be low (Pacific Seafood Management Consulting Group, 1996). Similarly, no whale entanglements have been recorded in WA's extensive pearl aquaculture operations, despite their proximity to humpback whale calving areas (NSW DPI, 2005). In WA, whale entanglements have been known to occur with fine ropes used in the West Coast Rock Lobster Fishery traps, however no recorded entanglements have been recorded due to taught aquaculture lines (Campbell, 2011).

Overview of Whale Entanglement and Taut-Line Aquaculture Systems

Globally, there is no documented evidence of whale entanglement in kelp farming operations or other taut-line aquaculture systems. This stands in contrast to fisheries – particularly when using free-floating, fine-gauge ropes, nets and longlines. Kelp farms typically employ taut, thick, high-visibility lines that are anchored (block or screw anchored) to the seafloor and tensioned through buoyancy systems—design features specifically intended to minimise slack and therefore reduce the risk of entanglement. According to the World Wildlife Fund, maintaining taut and visible lines is a standard best practice that mitigates risk to marine megafauna such as whales WWF Seaweed Farming Guide.

A 2021 environmental review by the National Marine Fisheries Service (NMFS) in the United States found no recorded incidents of whale entanglements in existing kelp aquaculture projects worldwide, including during the assessment of a proposed kelp farm at Vashon Island, Washington (Brown, 2023).

Despite this strong safety record, insights from more entanglement-prone industries provide valuable lessons. The Western Rock Lobster (WRL) industry in Western Australia, which uses fine, long, untensioned lines attached to traps, has experienced entanglement incidents involving humpback whales. In 2020, the first known case of a deceased whale washed ashore entangled in WRL gear, triggering public concern and scrutiny. Prior to this, several high-risk whale rescues had been required. Such operations are hazardous—

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having led to the death of responders in Canada and New Zealand—but they also pose a reputational threat to the industry by eroding social license to operate.

Recognising this, WRL authorities launched a structured mitigation research program to reduce entanglement risk, improve gear design, and enhance the industry's long-term sustainability. Crucially, they also committed to broad public dissemination of outcomes, reinforcing transparency and community trust when incidents do occur.

Kelp farms, by contrast, are lower risk due to their taught mainline infrastructure and overall operating context. Nevertheless, best practice recommendations include:

- Highly visible, thick ropes (typically 25–35 mm in diameter)
- No netting or fine lines used
- Midwater dropper lines, maintaining at >10 m clearance from the seabed
- Mainline spacing of 10–20 m to allow navigation by large animals
- Routine inspections
- Post-storm servicing to ensure structural integrity
- Placement of farms away from critical calving, migration or aggregation zones

Whale entanglement in kelp aquaculture remains extraordinarily rare, with no recorded incidents globally to date. However, the consequences of even a single high-profile entanglement—such as loss of life– could pose significant risks to social license, as demonstrated in the WRL fishery. For this reason, maintaining best practices, not looping dropper ropes, conducting ongoing monitoring and independent reviews, the strict adherence to both a Monitoring and Maintenance Plan and Marine Fauna Interaction Plan and openly communicating risk mitigation efforts are essential for the kelp industry to remain both environmentally responsible and socially resilient as it scales.

Dolphins

Disaster Bay encompasses a diverse range of marine habitats, including open ocean, rocky reefs, and estuarine environments. These habitats are conducive to supporting various marine mammal species, including dolphins which are known to frequent the bay from time-to-time. Entanglement of dolphins in kelp farming infrastructure is considered negligible due to the nature of kelp farm infrastructure, which uses thick, taut, and non-looping lines suspended vertically in the water column without netting or slack that could trap marine fauna.

According to the Marine Mammal Protected Areas Task Force, the southern coast of New South Wales, including areas around Eden and Disaster Bay, supports a variety of species which includes common bottlenose dolphins (*Tursiops truncatus*) and Indo-Pacific bottlenose dolphins (*Tursiops aduncus*), which are known to inhabit coastal and estuarine waters along the NSW coastline.

Seals

Australian and New Zealand fur seals are present all year round in Disaster Bay. Entanglement is considered very low due to the nature of kelp farm infrastructure, which uses thick, taut, and non-looping lines suspended vertically in the water column without netting or slack that could trap marine fauna.

While seals—particularly curious juveniles—may interact with aquaculture structures, the design and regular maintenance of kelp lines significantly mitigate the potential for entanglement. Longline aquaculture systems have operated in Australian waters, including areas frequented by Australian and New Zealand fur seals, for decades without recorded seal entanglement incidents. Proper infrastructure tensioning, secure attachment of seeding lines and strict biofouling control further minimise risks. Therefore, based on existing operational history and best-practice mitigation, seal entanglement in kelp lines is highly unlikely (Price CS, Keane E, Morin D, Vaccaro C, Bean D, Morris JA. 2017).

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Teleosts, Rays and Sharks

Over 200 species of teleosts, rays and sharks inhabit NSW coastal waters. While there is no specific comprehensive inventory detailing the exact number of bony fish species (teleosts) in Disaster Bay, the region's marine biodiversity suggests a diverse assemblage of bony fishes. Disaster Bay encompasses a variety of marine habitats, including some rocky nearshore reefs, some kelp beds and an expansive sandy bottoms to a depth of approximately 40 meters. These habitats support numerous marine species, including Snapper (*Pagrus auratus*), Yellowfin Bream (*Acanthopagrus australis*), Tarwhine (*Rhabdosargus sarba*), Luderick (*Girella tricuspidata*), Spotted Pipefish (*Stigmatopora argus*), Bridled Leatherjacket (*Acanthaluteres spilomelanurus*), Sailfin Goby (*Nesogobius pulchellus*) and Weed Whiting (*Neoodax balteatus*). More than 100 fish species live in the subtidal sand-dominated habitats in Southern NSW, including several species of Mullet, Whiting and Flathead. Drift algal habitat is dominated by Weed Whiting (*Neoodax balteatus*), Crested Weedfish (*Cristiceps australis*) and Woods Siphonfish (*Siphamia cephalotes*). Sprats (*Hyperlophus vittatus* and *Sardinops neopilchardus*), Anchovies (*Engraulis australis*), Silversides (*Atherinason hepsetoides, Atherinosoma presbyteroides*), Mullet *(Myxus elongates*) and Sand Whiting (*Sillago ciliata*) are the most abundant species in areas of sandy beach habitat such as Disaster Bay.

Ray species in the Disaster Bay region belong to three families; (1) stingrays (Family *Dasyatididae*) e.g. Smooth Stingray (*Dasyatis brevicaudata*); (2) stingarees (Family *Urolophidae*) e.g. Common Stingaree (*Trygonoptera testacea*) and (3) skates (Family *Rajidae*). Many of these species are temporary residents and move over large areas but some species e.g. Common Stingaree are considered to be permanent residents inhabiting deep sandy areas (NSW MP, 2008).

Shark species possibly found within Disaster Bay include Gummy Sharks (*Mustelus antarcticus*), Spotted Wobbegongs (*Orectolobus. maculatus*), Grey Nurse Sharks (*Carcharias taurus*), Port Jackson Sharks (*Heterodontus portusjacksoni*), Angel Sharks (Squatina australis), Bronze Whalers (*Carcharhinus brachyurus*), Hammerheads (*Sphyrna spp.*), Mako Sharks (*Isurus oxyrinchus*) and White Sharks (*Carcharodon carcharias*).

There is limited information pertaining to entanglement interactions with mariculture infrastructure and teleosts, rays and sharks. However, there is little evidence to suggest that entanglement in longline infrastructure is an issue of concern, particularly for teleosts and rays due to their small size, the absence of netting and loose lines and the thick unlooped diameter ropes that will be used. Of particular conservation importance is the critically endangered grey nurse shark, which may use Disaster Bay as a foraging ground. Grey nurse sharks (*Carcharias taurus*) are critically endangered along Australia's east coast, with an estimated population of approximately 1,500 individuals. They inhabit temperate coastal waters, favouring habitats such as deep sandy-bottomed gutters, rocky caves, and inshore reefs, typically at depths ranging from 15 up to 190 meters. While there is no specific documentation of grey nurse shark sightings in Disaster Bay, the potential exists. Notably, Montague Island, located 290 km north of Disaster Bay, is recognised as a critical habitat for grey nurse sharks. These sharks exhibit migratory behaviour along the New South Wales coast, moving between various aggregation sites throughout the year. Grey nurse sharks are usually observed in the summer-autumn months. Critical habitat zones for grey nurse sharks typically consist of rocky reefs and islands surrounded by sandy-bottomed gutters and rocky submarine caves extending to a depth of 190 m. During the day this species can be observed hovering or slowly swimming around high relief reefs, while at night they become more active and hunt over soft substrata and rocky reefs (Smale, 2005).

The potential risk of entanglement of sharks in longline infrastructure while foraging in the area will be mitigated by implementing a range of mitigation measures e.g. taut ropes, thick diameter lines, heavy culture lines and regular inspections and maintenance.

Marine Turtles

In NSW there are resident groups of green turtles (*Chelonia mydas*), loggerhead turtles (*Caretta caretta*) and hawksbill turtles (*Eretmochelys imbricata*) while leatherback (*Dermochelys coriacea*) and flatback turtles (*Natator depressus*) are occasionally sighted (Environment Australia, 2003). Most of these species are vagrants which are thought to use the warm waters of the Eastern Australian Current each summer to disperse southward. The NSW marine turtle populations are at the southern limits of the species known distribution and

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outside the limits of the normal breeding ranges (Cogger, 2003). According to Environment Australia (2003), there is no available evidence to suggest any turtle mortalities from aquaculture activities. There are concerns about the potential of ingestion of marine debris associated with any human activities in NSW waters. Direct interaction between turtles and longline infrastructure is considered unlikely but turtles are highly vulnerable to marine debris (Marine Pollution Research, 2008). However, there are no recorded turtle entanglements in longline aquaculture operations. Risks will be mitigated through a Waste Management Plan and proper infrastructure maintenance, as detailed in the Monitoring and Maintenance Plan.

Seabirds

There are a range of resident and migratory seabird and shorebird species that inhabit the coastal waters and intertidal zone in Southern NSW, including cormorants, pelicans, penguins, shearwaters, giant-petrels, storm-petrels, terns, gannets, darters, gulls, albatrosses, sea eagles, ospreys, herons, egrets, oystercatchers, plovers, sandpipers, curlews and godwits.

Little penguins (*Eudyptula minor*), also known as fairy penguins, are present in the region surrounding Disaster Bay. While there is no documented breeding colony within Disaster Bay itself, nearby areas such as Twofold Bay and Montague Island host established colonies. In Eden, adjacent to Disaster Bay, conservation efforts are underway to protect and re-establish little penguin populations. The "Little Penguins of Eden" group, supported by the Eden Community Access Centre, aims to protect these seabirds in Twofold Bay and has plans to establish a new colony at Wheel Cove, Eagles Claw, Middle Head.

Baranguba / Montague Island, located 150 km north of Disaster Bay, is home to one of the larger NSW colonies of little penguins. (Little penguin numbers are currently being assessed - final numbers to be released in 2026). While direct sightings of little penguins in Disaster Bay are less common, the proximity to these colonies suggests that penguins may forage in the bay's waters. However, without specific studies or surveys in Disaster Bay, their presence remains speculative. Penguins are prone to entanglement of discarded fishing line and nets made of fine filament. However, fairy penguins are not at risk of becoming entangled in ropes of a diameter greater than 20 mm, especially as they feed underwater by sight during daylight hours (Pacific Seafood Management Consulting Group, 1996).

Seabirds could potentially be vulnerable to accidental collision with the longline infrastructure when aerial diving for schooling fish within the longline farms. There is also a potential risk of ingestion of marine debris, as well as a risk of entanglement of diving birds in loose culture lines (Marine Pollution Research, 2008). These risks however, will be mitigated on Kelp Aquaculture Leases by appropriate infrastructure design and maintenance (e.g. taut lines) and the implementation of a Waste Management Plan. In addition, many seabird species may take advantage of the longline buoys as temporary roosting sites while foraging (Marine Pollution Research, 2008).

Mitigation Measures

The following mitigation measures will be implemented to minimise the risk of entanglement and ingestion of marine debris to marine fauna:

- Utilisation of longline design features and operational practices that minimise the risk of the entanglement of marine fauna including:
- highly visible, thick, rigid ropes and anchor lines (Hoagland et al., 1998) (e.g.25-35 mm diameter);
- culture lines will not extend for the full depth of water below the longline backbone.

<u>Implementation of Monitoring and Maintenance Plan, including:</u>

- keep all warp lines tightly tensioned (taut rope policy) (Hoagland et al.,1998) so if marine fauna do encounter the infrastructure there is no slackness within the lines to enable entanglements;
- regular inspections, maintenance and repair of longline infrastructure to maintain structural integrity and minimise the occurrence of marine debris (Hoagland et al., 1998), particularly after severe weather;

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- at least bi-annual (twice per year) servicing of longline infrastructure including screw anchors, chains and mooring ropes;
- ensuring lines and culture apparatus are positioned correctly in the water column by monitoring the number of buoys comparative to the weight of the stock on each longline; and
- regular removal of biofouling and sediment to assist with the maintenance of the structural integrity of the longline infrastructure.

Implementation of the Waste Management Plan, including:

- obsolete infrastructure (e.g. worn ropes) and domestic garbage will be secured in storage bins on vessels which will have tightly fitted lids. All waste will be disposed of at an approved land based facility;
- all gear that can be marked (e.g. buoys) will be labelled uniquely to identify it as the property of the lease operator/s in the unlikely event that components were to break free;
- regular cleaning of biofouling and sediment to reduce the amount of potential food available which may attract marine fauna e.g. turtles; and
- implementation of the Marine Fauna Interaction Plan which will involve the monitoring and recording of marine fauna interactions with the longlines, vessels and/or humans during the operational stage. Sightings will be recorded in an appropriate format to ensure that data collected over time is relevant, comparable and consistent.

Implementation of the Marine Fauna Interaction Plan which will include:

- a response plan (including MPA, DCCEEW and DPIRD Fisheries NSW staff) for entanglement incidences including procedures to be followed, training and equipment required and reporting incidents;
- a formal commitment from the operator/s to respond to marine mammal entanglements on the leases, including promptly notifying relevant authorities and/or personnel, maintaining an observer on site to assist with communication until authorised rescue teams arrive and providing logistical assistance if needed e.g. use of vessels;
- employees will be trained in the reporting and handling of injured or entangled fauna where appropriate;
- a training/reference manual will be prepared and kept on service vessels to provide initial guidance for fauna handling and First Aid (Umwelt, 2003); and
- the implementation and effectiveness of the mitigation measures will be monitored and if deemed inadequate, modifications will be required until there is no significant risk of entanglement and marine debris pollution.

Summary of Mitigation Measures, as follows:

Longline design and practices that reduce entanglement risks:

- Abide by structural integrity detailed in the Monitoring and Maintenance Plan
- Thick (25–35 mm), high-visibility, taut ropes
- Midwater deployment of culture lines (4–5 m from seabed)
- No netting or looped lines used in culture infrastructure
- Backbone deployment to avoid peak whale migration
- Regular inspections, especially post-storm
- Annual servicing of all infrastructure
- Proper line positioning using buoyancy checks

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- Biofouling and sediment removal

Entanglement Plan

- Abide by approved Marine Fauna Interaction Plan:
- Standardised logging of fauna sightings and interactions
- Monitoring data used to refine mitigation practices
- Marine Fauna Entanglement Plan – Incident Response section (attached as Appendix B1):
- Emergency response plan
- On-site observer presence
- Immediate notification of authorities
- Staff trained in handling/reporting procedures
- Onboard training manuals and first-aid guides

Waste Management Plan:

- Secure onboard waste storage
- Disposal at approved land-based sites
- Marking of all gear for traceability
- Routine debris removal

EPBC – Not A Controlled Action

The Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW), has determined that the proposed Kelp Aquaculture Farm known as the Eden-1 Golden Kelp Farm, located offshore in Disaster Bay, has received formal approval under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). In a notification dated 20 June 2025, DCCEEW confirmed that the proposed action by Auskelp Pty Ltd to construct and operate a 200-hectare ocean-based kelp aquaculture farm is not a controlled action (EPBC 2025/10149). The decision, made under Section 75 of the Act, confirms that the Project is unlikely to have a significant impact on any matters of national environmental significance protected under Chapter 2 of the legislation. It is important to note; this determination applies solely to Commonwealth matters and does not remove the requirement for separate state or local government approvals under relevant legislation.

Conclusion

Longline aquaculture has been practiced in Twofold Bay, Jervis Bay and Port Stephens for almost four decades without entanglement or ingestion related incidents. Globally, longline kelp farming infrastructure spans many thousands of hectares with no documented cases of mammal entanglement. For the Eden-1 Kelp Aquaculture Farm, the risk of marine fauna entanglement or ingestion of debris has been assessed as low, based on the farm's taut-line design and implementation of key safeguards including the Marine Fauna Interaction Management Plan, Entanglement Avoidance Protocol, and Waste Management Plan. Compared to other marine activities—such as commercial fishing, netting, ghost gear, and widespread marine plastic pollution—kelp farming presents a significantly lower risk to marine life. Even so, a precautionary approach has been adopted with monitoring and adaptive management focus until long-term operational data from Disaster Bay validates the low-impact nature of this activity.

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9.4.5 Vessel Strike and Acoustic Pollution

Risk Table 19: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – vessel strike and acoustic pollution (modified from Fletcher et al., 2004; Vom Berg, 2008; Laist et al., 2001 and Van Waerebeek & Leaper, 2008).

Issue	Will the operation of the Kelp Aquaculture Farm have a significant impact on the occurrence of vessel strikes and/or the level of acoustic pollution on fauna?			
Comments for consideration	• Will there be an increased risk of vessel strikes to marine fauna due to marine vessel traffic associated with daily operations and maintenance of the facilities? • Is there an increased risk of vessel strikes during longline setup in Disaster Bay? • Will observers need to be employed to reduce the risk of vessel strikes? • Is the noise generated by vessel movement and associated activities likely to disturb any species of marine fauna?			
Description	• Marine vessel movements associated with operations o 0–2 return trips per day (Disaster Bay) • Disaster Bay daily marine traffic o Less than 10 vessel movements per day			
Proposed Management – Mitigation and Monitoring	• Adhere to Observer Protocol detailed in Auskelp Marine Fauna Interaction Plan 2025 (attached a Appendix B1) • Maintain regulated distances from marine fauna • Farm construction to avoid migration season • Daylight hours operation only • Adhere to NSW Government fauna approach guidelines and speed limits • Slow down in sensitive areas or during migration periods (June-November) • Hours of operation = predominately daylight • Vessel motors – well maintained			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	1	1	Low

Justification of Ranking

The risk associated with the Eden-1 Kelp Aquaculture Farm contributing to vessel strikes or significant acoustic pollution has been assessed as low. This assessment is based on vessel movement frequency, vessel type and speed, operational timing, regional vessel context, and the implementation of formal mitigation measures detailed in the Auskelp Marine Fauna Action Plan 2025.

Disaster Bay, on the far south coast of New South Wales, is a relatively remote and lightly trafficked marine environment. Unlike Twofold Bay 25 km to the north, which accommodates commercial shipping (e.g. woodchip exports, tugboats, ocean liners, and naval vessels) and supports mussel aquaculture, Disaster Bay sees only occasional use by recreational fishing boats, jet skis, commercial fishing boats, abalone/sea urchin divers, and commercial dive boats. The Wonboyn Lake entrance provides limited access for smaller boats and jet skis only due to its shallow and hazardous bar, and is infrequently used except by skilled local operators.

The Eden-1 kelp farming operation will involve 0–2 return trips per day, primarily for inspections and maintenance, with higher activity only during deployment and harvesting. Service vessels will typically

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operate during daylight hours and at low cruising speeds (less than 15 knots), reducing the risk of collisions with marine megafauna. Vessel motors will be well maintained, limiting underwater noise emissions.

It is acknowledged that vessel traffic will pass through areas known for whale migration, particularly between Eden and Disaster Bay with a culmination point near Green Cape Lighthouse, raising the need for added precautions in these areas. However, current research suggests that the overall risk of whale strikes in low-speed, low-traffic operations remains limited; Laist et al. (2001) and Van Waerebeek & Leaper (2008) note that the majority of confirmed whale strikes involve large, fast-moving vessels such as container ships or ferries. Small aquaculture vessels travelling at speeds under 10 knots pose negligible risk when proper observer protocols are in place.

Proposed Management Measures

- Limit operations to daylight hours except in emergencies.
- Maintain vessel speeds appropriate to environmental conditions and fauna sightings (≤ 25 knots in sensitive zones).
- Keep motors well serviced to reduce noise emissions.
- Adhere to NSW RMS speed limits and marine fauna approach guidelines.
- Adhere to Observer Protocol (See Auskelp Marine Fauna Action Plan 2025, attached as Appendix B1)
- Adjust course or speed if marine fauna is observed within proximity.
- Avoid farm construction during peak whale migration periods (June to November).

Timing and Location Management

- Avoid construction and infrastructure deployment during peak whale migration.
- Slow down in high conflict zones e.g. Green Cape point.

Conclusion

The Eden-1 Kelp Aquaculture Farm will result in a moderate increase in vessel movements within Disaster Bay; however, the vessel types used, small to medium service boats with outboard or inboard motors, are typical of those already operating in the region, particularly from nearby Twofold Bay. These vessels travel at low speeds, generally under 15 knots during operations, and their acoustic and physical profiles do not significantly differ from those of recreational fishing boats, dive charters, or existing commercial fishing vessels in the area. Given the remote nature of Disaster Bay and its low baseline activity, the increase is not expected to elevate the risk of vessel strikes on marine fauna or meaningfully elevate acoustic levels. Assessed in conjunction with higher vessel volumes operating in Twofold Bay—including commercial ships, cruise liners, and naval vessels—and with daylight-only operations and observer protocols, the residual risk of vessel strikes and acoustic disturbance is assessed to be 'low'. Continued monitoring and adaptive management will ensure that interactions with whales, dolphins, turtles, and seabirds remain minimal, while also supporting safe co-use of the bay by recreational and commercial stakeholders.

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9.4.6 Threatened/Protected Species and MNES

Risk Table 20: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – threatened/protected species and Matters of National Environmental Significance (modified from Fletcher et al., 2004; Vom Berg, 2008 McGovern et al. 2025).

Issue	Will the operation of the Kelp Aquaculture Farm have a significant impact on threatened species, protected species and/or matters of MNES?			
Comments for consideration	• Are any threatened or protected species likely to be impacted by the leases? • Are the leases going to disturb habitat of any threatened or protected species e.g. foraging, breeding, resting or migratory habitat? • Will the leases have a significant impact on matters of MNES and/or other protected matters listed under the EPBC Act? • What measures will be implemented to mitigate, monitor and manage potential impacts on threatened / protected species and matters of MNES? • Are there positive impacts of kelp farming?			

Description	• World Heritage Properties: None
	• National Heritage Places: None
	• Wetlands of International Importance (Ramsar): None
	• Great Barrier Reef Marine Park: None
	• Commonwealth Marine Area: None
	• Total Listed Threatened Ecological Communities: 3
	• Total Listed Threatened Species: 81
	• Total Listed Migratory Species: 51
	• Threatened and Protected Species Likely in Kelp Aquaculture Farm Area:
	  o Critically Endangered: 2
	  o Endangered: 12
	  o Vulnerable: 13
	  o Migratory: 7
	• Kelp faming reduces eutrophication (and may diminish algal blooms)			

Proposed Management – Mitigation and Monitoring	• NSW Biodiversity Conservation Act Search (attached as Appendix A7) • Protected Matters Search Tool - Commonwealth (attached as Appendix A7) • Marine Fauna Interaction Plan • Environmental Management Plan			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	2	2	Low

Justification of Ranking

The Eden-1 Kelp Aquaculture Farm has been assessed under the following legislation to determine its impact on threatened and protected species and MNES. Only threatened species that were known or considered likely to occur in Disaster Bay and/or known to utilise habitat in the region were considered further in an Assessment of Significance (Appendix A7 and A13). Hence, terrestrial species were excluded from the assessment as the proposed activity is marine based. Threatened marine and intertidal species were assessed according to the Threatened Species Assessment Guidelines. 'Protected' species do not require an

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Assessment of Significance, however some protected species were included if a risk pathway overlapped their respective habitat.

Commonwealth Legislation:

- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) – primary legislation protecting Matters of National Environmental Significance (MNES), including listed threatened and migratory species and ecological communities.
- Biosecurity Act 2015 (Commonwealth) – governs the management of risks from pests and diseases to human, animal, and environmental health.

New South Wales Legislation:

- Biodiversity Conservation Act 2016 (NSW) – provides for the protection and management of threatened species and ecological communities.
- Fisheries Management Act 1994 (NSW) – addresses the conservation of fish habitats and protection of aquatic biodiversity.
- Biosecurity Act 2015 (NSW) – imposes a general biosecurity duty on all individuals and businesses.
- Marine Estate Management Act 2014 (NSW) – provides for the integrated management of the marine estate.

2. Identified Threatened and Protected Species

Protected Matters searches and expert review have identified species within the Eden-1 lease area and surrounding Disaster Bay. This list of identified species has been broken down into respective groups against the potential impacts criteria – the categories being Fish, Cetaceans, Marine Mammals, Marine Turtles, and birds (both marine birds and shore birds).

Fish:

Identified species:

- Giant Manta Ray (*Mobula birostris*) – Vulnerable
- Grey Nurse Shark (*Carcharias taurus*) – Critically Endangered (NSW) / Endangered (Commonwealth)
- Shortfin Mako (*Isurus oxyrinchus*) – Migratory
- Whale Shark (*Rhincodon typus*) - Vulnerable
- White Shark (*Carcharodon carcharias*) – Vulnerable (Commonwealth)

Potential impacts on fish which could occur or be exacerbated by the proposed Kelp Aquaculture Farm were identified as:

- the potential to increase the impact of the key threatening process (KTP) of 'injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris' (Biodiversity Conservation Act 2016 (NSW) and EPBC Act 1999).
- the potential to alter food resources and behaviour (e.g. FAD);
- physical disturbance (e.g. noise);
- habitat modification and/or exclusion;
- pollution;
- change of distribution due to removal of potential habitat; and
- the potential to attract fish from Sanctuary Zones to the lease areas where they may be vulnerable to fishing activities.

The Assessments of Significance revealed the Kelp Aquaculture Farm is unlikely to have a significant impact on the species identified so Species Impact Statements were not conducted. Important breeding, feeding or

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resting areas are unlikely to be impacted by the proposed aquaculture activities and a range of mitigation measures will be implemented to manage potential risks.

Cetaceans:

Identified species:

- Blue Whale (*Balaenoptera musculus*) – Endangered
- Bottlenose Dolphin (*Tursiops aduncus*) – Protected
- Bryde's Whale (*Balaenoptera edeni*) - Migratory
- Common Dolphin (*Delphinus delphis*) – Protected
- Fin Whale (*Balaenoptera physalus*) – Endangered
- Humpback Whale (*Megaptera novaeangliae*) – Protected (NSW), Migratory
- Killer Whale, Orca (*Orcinus orca*) - Protected
- Pygmy Right Whale (*Caperea marginata*) - Migratory
- Southern Right Whale (*Eubalaena australis*) – Endangered

Potential impacts on Cetaceans which could occur or be exacerbated by the proposed Kelp Aquaculture Farm were identified as:

- increased risk of vessel strike;
- increased acoustic pollution;
- modification and/or exclusion from potential resting habitat; and
- the potential to increase the impact of the KTP of 'entanglement or ingestion of anthropogenic debris in marine and estuarine environments' (Biodiversity Conservation Act 2016 (NSW) and EPBC Act 1999).

Records confirm that both Southern Right whales (*Eubalaena australis*) and humpback whales (*Megaptera novaeangliae*) migrate through Disaster Bay during their annual movements between Antarctic feeding grounds and tropical breeding areas, typically from May to July (northward migration) and August to November (southward migration). While whale presence has been observed in Disaster Bay, usage is significantly less frequent than in nearby Twofold Bay. Scientific evidence provided by McGovern et al. (2025) documents the regular and concentrated use of Twofold Bay by migrating humpback whales. Although no direct comparative studies between the two bays currently exist, a synthesis of scientific literature, historical observations, and ecological features strongly supports the conclusion that Twofold Bay is more heavily used by cetaceans. Its sheltered, deep waters and high nutrient availability provide favourable resting and feeding conditions that are less pronounced in the more exposed and dynamic Disaster Bay environment.

Given this disparity, the Assessment of Significance determined that the Eden-1 Kelp Aquaculture Farm is unlikely to result in significant impacts on listed whale species or other marine megafauna. This conclusion is reinforced by the fact that Twofold Bay already supports heavy marine traffic, including large commercial vessels, cruise ships, and a 37.5-hectare mussel farming operation, without evidence of significant harm to whale populations. As such, no Species Impact Statements were deemed necessary. The proposed Eden-1 farm is located outside recognised breeding, feeding, or resting habitats for these species, and a suite of mitigation measures will be implemented to manage any potential risks.

Marine Mammals:

Identified species:

- Australian Fur Seal (*Arctocephalus pusillus doriferus*) – Protected.
- New Zealand Fur Seal (*Arctocephalus forsteri*) – Protected.

Potential issues which could occur or be exacerbated by the Kelp Aquaculture Farm on pinnipeds were identified as:

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- increased risk of vessel strike;
- increased acoustic pollution;
- reduced availability of foraging and/or resting habitat e.g. due to shading, sedimentation or exclusion; and
- the potential to increase the impact of the KTP of 'entanglement or ingestion of anthropogenic debris in marine and estuarine environments' (Biodiversity Conservation Act 2016 (NSW) and EPBC Act 1999).

Seals are opportunistic feeders with a diet consisting mainly of squid and small fish. Their foraging areas are extensive, and they are known to adapt to various marine environments. The New Zealand Ministry for Primary Industries conducted a review (MPI, 2021) on marine mammals' interactions with offshore aquaculture. The report noted that while fur seals may come into contact with aquaculture operations, the extent of negative effects, including fatal entanglements is minimal. The report emphasises the importance of informed siting of aquaculture facilities and the use of taut lines to minimise potential interactions. Although there are seal colonies present near Disaster Bay, particularly at Green Cape point, Kelp Aquaculture Farming is not considered to have a significant impact such that a Species Impact Statement would be required. This is due to current evidence, ongoing experience with mussel farming, and the use of taught line aquaculture systems.

Marine Turtles:

Identified species:

- Loggerhead (*Caretta caretta*) – Endangered
- Green (*Chelonia mydas*) – Vulnerable
- Leatherback (*Dermochelys coriacea*) – Endangered
- Hawksbill (*Eretmochelys imbricata*) – Critically Endangered

Potential issues which could occur or be exacerbated by Kelp Aquaculture Farming on turtles were identified as:

- increased risk of vessel strike;
- increased acoustic pollution;
- reduced availability of foraging and/or resting habitat e.g. due to shading, sedimentation or exclusion; and
- the potential to increase the impact of the KTP of 'entanglement or ingestion of anthropogenic debris in marine and estuarine environments' (Biodiversity Conservation Act 2016 (NSW) and EPBC Act 1999).

Marine turtle species are likely to occur in the widest study area. Kelp Aquaculture Farming is not considered to have a significant impact on marine turtles such that a Species Impact Statement would be necessary. This was mainly due to the absence of important nesting, mating or feeding areas in Disaster Bay, coupled with current evidence, ongoing experience with mussel farming, and the use of taught line aquaculture systems.

Birds:

Identified species:

A generic assessment was undertaken for bird species that use the same foraging techniques and/or habitat e.g. birds in the same species group such as albatrosses and shorebirds. Some bird species were excluded from the assessment due to their distribution being restricted to areas away from Disaster Bay (e.g. Lord Howe Island) or were non-existent in NSW, and this was cross referenced with other literature. The vulnerable, endangered, and migratory species located in Disaster Bay are as follows:

- Antipodean Albatross (*Diomedea antipodensis*) – Endangered
- Black-browed Albatross (*Thalassarche melanophris*) – Vulnerable
- Brown Skua (*Stercorarius antarcticus*) - Migratory

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- Buller's Albatross, Pacific Albatross (*Thalassarche bulleri*) – Vulnerable
- Flesh-footed Shearwater (*Ardenna carneipes*) – Vulnerable (NSW), Migratory
- Gould's Petrel, Australian Gould's Petrel (*Pterodroma leucoptera leucoptera*) - Endangered
- Indian Yellow-nosed Albatross (*Thalassarche carteri*) – Vulnerable
- Little Tern (*Sternula albifrons*) – Endangered (NSW), Migratory
- Northern Royal Albatross (*Diomedea sanfordi*) - Endangered
- Salvin's Albatross (*Thalassarche salvini*) – Vulnerable
- Shy Albatross (*Thalassarche cauta*) - Endangered
- Sooty Oystercatcher (*Haematopus fuliginosus*) – Protected
- Sooty Shearwater (*Ardenna grisea*) – Vulnerable
- Southern Giant-Petrel, Southern Giant Petrel (*Macronectes giganteus*) - Endangered
- Southern Royal Albatross (*Diomedea epomophora*) – Vulnerable
- Wandering Albatross (*Diomedea exulans*) – Vulnerable
- White-bellied Storm-Petrel (*Fregetta grallaria*) – Vulnerable
- White-capped Albatross (*Thalassarche steadi*) – Vulnerable

Potential issues which could occur or be exacerbated by Kelp Aquaculture Farming on marine birds and shore birds were identified as:

- alteration of food sources (i.e. behavioural changes);
- physical disturbance e.g. noise;
- disturbance and disorientation due to artificial lights (navigation and vessel lights);
- habitat modification and/or exclusion; and
- the potential to increase the impact of the KTP of 'entanglement or ingestion of anthropogenic debris in marine and estuarine environments' (Biodiversity Conservation Act 2016 (NSW) and EPBC Act 1999).

Kelp Aquaculture Farming is not considered to have a significant impact on any seabird species such that a Species Impact Statement would be necessary. This is mainly due to the distance of the leases from nesting and roosting sites, and the range of mitigation measures that will be implemented to manage the potential risks.

Risk Pathways

The risk pathways to threatened, vulnerable or protected species was determined as follows:

Habitat Disturbance

The Eden-1 kelp aquaculture lease is located more than 1.1 km offshore (at the closest point) over a soft sandy seabed with no identified rocky reef structures or seagrass meadows. The infrastructure is designed to minimise interaction with the seafloor, using screw anchors to secure longlines while suspending farming components above the substrate. This approach ensures that benthic habitats remain largely undisturbed throughout the operational life of the Project.

Entanglement Risk

The risk of entanglement to marine fauna has been assessed in Section 9.4.4 Entanglement and Ingestion of Marine Debris, and Section 4.10 Infrastructure Design. All longlines are kept under tension to eliminate slack that could entrap marine animals. No nets, mesh, or other loose equipment are used within the farm structure. Importantly, there are no documented global cases of whale entanglement in kelp aquaculture systems, and the infrastructure at Eden-1 adheres to best practice standards to further mitigate any potential interaction.

Foraging and Behavioural Disruption

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The Eden-1 Project is a passive system with no artificial feeding, chemical use, or light emissions that would otherwise alter natural behaviours of local fauna. As there are no baits or attractants used, the risk of modifying the natural foraging behaviour or prey availability of marine mammals, fish, or birds is negligible. The kelp farm is expected to operate in harmony with existing food web dynamics in Disaster Bay.

Disease and Biosecurity

To maintain genetic integrity and biosecurity, all sori used in cultivation are sourced locally from within Disaster Bay. No exotic or genetically modified kelp strains are introduced. Hatchery and cultivation protocols comply fully with NSW Department of Primary Industries (DPI) biosecurity guidelines, ensuring the exclusion of disease vectors, marine pests, and non-native organisms.

Vessel Strike and Acoustic Pollution

Vessel traffic associated with the Eden-1 farm is minimal, limited to 0–3 return trips per day, and restricted to daylight hours to reduce disturbance. All operations follow NSW Roads and Maritime Services (RMS) guidelines on safe approach distances to marine fauna. Engines are maintained to minimise underwater acoustic emissions, thereby reducing the risk of behavioural disturbance or vessel strike, particularly during whale migration periods.

Artificial Lighting

To comply with navigational safety without contributing significantly to light pollution, the Eden-1 farm uses low-intensity, flashing white strobe lights mounted on buoys to mark lease boundaries. These are designed with a narrow vertical divergence to limit skyward and seaward spill. Additionally, service vessel lights are shielded and directed downward during any required night operations, reducing the likelihood of disorientation among seabirds or marine life.

Mitigation Measures

A comprehensive suite of management strategies will be implemented to ensure ongoing environmental protection. These include a Marine Fauna Interaction Plan (MFIP), Environmental Management Plan (EMP), and appropriate rig design and vessel operation protocols. Annual environmental reporting, including assessments under the Environment Protection and Biodiversity Conservation (EPBC) Act, will be conducted and interactions with marine fauna will be recorded and evaluated to inform adaptive management strategies.

Areas of Conservation Significance

According to NSW DPI, most of Disaster Bay is considered available to aquaculture except for areas around reef systems and river/estuarine mouths. The proposed aquaculture lease will be located 1 km from the edge of the nearest declared reef and is not located within or adjacent to any designated Marine Protected Area. The nearest Marine National Park is Cape Howe Marine National Park in Victoria, approximately 24.7 km from the proposed site. The nearest Marine Park is Batemans Marine Park, located 108 km to the north-northeast. The closest Aquatic Reserve is Bushrangers Bay Aquatic Reserve, located approximately 309 km to the north-northeast.

The two nearest terrestrial conservation areas—Beowa National Park and Nadgee Nature Reserve—are situated onshore, approximately 3 km north and 1.1 km west of the proposed aquaculture lease, respectively. These are land-based reserves, and their conservation values are predominantly terrestrial. Given that kelp aquaculture operations are marine based, use no land infrastructure in or adjacent to these parks, and involve no runoff, clearing, or terrestrial access, the potential for any impact on terrestrial flora and fauna is negligible. There are no connections between the lease area and land-based ecosystems that would result in habitat disturbance, species displacement, or edge effects on these protected areas.

Additionally, the marine farming activity is static in nature, uses no artificial feed, pesticides, or freshwater, and is not expected to generate nutrient flows or acoustic impacts that would reach the coastline or affect upland environments. The strong tidal flushing of Disaster Bay and the offshore placement of the lease (more than 656 m from shore) further buffer any potential landward impacts. Importantly, kelp grows naturally in Disaster Bay, with wild populations of *Ecklonia radiata* present on rocky reef habitats in the wider region. It is

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also common for beach-cast kelp to accumulate along the shoreline, particularly after storm events or periods of high swell. This natural cycle of kelp detachment and deposition is a well-established feature of the local coastal ecosystem. The proposed Eden-1 kelp aquaculture farm will replicate natural species and growth processes already occurring in the bay and is not expected to alter or diminish these natural dynamics.

Algal Blooms

Since March 2025, South Australia's coastal waters have been experiencing a harmful algal bloom (HAB) caused by the dinoflagellate algae in the species *Karenia*. This bloom has expanded to cover an area of approximately 20,000 square kilometres (March 2026), leading to widespread marine life fatalities, including fish, dolphins, seals, sharks, rays, crustaceans and sea dragons. The bloom's proliferation is attributed to elevated sea temperatures, calm weather conditions, and nutrient-rich waters, resulting in oxygen depletion and the release of toxins that disrupt marine ecosystems (EPA SA, 2025; FRDC 2025; CSIRO 2026).

Kelp aquaculture presents a promising nature-based solution to mitigate such environmental crises. Kelp species such as *Ecklonia radiata* are highly efficient at absorbing excess nutrients, particularly nitrogen and phosphorus, from the water column. By assimilating these nutrients, kelp cultivation can reduce the likelihood of eutrophication—a primary driver of HABs. In doing so, kelp farms indirectly help protect endangered, threatened and protected marine species by improving oxygen levels, limiting the proliferation of harmful algae, and maintaining healthy food webs. Many sensitive marine species, including dolphins, turtles, and certain fish, are especially vulnerable to hypoxic conditions and ecosystem imbalances triggered by HABs. Kelp farming enhances water clarity and oxygenation, creating a more balanced marine environment. Studies have demonstrated that integrating kelp cultivation in eutrophic coastal areas can improve water quality and regulate phytoplankton communities, thereby diminishing the frequency and intensity of algal blooms (Zhou et al., 2020; Zhang et al., 2019). By improving ecosystem resilience and reducing stressors like eutrophication, kelp farming supports the broader conservation objectives of marine biodiversity protection.

Conclusion

The risk of the kelp aquaculture farming activities in Disaster Bay having a significant impact on threatened, vulnerable, protected, or migratory species listed under the Biodiversity Conservation Act 2016 (NSW) or the Environment Protection and Biodiversity Conservation Act 1999 (Cth) was assessed to be low. This conclusion reflects the environmental characteristics of the proposed site, including the absence of sensitive or unique habitat, the soft-sediment seafloor (mobile sands), and the extensive expanse of similar unobstructed habitat in both the immediate and surrounding marine environment. Based on current habitat mapping, species risk analysis, and operational planning, the likelihood of significant direct or indirect impacts to listed threatened or migratory species is low to negligible.

The proposed kelp aquaculture lease is not located within a marine national park, marine park, or aquatic reserve, and is sufficiently distanced from all conservation areas — including Beowa National Park and Nadgee Nature Reserve — to avoid direct or indirect ecological effects on protected terrestrial or marine ecosystems. The Project has received a Biodiversity Development Assessment Report (BDAR) waiver from the NSW Department of Planning, Housing and Infrastructure and DCCEEW under section 7.9(2) of the BC Act, confirming that the Eden-1 proposal is not likely to have significant biodiversity impacts. At the Commonwealth level, the Australian Government has determined that the Project is not a controlled action under the EPBC Act (EPBC 2025/10149), confirming that it is not expected to have a significant impact on Matters of National Environmental Significance (MNES). Additionally, kelp aquaculture can provide indirect ecological benefits. By removing excess nutrients, increasing water clarity, and contributing to improved dissolved oxygen levels, kelp cultivation can enhance overall marine ecosystem health and support the resilience of threatened and protected species.

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9.4.7 Behavioural Changes

Risk Table 21: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – impacts on marine fauna behaviour (modified from Fletcher et al., 2004; Vom Berg, 2008 McGovern et al. (2025).

Issue	Will the operation of Kelp Aquaculture Farming have a significant impact on the behaviour of any marine species?			
Comments for consideration	• Is the facility situated in any known migratory pathways? • Will the operation interfere with foraging, breeding and/or resting habitat of any marine fauna species? • Are any species expected to experience behavioural changes due to the operation of the Kelp Aquaculture Farming e.g. changes to fish swim paths and/or behaviour? • Will there be a potential disturbance of whale resting behaviour, in particular the Southern Right Whale and Humpback Whale? • Are the leases likely to attract aggregations of native fauna e.g. function as Fish Aggregating Devices (FAD)? • Are the leases likely to have any draw down effects on nearby natural reefs and/or Sanctuary Zones? • What measures will be implemented to mitigate, monitor and manage potential impacts on migratory pathways and behavioural changes? • Will there be increased shark numbers in Disaster Bay once the Kelp Farm operates?			
Description	• East coast – migratory pathway for whales • Disaster Bay – 20 resident or transient Indo-Pacific bottlenose dolphins • Presence of Bronze Whaler sharks • Greencape Head Hang-out – approximately 20-30 fur seals (6 km from Kelp Aquaculture Farm) • Distance to wild Kelp Zones = 1.1 km			
Proposed Management – Mitigation and Monitoring	• Limit scale of operations (5% of Disaster Bay) • Buffer zone between leases and natural rocky reefs • Regular removal of biofouling to reduce attraction of marine fauna • Marine Fauna Interaction Plan			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	2	2	Low

Justification of Ranking

Whales

Humpback whales (*Megaptera novaeangliae*) and Southern Right whales (*Eubalaena australis*) migrate annually between nutrient-rich summer feeding grounds in the Antarctic and warmer winter breeding grounds in tropical and subtropical waters along Australia's east coast (DAWE, 2020). Their northward migration generally occurs between May and August, with the southward return from September to November (Noad et al., 2011; Pirotta et al., 2022).

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Whales frequently travel close to the coast during the southward migration, particularly females with calves seeking sheltered areas to rest. In this context, Twofold Bay, located approximately 25 km north of Disaster Bay, is widely recognised as a significant aggregation area, or resting ground, for migrating whales (McGovern et al., 2025). This is attributed to its deep, protected waters, minimal swell, and a long history of cetacean usage, including historical whaling observations and contemporary whale-watching data.

By contrast, Disaster Bay is not directly located within the core migration route used by most whales along the east coast. It is a more exposed, high-energy embayment that lacks the calm, protected features necessary for frequent whale resting or aggregation. While whales are occasionally observed passing through or offshore of Disaster Bay during migration, it does not function as a significant congregation or calving zone. Scientific reviews (McGovern et al., 2025) and observational data confirm that Twofold Bay receives significantly higher whale visitation rates than Disaster Bay, due to ecological features more conducive to resting and social behaviours.

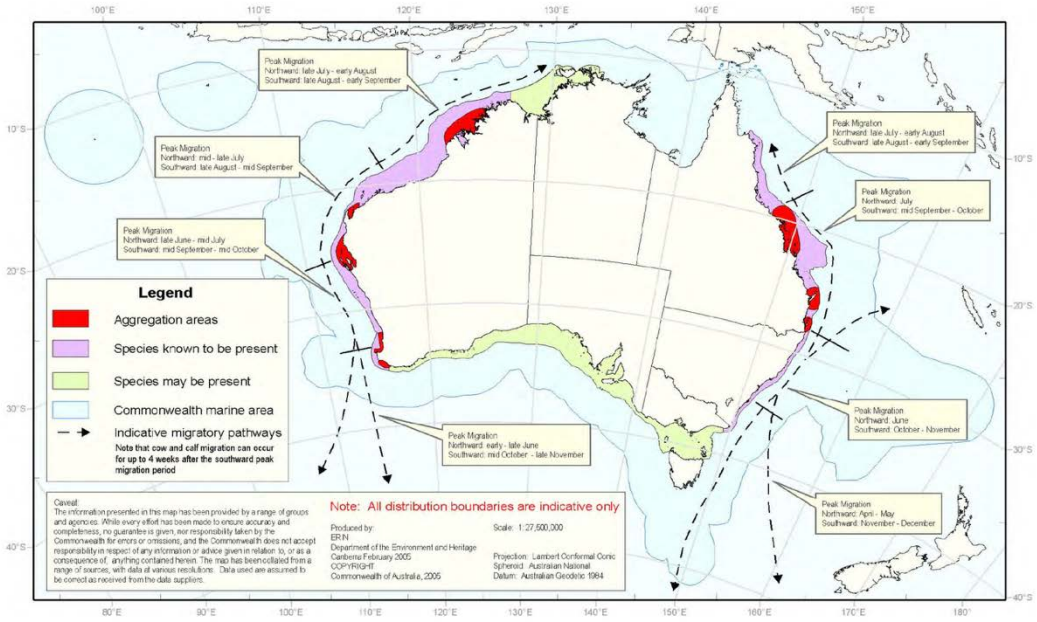

Figure 59: Distribution, migration and recognised aggregation areas of the Humpback Whale (Source: DEH, 2005).

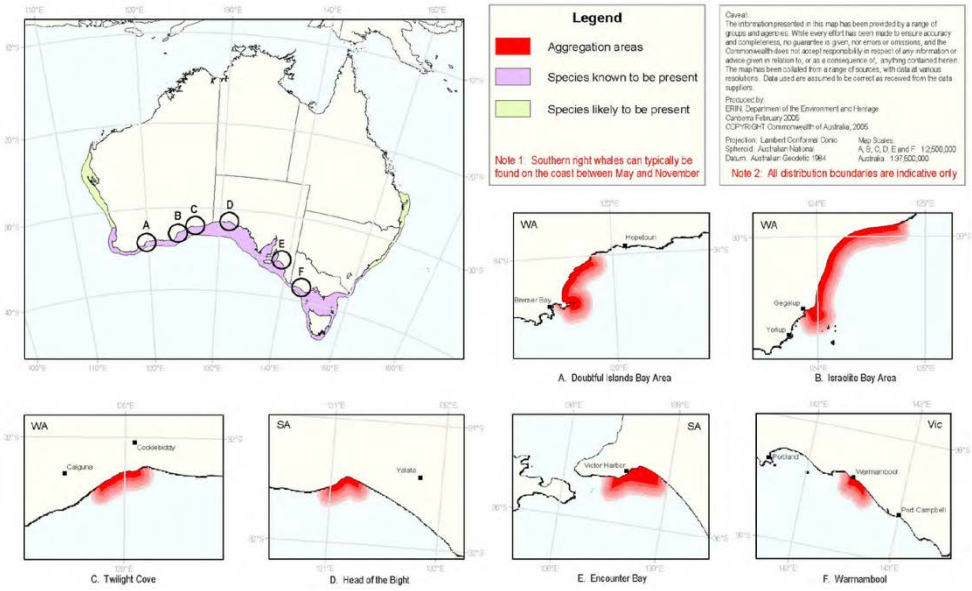

Figure 60: Distribution, migration and recognised aggregation areas of the Southern Right Whale (Source: DEH, 2005).

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The Eden-1 Kelp Aquaculture Farm, located in Disaster Bay, will at maximum occupy 200 hectares, representing 5% of the bay's total area. The Project utilises low-impact, non-extractive infrastructure consisting of longlines suspended mid-water by buoys and anchored with screw anchors. This configuration avoids physical contact with the seafloor and poses minimal risk of barrier formation or migratory disruption. No feed, acoustic deterrents, baiting, or chemical attractants will be used—greatly reducing the likelihood of behavioural disturbance or altered migration paths.

Scientific literature indicates that humpback whales exhibit strong site fidelity to breeding and feeding habitats (Clapham et al., 1993; Urban et al., 2000), with non-random migratory paths shaped by learned and maternally imprinted behaviour (Baker et al., 1994). They navigate using a combination of oceanographic features, bottom topography, and possibly geomagnetic cues (Matthews, 1966; Vang, 2002). These mechanisms allow whales to identify preferred resting grounds—like Twofold Bay—and to avoid areas that are unsuitable, such as those with heavy swell or poor bathymetric characteristics like Disaster Bay.

While migrating whales do pass near Disaster Bay, the bay is not directly situated within a preferred migratory corridor and is not considered an aggregation zone. Scientific literature and observational evidence confirms that Twofold Bay is more heavily used by migrating cetaceans as a resting and feeding area.

Dolphins

Disaster Bay is periodically visited by a transient population of approximately 20 Indo-Pacific bottlenose dolphins (*Tursiops aduncus*), with sightings reported in the shallow nearshore areas (NSW DPIE, 2024). Unlike resident populations observed in enclosed embayments like Jervis Bay or Port Stephens, dolphins in Disaster Bay are more transient and do not exhibit consistent site fidelity. Aggregation behaviour is less common, and the lack of significant seagrass beds or enclosed shallow reef systems in the immediate lease area reduces the likelihood of sustained dolphin presence. The Eden-1 Kelp Aquaculture Farm will be located over soft-sediment habitat more than 1.1 km offshore and is not situated within known or likely dolphin calving or feeding grounds.

Research from aquaculture sites such as Shark Bay, WA, and Port Stephens, NSW, shows mixed responses by dolphins to aquaculture infrastructure. Some studies (e.g. Mann, 1999; Wursig & Gailey, 2002) have documented avoidance behaviour where infrastructure alters prey availability or fish schooling behaviour. In contrast, other reports (Umwelt, 2003) describe dolphins transiting through longline infrastructure or using it as shelter from predators, with anecdotal evidence of increased dolphin presence post-installation at certain pearl farms.

The kelp farming longline infrastructure proposed for Eden-1 consists of tensioned vertical lines and buoys suspended in the water column, which will not physically block marine fauna movement. Given the offshore location, open structure, and limited scale, only minor and highly localised modification of dolphin movement is expected, with no identified risk to calving, resting, or foraging. Nonetheless, the Project will implement a Marine Fauna Interaction Management Plan (MFIMP) to monitor dolphin presence and behaviours, including visual observations during operations and vessel protocols to minimise collision risk.

Seals

The Australian fur seal (*Arctocephalus pusillus doriferus*) and the New Zealand fur seal (*Arctocephalus forsteri*) are recorded along the far south coast of New South Wales, including the Disaster Bay region. While there is no documented established haul-out site within the immediate vicinity of Eden-1, individuals of both species are known to range widely and may sporadically visit coastal headlands and offshore platforms. A known fur seal haul-out exists further north at Steamers Head (south of Jervis Bay), established in 1989, supporting both species throughout much of the year (NSW MP, 2009b; Fisheries NSW, 2013).

Hang-out locations in the broader region include headlands and offshore rock formations near Beowa National Park and Green Cape, though no systematic surveys have confirmed regular seal congregation at Eden-1's proposed location. Individual juvenile seals (approximately 1 year old) have been seen resting on kelp test lines in Disaster Bay (Auskelp 2024/2025). The presence of wild fish and other mobile invertebrates around the kelp longlines may occasionally attract opportunistic predators such as fur seals. However, due to the

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distance from known haul-out areas, the low frequency of seal sightings in the immediate area, and the passive nature of kelp cultivation (which lacks baited or feed-related attractants), the likelihood of significant behavioural change or negative interactions is considered 'low'.

Further, mitigation measures including visual monitoring during operations, minimised vessel noise, and taught mooring designs will be incorporated to reduce potential disturbance or entrapment risks for marine mammals. Overall, the Eden-1 kelp aquaculture project is unlikely to have an impact on local seal populations or behaviours.

Sharks

Research indicates that there is no documented evidence that offshore kelp farms increase shark presence or cause shark aggregation. Peer-reviewed studies show that shark distribution is primarily shaped by prey availability, water temperature, and habitat features, rather than the presence of seaweed or non-feeding structures such as kelp aquaculture lines (Heupel et al., 2015; Espinoza et al., 2014). Elevated shark activity is typically associated with environments where food sources are concentrated—such as seal and sea lion colonies (Wirsing et al., 2021), fish farms where discarded feed and fish waste attract predators (Dempster et al., 2009), river mouths and estuary outflows where nutrient-loaded waters attract schooling fish (Knip et al., 2010), and areas with active commercial fishing, particularly those discharging offal or bycatch (Towner et al., 2022). In contrast, offshore kelp farms—comprising passive longlines, neutrally buoyant kelp, and no organic discharge—do not provide food subsidies and therefore do not generate conditions associated with shark aggregation. Studies of seaweed aquaculture systems internationally, including large-scale kelp farms in South Korea, China, and Europe, have similarly found no correlation between kelp cultivation and increased shark presence (FAO, 2018; Buschmann et al., 2017). Across global aquaculture assessments, seaweed farming is consistently categorised as one of the lowest-risk sectors for wildlife interactions, including sharks and large predators (Campbell et al., 2019).

Disaster Bay is recognised as an area where naturally occurring shark aggregations are common, particularly along the sandy, unvegetated seafloor that characterises much of the nearshore and offshore environment. Drone footage collected by community members, recreational users, and marine observers has consistently documented groups of bronze whaler sharks (*Carcharhinus brachyurus*) cruising in open-water habitats within the bay. These aggregations occur independently of any aquaculture or commercial infrastructure and are typical of bronze whaler behaviour, as the species is known to frequent surf zones, sandy embayments, and areas where schooling fish and baitfish are abundant. The broad, gently sloping bathymetry of Disaster Bay, combined with its high water clarity and healthy pelagic food web, creates favourable natural conditions for shark presence and visibility from above. The occurrence of bronze whalers in this region is therefore understood to be a natural ecological phenomenon, reflective of the bay's biological productivity and habitat characteristics rather than any anthropogenic influence. White Pointer sharks have also be recorded in Disaster Bay, but is difficult to judge the frequency or duration of their stay.

Fish

Disaster Bay, situated within the warm temperate bioregion of southeastern Australia, supports a diverse assemblage of marine fauna, including numerous species of bony fish, elasmobranchs (sharks and rays), and benthic invertebrates. Although comprehensive species-specific surveys for the bay are limited, regional biodiversity data from adjacent New South Wales coastal waters indicate the presence of at least 216 species of fish, sharks, and rays (NSW DPI, 2022). These include species of recreational and ecological importance such as Flathead (*Platycephalus spp.*), Australian Salmon (*Arripis trutta*), Trevally (*Pseudocaranx dentex*), and Luderick (*Girella tricuspidata*). The area is frequented by Port Jackson Sharks (Heterodontus portusjacksoni) and other shark species including Bull Sharks (*Carcharhinus leucas*) and, on rare occasions, Great White Sharks (Carcharodon carcharias). The region also supports populations of smaller demersal and pelagic fish such as Yellowfin Bream (*Acanthopagrus australis*), Snapper (*Chrysophrys auratus*), Sand Whiting (*Sillago ciliata*), and Squid (*Sepioteuthis australis*). Benthic species such as Eastern Rock Lobster (*Sagmariasus verreauxi*), several species of Seahorses (*Hippocampus spp.*), and commercially important molluscs and crustaceans also form part of the broader marine community.

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The proposed Eden-1 Kelp Aquaculture Farm consists of longline structures designed for the cultivation of *Ecklonia radiata*. These structures, while artificial in nature, may function as low-relief habitat substrates or fish aggregating devices (FADs), promoting localised increases in habitat complexity and potentially providing refuge or foraging opportunities for certain mobile species. However, kelp aquaculture systems differ substantially from baited or feed-based aquaculture models, and the absence of supplementary feeding, nutrient enrichment, or attractant inputs reduces the risk of altering predator-prey dynamics or attracting large aggregations of marine megafauna.

The Eden-1 site is located over an area characterised by shifting sandy benthic habitat, generally referred to as an "unvegetated sandy substrate with no biological assemblages" due to the low structural complexity and limited natural reef presence. This selection was intentional to minimise interactions with established benthic communities and ecologically sensitive reef systems. The farm is positioned more than 1.1 km from the nearest shoreline and over 25 km from any other existing or proposed kelp cultivation site. A substantial spatial buffer surrounds the installation footprint to prevent cumulative habitat effects and to maintain the natural hydrodynamic and sedimentary processes of the bay.

While it is possible that the kelp farm may offer novel microhabitats to certain fish or invertebrate species, current scientific understanding indicates that such systems, particularly in low-complexity benthic zones, result in only localised and minor ecological influence. The scale, spatial isolation, and non-extractive nature of kelp aquaculture at Eden-1 are considered to minimise the likelihood of draw-down effects from natural reefs or sanctuaries, especially given the lack of reef habitat within the immediate vicinity of the site.

The ecological performance of the farm will be further assessed through monitoring programs targeting species abundance, habitat usage, and water quality, enabling adaptive management in accordance with regulatory frameworks and best-practice guidelines for low-impact aquaculture development.

Birds

Seabirds such as cormorants (*Phalacrocorax spp.*) and Australasian gannets (*Morus serrator*) are known to interact with aquaculture infrastructure, particularly in systems where wild fish aggregate near structures. These birds are intelligent, opportunistic predators capable of exploiting predictable food sources, and in some settings, this has led to habituation and changes in natural foraging behaviours. The Eden-1 Kelp Aquaculture Farm has been intentionally located and designed to reduce such interactions. The farm is situated over a featureless sandy seabed, with no nearby reef or intertidal structures that typically support seabird foraging or roosting. It maintains a buffer of more than 1.1 km from the nearest shoreline and over 1.1 km from any rocky reef or shell-rich substrate, avoiding proximity to known seabird roosting or nesting habitats. Importantly, the infrastructure design of Eden-1 does not lend itself to seabird roosting. The surface elements consist primarily of low-profile, rounded polyethylene buoys used to support submerged longlines. These buoys are non-rigid, dome-shaped, and in constant motion, which makes them unsuitable as stable resting platforms for seabirds. There are no elevated platforms or structures above the waterline that would provide the kind of perching opportunity commonly exploited by species like cormorants or gulls.

Supporting this design-based mitigation, local experience with mussel aquaculture operations in nearby Twofold Bay has shown no consistent accumulation of seabirds at aquaculture sites. Long-term observations by operators and regulators in that region indicate that seabirds do not appear to be attracted to suspended aquaculture infrastructure in this area, either for roosting or foraging. This regional precedent strengthens the expectation that Eden-1's similar offshore structure and operation will not significantly alter local seabird behaviour. Operational activities, including vessel movements and farm maintenance, are also recognised as potential disturbance sources. Anthropogenic noise and presence may affect seabird activity, particularly during sensitive life stages such as breeding or moulting. Eden-1 will implement best practice management protocols, including minimisation of unnecessary noise and human activity during peak seabird periods and the maintenance of spatial buffers around known sensitive habitats.

Given the farm's offshore location, the lack of suitable roosting surfaces, the absence of nearby critical bird habitat, and the supporting precedent from regional aquaculture operations, the risk of significant adverse effects on seabird populations is considered low. Nevertheless, ongoing monitoring and adaptive

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management will be employed to detect and respond to any emerging issues, ensuring that the ecological values of Disaster Bay are maintained throughout the life of the Project.

Conclusion

The risk of the Eden-1 Kelp Aquaculture Farm having a significant impact on the behaviour or distribution of marine fauna in Disaster Bay is considered low. This conclusion is supported by the relatively small footprint of the farm in the context of the expansive and largely unobstructed marine environment, and its placement over sandy substrate, away from ecologically sensitive habitats such as natural reefs, intertidal rocky zones, or seagrass beds. The farm is sited more than 1.1 km from the shoreline and over 1.1 km from the nearest rocky reef, providing spatial buffers to avoid overlap with habitat zones. The site is not located on primary or known whale migration routes or within any identified whale aggregation, resting, or calving area. While whales seasonally migrate along the New South Wales coastline, including through nearby offshore waters, the farm lies outside of primary migratory corridors, and is not situated within any area considered critical habitat for cetaceans. The farm's infrastructure does not include high-relief or elevated structures that would offer perching or roosting opportunities for seabirds. Experience from nearby aquaculture operations, including mussel farms in Twofold Bay, has shown no pattern of seabird congregation reinforcing expectations of minimal interaction. Additionally, a comprehensive Marine Fauna Interaction Management Plan will be implemented as part of the Project's safeguards, incorporating strategies such as biofouling control, vessel speed limits, exclusion zones during sensitive periods, record keeping of interactions and response protocols for wildlife encounters.

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9.4.8 Areas of Conservation Significance

Risk Table 22: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – impacts on areas of conservation significance (modified from Fletcher et al., 2004; Vom Berg, 2008; NSW DPI, 2023).

Issue	Will the operation of Kelp Aquaculture Farming have an impact on areas of conservation significance?			
Comments for consideration	• What areas of conservation significance are present in the region? • How far are the areas of conservation significance from the farm? • How are any of the areas of conservation significance likely to be impacted by the farm? • Are any areas of 'critical habitat' likely to be impacted? • What measures will be implemented to mitigate, monitor and manage any potential impacts on areas of conservation significance? • Can drones be operated from within a Nature Reserve?			
Description	• Site Selection o No environmentally sensitive or unique areas o Classified TYPE 3 - minimally sensitive key fish habitat o Habitat: unvegetated sandy substrate with low natural complexity and no biological assemblages • Distance to areas of conservation significance: o NSW Nature Reserve (Nadgee) = 1.1 km o NSW National Park (Beowa) = 3 km o VIC Marine Park (Cape Howe) = 24 km o Critical Habitat – Grey Nurse Shark (Montague Island) = 50 km o NSW Marine Park (Bateman's Bay) = 108 km o Ramsar Wetlands: NSW Nature Reserve (Towra Point) = 400 km			
Proposed Management – Mitigation and Monitoring	• Limited scale operations (5% of Disaster Bay) • Buffer zone between leases and natural reefs • Located in an area designated as available for aquaculture by NSW Fisheries DPI.			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	0	1	0	Negligible

Justification of Ranking

Areas of conservation significance include Marine Protected Areas, Ramsar wetlands, national parks, nature reserves, and areas of critical habitat declared under the Fisheries Management Act 1994 and the Biodiversity Conservation Act 2016.

The Eden-1 Kelp Aquaculture Farm is located in Disaster Bay, New South Wales, in an area designated as suitable for aquaculture by the NSW Department of Primary Industries (DPI Fisheries, 2023). The proposal covers less than 5% of the total bay area and has been deliberately sited to avoid ecologically sensitive

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habitats and to maintain appropriate spatial buffers from protected zones. Several areas of conservation significance are present within the broader region surrounding the proposed farm site.

These include:

Nadgee Nature Reserve (NSW Nature Reserve) –1.1 km west of AL21/004

Designation: NSW Nature Reserve, managed under the National Parks and Wildlife Act 1974.

Details: Nadgee is one of the most ecologically intact coastal reserves in New South Wales and is part of the Nadgee to Mallacoota Inlet Important Bird Area (IBA), recognised by 'BirdLife International'. The reserve features a unique combination of coastal heathlands, estuaries, freshwater lagoons, and eucalypt forests. It provides habitat for several threatened species, including the Ground Parrot (*Pezoporus wallicus*), Eastern Bristlebird (*Dasyornis brachypterus*), and Swift Parrot (*Lathamus discolor*). The reserve also plays a key role in maintaining ecological connectivity with cross-border protected areas in Victoria.

Access: Nadgee Nature Reserve will not be used for any commercial access associated with the Eden-1 Kelp Aquaculture Farm. The only anticipated requirement for entry relates to occasional visual observation following extreme storm events, and only in circumstances where safe ocean access from Eden or Edrom is unavailable, which ahs been discussed in direct consultation with NSW NPWS. Under such scenarios, no vehicles will be permitted off designated roadways, and access to Greenglades Beach will be strictly by foot using designated public pathways. Observations will be limited to the inspection of beach conditions for (i) potential loss of longline infrastructure, (ii) the observation of storm-cast kelp, or (iii) the launching of drones from the waterside to support farm inspection for vessel or marine mammal safety. Access for this purpose is expected to occur fewer than twelve times per year and only under extreme conditions. Any detached infrastructure requiring removal will be retrieved from Disaster Bay directly, and not through the reserve, unless such recovery can be demonstrated to have no impact on pathways, roads, or vehicle access within the reserve. In the highly unlikely event of a catastrophic injury to a crewmember, emergency circumstances may necessitate coming ashore in the proximity of Wonboyn as the most expedient course of action; while this outcome is not anticipated, it is recognised as a contingency solely for the purposes of protecting human life.

Figure 61: Map of Nadgee Nature Reserve (NSW Government, 2021).

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Note: drones cannot be launched from within the Nadgee Nature Reserve and may only be launched from the beach below the Mean High Water Mark (MHWM).

Beowa National Park (NSW National Park) – ~3.1 km northwest

Designation: NSW National Park, formerly known as Ben Boyd National Park.

Details: Beowa National Park spans more than 10,000 hectares and includes two main sections surrounding Twofold Bay and Disaster Bay. It encompasses dramatic coastal cliffs, sheltered inlets, forested hinterland, and some Aboriginal cultural heritage sites. The park is a key whale-watching location during the annual humpback migration, particularly around Green Cape Lighthouse. It supports important terrestrial biodiversity, including swamp wallabies, bandicoots, and numerous native bird species. The park is managed under a conservation plan that prioritises habitat protection, fire management, and low-impact recreational use.
Access: Beowa National Park will not be used for any commercial access of any kind associated with the Eden-1 Kelp Aquaculture Farm.

Figure 62: Map of Beowa National Park (NSW Government, 2021).

Cape Howe Marine National Park (Vic Marine Park) – ~24 km south

Designation: Victorian Marine National Park, protected under the National Parks Act 1975 (Vic).

Details: Cape Howe Marine National Park lies adjacent to the Victoria–NSW border and forms part of a continuous conservation corridor with Nadgee Nature Reserve. Covering approximately 4,050 hectares, the park protects a rich mix of marine habitats including granite reef systems, seagrass meadows, sandy plains, and intertidal platforms. It is home to species such as abalone, reef fish, and the weedy seadragon (*Phyllopteryx taeniolatus*), and provides refuge for migratory and resident seabirds. Extractive activities such as fishing and collecting are prohibited to preserve the park's ecological integrity.

Access: No access or interaction is required to Cape Howe Marine Park.

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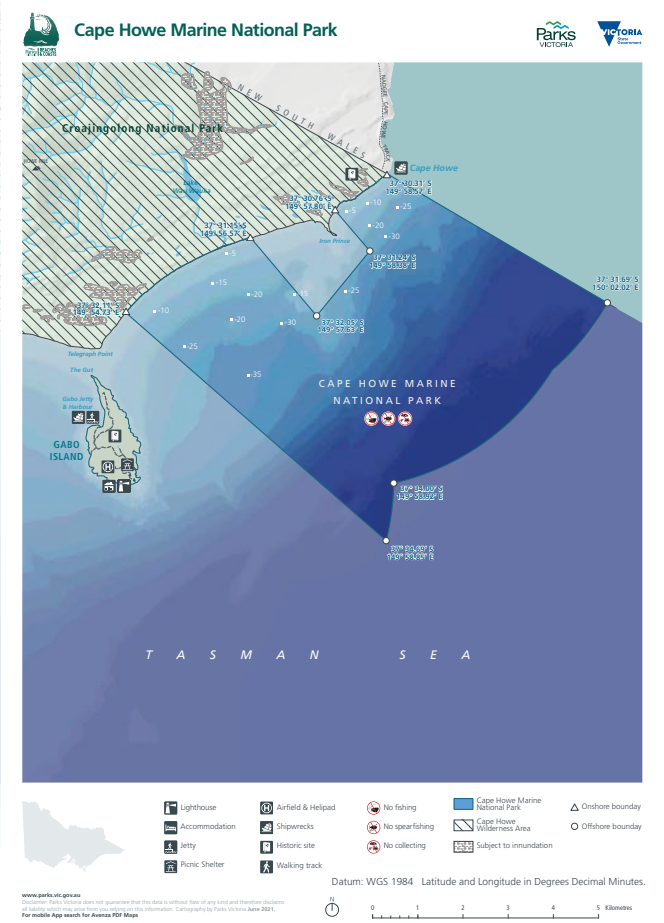

Figure 63: Map of Cape Howe Marine National Park (Victorian Government, 2021).

Wonboyn Entrance ICOLL – ~2.6 km northwest of AL21/004

Designation: Intermittently Closed and Opening Lake or Lagoon – previously designated as a Wave Dominated Barrier Estuary (2004).

Details: The Wonboyn Lake entrance is recognised as a hazardous and dynamic coastal feature, posing significant challenges for navigation. Characterised by shallow crescent-shaped sandbars inside the entrance itself and strong surf conditions outside breaking on a shallow bar, the entrance itself is subject to rapid tidal movement up to 5 m/s. The bar itself is often subject to breaking waves that may render it dangerous for all but the most experienced boaters. Safe passage is typically limited to periods of the highest tides (for access), and even then, conditions can be unpredictable. This natural volatility restricts reliable marine access from Wonboyn to adjacent coastal areas, including Disaster Bay. Historically, Wonboyn Lake functioned as a Wave-dominated Barrier Estuary. However, in September 2004, the entrance closed completely for the first time since records began in the 1940s. This event led to a reclassification of the lake as an Intermittently Closed and Open Lake or Lagoon (ICOLL). Since then, the entrance has experienced multiple closures, notably in 2009 and 2019 and the entrance remains shallow due to significant sand accumulation, inhibiting access except at the highest of tides.

Access: Wonboyn Lake Entrance will not be used for commercial access associated with the Eden-1 Kelp Aquaculture Farm – all services will be conducted via Eden/Edrom. In the unlikely event of injury to a crewmember, vessel strike, mammal entanglement or other emergency circumstances access via the Wonboyn Entrance may be required if this is deemed the most expedient course of action (if safe access over the Wonboyn bar can be achieved). While these scenarios are not anticipated, it is recognised as a contingency for the purposes of emergency access, managing injuries, or protecting human life.

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Batemans Marine Park (NSW Marine Park) – ~108 km north

Designation: NSW Marine Park, established under the Marine Estate Management Act 2014.

Details: The closest NSW Marine Park to Disaster Bay project site is the Batemans Marine Park, which covers 85,000 hectares and stretches from Murramarang Beach near Bawley Point to Wallaga Lake. It includes Sanctuary Zones (no-take), Habitat Protection Zones, and General Use Zones. The park protects estuaries, offshore reefs, seagrass beds, and soft sediment habitats, while accommodating recreational and commercial uses under zoning regulations. Key conservation features include biodiversity corridors, whale migration pathways, and nursery grounds for commercial fish species. The park's zoning plan (NSW Marine Parks Authority, 2022) is informed by ecological, cultural, and social values.

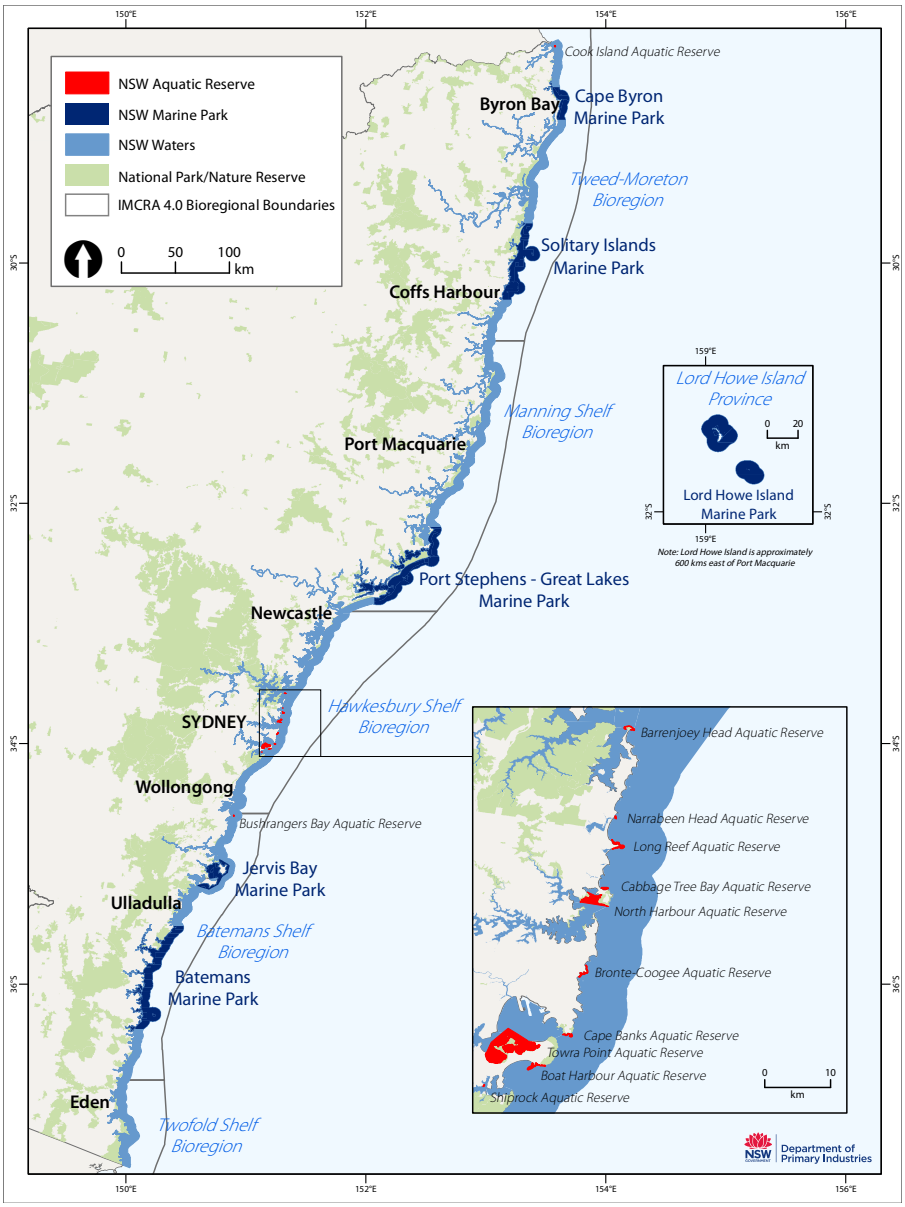

Figure 64: Map of NSW marine Protected Areas, (NSW DPI, 2025).

Terrestrial Conservation Areas

While both Nadgee Nature Reserve and Beowa National Park are in relatively close proximity to the Eden-1 site (1.1 km and 3 km, respectively), these are entirely terrestrial conservation areas. There is no direct ecological linkage between the terrestrial environments they protect and the offshore marine footprint of the proposed aquaculture site. The Eden-1 farm is located in subtidal, soft-sediment marine waters with no inflow,

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outflow, or land-based runoff connection to either reserve. In addition, wild *Ecklonia radiata* (golden kelp), the species proposed for cultivation, already occurs naturally within Disaster Bay and adjacent coastal waters. Its introduction in aquaculture form does not represent a novel or ecologically disruptive species to the marine environment and presents no threat to adjacent terrestrial habitats. Therefore, the presence of the kelp farm does not represent a biological or visual intrusion into the conservation values of either Nadgee or Beowa, nor will it alter the ecological function of those terrestrial protected areas.

Impact on Conservation Areas

The Eden-1 Kelp Aquaculture Farm is not situated within, nor does it directly adjoin, any area of conservation significance. The farm site is positioned over shifting sandy substrate and is separated from other marine ecosystems such as natural kelp beds, seagrass and reef systems by more than 1.1 km. These buffers reduce the likelihood of habitat displacement, shading risk, or disruption of species dependent on those ecosystems.

Importantly, no designated areas of 'critical habitat', as defined under the Fisheries Management Act 1994 or Biodiversity Conservation Act 2016, are located within proximity of the farm site. The nearest known critical habitat—Grey Nurse Shark aggregation zones near Montague Island—is more than 50 km away and lies outside the expected range of ecological influence from kelp aquaculture infrastructure. Kelp farming does not involve supplementary feeding, fresh water, chemical inputs, or physical disturbance of the seabed. The passive nature of longline kelp cultivation means the system has minimal interaction with mobile fauna or benthic communities, and presents limited barrier to the movement of cetaceans or pelagic fish species.

Mitigation, Monitoring, and Management

To ensure continued protection of conservation values in the region, the Eden-1 Project will implement the following environmental safeguards:

- Maintain spatial planning and siting to avoid key habitats, consistent with aquaculture zoning frameworks (DPI Aquaculture Strategy, 2021).
- Limiting Aquaculture in Disaster Bay to less than 5% of total area.
- Marine Fauna Interaction Management Plan (MFIMP) covering wildlife encounter protocols, vessel speed limits, and seasonal activity restrictions.
- Ongoing ecological monitoring of marine fauna behaviour, biofouling levels, and any potential habitat changes to detect early signs of interaction.
- Adaptive management measures to respond to any unexpected ecological impacts based on monitoring results.

Conclusion

The risk of the Eden-1 Kelp Aquaculture Farm having a significant impact on nearby areas of conservation significance is assessed as 'negligible'. The farm is not located within or adjacent to any marine park, Ramsar wetland or area of declared critical habitat. While Nadgee Nature Reserve and Beowa National Park are in relatively close proximity, both are terrestrial reserves with no direct ecological linkage to the offshore project site. The cultivation of *Ecklonia radiata*, a species already present in the local marine environment, introduces no novel ecological pressures to the bay or its surroundings. The passive nature of kelp farming, combined with the site's spatial isolation, substantial environmental buffers, and a commitment to best-practice environmental management, ensure that the Project can operate with minimal ecological footprint. The overall assessment, supported by regional ecological data and the NSW DPI aquaculture framework (NSW DPI, 2023), confirms that the Eden-1 operation is unlikely to result in any measurable adverse impact on the integrity, function, or conservation objectives of protected areas in the region.

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9.4.9 Resource Use and Waste

Risk Table 23: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – resource use and waste disposal (modified from Fletcher et al., 2004; Vom Berg, 2008; NSW DPI, 2023).

Issue	Will the waste generated from the operation of Kelp Aquaculture Farming have a significant impact on the environment or humans?			
Comments for consideration	• Will Kelp aquaculture farming produce any waste? • What is the protocol for disposal of general waste and worn infrastructure? • What measures will be implemented to remediate, monitor and manage issues associated with waste disposal?			

Description	• Waste pollution
	  • Biowaste (i.e. biofouling)
	  • General waste
	  • Obsolete/worn infrastructure			

Proposed Management – Mitigation and Monitoring	• Approved Waste Management Plan
	  • Fouled kelp will be used for fertiliser products
	  • Damaged infrastructure will be disposed of at an approved land based waste facility
	• Approved Structural integrity and stability of infrastructure managed via the Monitoring and Maintenance Program			

Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	0	2	0	Negligible

Justification of Ranking

The operation of the Eden-1 Kelp Aquaculture Farm will generate limited waste, including minimal amounts of biofouling waste. In accordance with the NSW Waste Classification Guidelines – Part 1: Classifying Waste (NSW EPA, 2014; updated 2022), biodegradable organic material such as biofouling detritus will be classified as General Solid Waste (putrescible). Ageing, damaged, or obsolete infrastructure—such as ropes, flotation buoys, and plastic or steel fittings—will be classified as General Solid Waste (non-putrescible). All waste will be handled, stored, and disposed of in accordance with the Protection of the Environment Operations Act 1997 and relevant EPA licencing and transport requirements.

The longline infrastructure, particularly the horizontal lines, will be colonised naturally by a range of marine biofouling organisms, such as mussels, other seaweeds, sponges, algae, ascidians, other molluscs (gooseneck barnacles) and barnacles. Sediment from the water column also settles on ropes and other longline components. Removal of biofouling and sediment from the infrastructure is important to reduce resistance to currents and wave action which may jeopardise its integrity e.g. stress lines and moorings and may cause the main lines to sag and lower in the water column. Biofouling removal is also important to maintain water quality, reduce the availability of habitat for diseases and parasites and to minimise the attraction of wild fauna (e.g. herbivorous fishes) which feed on it and can cause damage to the infrastructure (Braithwaite et al., 2007). Biofouling can increase the number of buoys and longlines required to maintain buoyancy (which increases equipment costs).

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The farm infrastructure will be cleaned on a regular basis in order to remove biofouling. Cleaning of the longlines will be undertaken approximately every 20 weeks or when considered necessary (e.g. during winter months cleaning may be needed less frequently due to slower fouling rates). The decrease in water temperature during this time of the year causes the fouling to decrease, conversely, kelp growth is at its fastest rate during winter, when the water temperature is coldest and nitrate availability from upwelling is highest. The mooring connection point to the screw anchor will also be cleaned, which will occur at least once a year. During cleaning of infrastructure, observations will be made for unusual marine organisms or suspected marine pests that will be duly reported to NSW DPI. The cleaning of buoys and mainline ropes is done regularly to ensure minimal buildup, thereby reducing the overall fouling over a given period. Floats are tied to the mainline to allow for easy removal and cleaning – and to minimise the presence of barnacles from interfering or cutting ropes due to abrasion.

Buoys and ropes may be taken to the land-based site for cleaning if damaged, otherwise they will be kept clean with scraping tools or cleaned using salt water-pressure cleaning equipment. On board pressure cleaning equipment, consists of a commercial-grade power unit (pump), filter unit and cleaning unit. A winch will be used to pull the longlines up from the water, which will then be lifted alongside the vessel. Note: the kelp dropper lines themselves will not be cleaned and will only be added to the mainlines as the water temperature consistently falls below 21 degrees Celsius. Once kelp is established (as proven by Auskelp in open-ocean testing in Twofold Bay and Disaster Bay from 2022-2025) the opportunity for fouling is diminished or eradicated – ensuring the seeded dropper lines will not require cleaning. No chemicals will be involved in any kelp infrastructure cleaning process.

During the operation of the leases, the longline, anchor and mooring infrastructure, including ropes, buoys and moorings will wear and will need to be replaced. The longline infrastructure will be inspected regularly to ensure all components remain structurally sound. Inspections of the longline infrastructure will also be conducted after cleaning and severe weather to ensure that structural integrity has not been compromised. The inspection and maintenance procedures will be described in the Monitoring and Maintenance Program. In the unlikely event of detachment of any farm infrastructure, Auskelp is responsible for the cleanup and removal of any gear. Under NSW Fisheries DPI requirements permit holders are required to enter into an Aquaculture Lease Security Arrangement (Bond). In the event that any related longline infrastructure breaks away from the lease due to an extreme weather event, vandalism or unexplained equipment failure, the bond can be used to remove lost or abandoned infrastructure if the operator fails to do so.

The daily operation of the kelp Aquaculture Farm generates minimal general waste, such as plastics, containers and bags. In the event of any general waste being generated, or found in the lease area, wastes will be secured in waste bins on the service vessels and transported by road to an appropriate waste disposal facility. On board operations will also involve the use of fuel and oil products, which will be secured in storage containers with tightly fitted lids. Regular servicing of all boats and equipment, as well as daily inspections and appropriate 'start up' and 'shut down' procedures will ensure early identification of any issues (e.g. potential spillages or leaks) and prompt remedial action by appropriately trained staff. Any residual or out of date products will be transferred to land-based facilities and disposed of in an appropriate manner.

The Kelp Aquaculture Farm will also follow industry best practice, such as:

- Waste materials will be reduced, reused and recycled where possible;
- Longline infrastructure removed from the lease will be returned to shore for processing, recycling or disposal;
- All sewage wastes will be contained on service vessels in onboard holding tanks or chemical toilets and disposed of through an approved vessel sewage discharge point on return to port; and
- Residual materials that cannot be reused or recycled will be disposed of at an approved waste management facility.

Waste handling, transport and disposal procedures, inspection schedules and industry best practices will be detailed in the approved Waste Management Plan.

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Conclusion

The risk of waste generated from the operation of the Kelp Aquaculture Farms having a significant impact on the environment or humans was assessed to be 'negligible'. Adoption of a Structural Integrity and Stability Monitoring Program will ensure that obsolete, worn, or damaged infrastructure is appropriately handled, transported, and disposed of in accordance with best practice and regulatory requirements. Unlike finfish or shellfish aquaculture, kelp farming does not produce any biological waste such as faeces, excess feed, or animal by-products. Shellfish and fish production often generate substantial waste in the form of shells, carcasses, internal organs, and processing by-products, which require specialised treatment, disposal, or repurposing to avoid environmental harm and odour issues. In contrast, kelp is a plant-based crop that can be fully utilised, with every part of the biomass suitable for conversion into food products, biofertilisers, animal feed, bioplastics, or carbon-sequestering bioproducts. Ropes and longline infrastructure will be reused wherever possible, and any materials reaching the end of their operational life will be retrieved and responsibly disposed of via an appropriate waste disposal facility.

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9.4.10 Offshore Resources

Risk Table 24: Summary of comments, proposed management measures, risk assessment values and reporting requirements for the issue – Offshore Resources (modified from Fletcher et al., 2004; Vom Berg, 2008; NSW DPI, 2023).

Issue	Will the Project limit access to offshore resources for commercial or recreational fishers? What will the effect on fish numbers be?			
Comments for consideration	• Does the proposal affect navigation, boating, diving, or tourism activities? • Are any licensed offshore resources displaced (e.g., commercial fishing quota, longline/gillnet operations)? • Will the kelp farm influence ecological resources such as habitat, water quality, or fish abundance? • Are whale migration, marine mammal use, or other environmental resources affected? • Does the Project establish a precedent for marine resource allocation or commercialisation of offshore waters? • Does the Project extract resources? • Will mining and exploration be affected or associated opportunities lost? • What will the effect be on local fish populations?			
Description	• Area of Kelp Aquaculture Farm = 200 ha (5% of Disaster Bay) • Presence of longline rigs = 100 ha (2.5% of Disaster Bay) • At least four navigational marks will be delineate each lease • Other waterway users include recreational and commercial fishers, dive operators, commercial fishing, abalone and urchin divers, sailors, whale watch operators, navy • Restrictions to net and longline fishing within Kelp Farm boundaries • Access available to recreational fishers • Does not remove any species (wild plant or animal) • Removes dissolved nutrients, improves water quality, mitigates eutrophication • Reduces commercial fishing in Disaster Bay by minimum 5%			
Proposed Management – Mitigation and Monitoring	• Maintain kelp farming footprint to ≤5% of Disaster Bay to ensure broad access for other marine users. • Ongoing consultation with commercial fishers. • Open access for recreational fishers. • Install high-visibility markers and maintain compliance with Transport for NSW Maritime safety requirements. • Implement Marine Fauna Interaction Plan. • Conduct regular debris inspections and infrastructure integrity assessments to prevent gear loss. • Monitor ecological conditions (water quality, fish abundance, benthic condition) to identify any cumulative effects.			
Risk Assessed Values				
Organisation / person	Consequence	Likelihood	Risk Value	Risk Ranking
Auskelp	1	2	2	Low

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Justification of Ranking

The risk to offshore resources is assessed as 'low', given the spatial footprint of the farm relative to the bay area, the absence of resource extraction, and the compatibility of kelp aquaculture with surrounding marine uses. Recreational access remains unrestricted, commercial fishing impacts are limited to a limited portion of the bay, and navigation corridors are unaffected. Kelp farming is regenerative and enhances ecological function rather than depleting resources. There are no known conflicts with Defence, shipping, tourism, or energy interests, and no statutory offshore rights are extinguished. The Project's monitoring, adaptive management triggers, and safety protocols further reduce the likelihood of adverse impacts.

Fish Numbers

Fish populations within the proposed Eden-1 lease area were assessed using Baited Remote Underwater Video (BRUV) deployments as part of the benthic ecology assessment (Elgin 2025). BRUV surveys were undertaken at six locations over two survey days, including four sites within the proposed lease area and two reference sites outside the lease, with each deployment analysed over a standardised recording period. The results indicate low fish abundance and species richness, with 14 fish taxa recorded in Disaster Bay, consistent with the unconsolidated sandy substrate and absence of reef, kelp, or other structurally complex habitat within the lease footprint. Observed species were predominantly mobile, generalist taxa typical of open sandy environments, and no threatened or protected fish species were recorded. These results were compared to with BRUV data collected using the same methodology in Merimbula Bay, where 27 fish taxa were recorded. The higher species richness observed at Merimbula Bay reflects the presence of rocky reef and mixed-substrate habitats that provide greater structural complexity and ecological niches.

The introduction of suspended kelp longline infrastructure at the Eden-1 site is expected to increase local fish abundance over time by adding structural complexity to an otherwise low-complexity sandy environment. The kelp lines and associated ropes create three-dimensional habitat in the water column, providing shelter, refuge from predators, and foraging opportunities for small pelagic and mid-trophic fish species. This structural habitat can attract baitfish and mobile generalist species, which in turn may support higher trophic levels through localised food-web enhancement. As kelp biomass develops, it also supports increased invertebrate colonisation on the infrastructure, further enhancing food availability. Importantly, this represents an additive ecological effect, as the farm introduces habitat without displacing existing reef, seagrass, or sensitive benthic communities. International and Australian studies of seaweed and suspended aquaculture systems consistently show that such structures can function as de facto fish aggregation habitat, leading to localised increases in fish abundance while maintaining broader ecosystem processes. Any changes in fish populations will be monitored through ongoing BRUV surveys to confirm trends and inform adaptive management.

Offshore Mining

The potential for interaction with offshore mineral and petroleum exploration activities has been considered in accordance with the Marine Waters Sustainable Aquaculture Strategy (MWSAS) and the Secretary's Environmental Assessment Requirements (SEARs), which require assessment of compatibility with existing and future offshore resource uses. A review of publicly available datasets, including Geoscience Australia petroleum titles, offshore mineral prospectivity mapping, and NSW government resource tenure information, indicates that no current petroleum titles, exploration permits, or declared offshore mineral extraction operations occur within, or in the immediate vicinity of, Lease AL21/004 in Disaster Bay. The lease area is located within State coastal waters over unconsolidated sandy sediments and does not coincide with mapped mineral sand deposits, hard-rock resources, or known extractive reserves of economic significance.

The Eden-1 kelp aquaculture infrastructure consists of low-profile, removable longline systems secured by screw anchors with a small seabed footprint and no dredging, blasting, or seabed excavation. As such, the Project does not sterilise mineral resources, permanently alter seabed geology, or preclude future exploration techniques. The infrastructure can be removed at the end of the lease term, restoring the seabed to its pre-existing condition and maintaining long-term resource access.

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Should offshore exploration activities be proposed in the future, the spatially defined lease boundaries, surface marking, and navigational charting of the aquaculture area will enable early planning coordination to avoid operational conflicts. The Project's relatively small footprint within Disaster Bay and its reversible infrastructure design ensure coexistence with potential future resource investigations. Accordingly, the Eden-1 Project is not expected to result in a material constraint on offshore mining or exploration activities and is consistent with the MWSAS requirement to minimise conflicts with other marine resource uses.

Industry Best Practice

The Eden-1 Kelp Aquaculture Project aligns closely with global and national best-practice frameworks for sustainable offshore seaweed aquaculture. Internationally, the Project follows the FAO Technical Guidelines for Sustainable Seaweed Aquaculture (2018), which outline requirements for ecosystem-based management, low-impact infrastructure design, carrying-capacity limits, and risk-based monitoring. It is also consistent with the Global Seaweed Coalition's Environmental Performance Standards and the UN Global Compact's Blue Economy Principles, which emphasise regenerative ecological benefits, protection of biodiversity, and socially responsible marine development.

Peer-reviewed scientific guidance—including Buschmann et al. (2017) on environmental interactions of seaweed farming and Campbell et al. (2019) on global sustainability benchmarks—supports the use of tensioned longline systems, minimal seabed contact, and regular inspection protocols to reduce habitat disturbance and prevent marine debris. The Eden-1 design reflects these principles through its use of screw-anchor systems, robust tensioning to prevent entanglement risk, and scheduled maintenance and debris audits.

Nationally, the Project adheres to the NSW Seaweed Industry Prospectus (2024), the NSW Marine Waters Sustainable Aquaculture Strategy (MWAS), and the Australian Government's National Aquaculture Strategy, which together promote low-emission, low-waste operations, spatial coexistence with other marine users, and transparent community engagement. The Project also aligns with best-practice requirements set out by NSW DPIRD Fisheries for biosecurity, marine pest prevention, stock provenance control, and ecological monitoring.

These frameworks collectively emphasise:

- Low-impact, removable anchoring and infrastructure designed for minimal seabed disturbance.
- Avoidance of sensitive habitats, including reefs, seagrass, and key ecological communities.
- No removal of wild flora or fauna.
- No addition of feed, pesticides or chemicals.
- Debris prevention and infrastructure integrity, including routine inspection, maintenance logs, and retrieval protocols.
- Considers coexistence with other marine users through careful siting, visible marking systems, and communication with fishers and maritime stakeholders and regulators.
- Protection and monitoring of marine fauna, including whale-interaction mitigation measures and high-appropriate surface markers.
- Transparent stakeholder engagement, consistent reporting, and community notification systems.
- Adaptive management, with ecological triggers for operational changes embedded in monitoring plans.

By integrating these internationally recognised strategies, the Eden-1 Project represents an environmentally responsible kelp aquaculture operation designed to coexist harmoniously with the natural environment and other marine resource users.

Conclusion

The risk of offshore resources being affected is assessed as low. The Project utilises best practice by integrating globally recognised sustainability standards, scientific evidence, and regulatory frameworks into

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its design and operations. Through low-impact infrastructure, careful site selection, maintenance and debris-prevention protocols, and a commitment to ecological enhancement, the Project meets — and in several areas exceeds — the expectations set by leading international bodies, national aquaculture strategies, and NSW regulatory guidance. The Eden-1 Project will not sterilise or permanently constrain access to offshore mineral or petroleum resources, and its removable infrastructure and minimal seabed footprint ensure compatibility with any future mining or exploration activities. In addition, the suspended longline structures may provide habitat complexity and refuge areas that can support increased local fish abundance and biodiversity, consistent with observations from similar offshore aquaculture systems. Accordingly, offshore resources are maintained, and the Project is designed to coexist, to the greatest extent practicable, with other marine uses and potential future resource investigations.

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10.0 ENVIRONMENTAL MANAGEMENT

10.1 Environmental Management Plan

Eden-1 Kelp Aquaculture Farm

A provisional Environmental Management Plan (EMP) has been completed for the Eden-1 Kelp Aquaculture Farm. The EMP will incorporate the most up-to-date environmental knowledge and regulatory standards and will ensure that commitments made in the Environmental Impact Statement (EIS), subsequent agency assessments, and any associated approvals or licence conditions are implemented in accordance with NSW environmental legislation and aquaculture policy.

The EMP will serve as an operational framework for the sustainable management of the kelp aquaculture facility. It will include a series of sub-management plans, monitoring programs, and operational protocols addressing the potential environmental impacts identified in the environmental assessment process. These plans will be finalised following development approval and will outline key information such as operational objectives, performance indicators, data collection methodologies, sampling requirements, reporting timeframes, designated monitoring locations, and emergency response procedures.

The objectives of the EMP will be to ensure that the Eden-1 Kelp Aquaculture Farm operates sustainably, with no significant impact on the surrounding marine environment, adjacent conservation areas, local communities, or the health and safety of personnel.

The EMPs objectives are as follows:

- Ensure industry best practices for kelp aquaculture are implemented across all operational phases.
- That interactions with marine fauna, including cetaceans, seabirds, and fish species, are minimised through preventative design and active monitoring.
- That water quality is protected and remains within safe ecological thresholds, in alignment with the NSW Marine Estate Management Strategy (NSW DPI, 2020).
- That the structural integrity of longline and buoy systems is maintained to prevent entanglement risk and marine debris.
- Ensure the risk of disease, parasites, or invasive biofouling species is minimised, and where such events occur, they are reported and managed promptly with appropriate remediation.
- That staff and public safety is prioritised, with comprehensive protocols for occupational and navigational safety.
- That waste materials, including biofouling waste and obsolete infrastructure (e.g., ropes and buoys), are classified and disposed of in accordance with the NSW Waste Classification Guidelines – Part 1: Classifying Waste (NSW EPA, 2022) and the Protection of the Environment Operations Act 1997.
- That navigation and marine access in and around Disaster Bay is maintained in accordance with Transport for NSW maritime regulations and NSW Port Authority advice.
- Ensure the environmental performance of the operation is regularly assessed through scheduled audits, monitoring reports, and review of compliance records.

The EMP provides the operational reference for staff, operators and contractors engaged in the setup, operation, and maintenance of the Kelp Aquaculture Farm. Responsibility for the implementation of the EMP will rest with the farm general manger, with periodic reporting provided to NSW DPIRD Fisheries to confirm mitigation, monitoring, and management measures are adhered to as per the aquaculture licence.

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10.2 Consolidated Mitigation Measures – Cross Reference Table

Eden-1 Kelp Aquaculture Farm

Consolidated Mitigation Measures		Detailed in EIS
Community Engagement - Ongoing		
CE1	■ **Transparency (CE1):** Annual Project Reporting published on website and emailed to Interested parties (includes marine fauna interactions)	6.8 Future Engagement
CE2	■ **Aboriginal Engagement (CE2):** Continue annual RAP engagement program; cultural awareness training; targeted employment and participation.	
CE3	■ **Assurance (CE3):** Third-party environmental audits every 3 years (fish assemblages and benthic habitat); publish findings and if required, corrective actions.	
CE4	■ **Education (CE4):** Training pathways with schools/TAFE; local procurement priority; internships and site visits, reviewed annually.	
CE5	■ **Complaints & Appeals (CE5):** Response email within 10-days to complainant; all complaints published annually on (de-identified) register; escalation pathway to NSW Fisheries if critical.	
Infrastructure – During Construction and Ongoing		
IN1	■ Visual Amenity: lease area located minimum 1.1km offshore ■ Maximum lease area 200 ha = 5% of Disaster Bay ■ No pile driving, underwater hammering or dredging ■ Infrastructure will only be located over unvegetated sandy substrate ■ Design features that minimise visibility from shoreline e.g. primarily dark coloured materials (floats), low profile and sub surface longline infrastructure as per Monitoring and Maintenance Plan ■ Conduct regular debris inspections annually and after storm events as per infrastructure integrity assessments in Monitoring and Maintenance Plan, Waste Management Plan and Environmental Management Plan ■ That waste materials and obsolete infrastructure (e.g., ropes and buoys), are classified and disposed of in accordance with the NSW Waste Classification Guidelines ■ Buoys and corner markers, will be labelled with the lease designation ■ Use International Association of Marine Aids (IALA) approved corner markers	9.1 Site Selection 9.2 Construction and Infrastructure 9.3 Impact On Community 9.4 Environment 10.0 Environmental Management

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Consolidated Mitigation Measures (continued)		Detailed in EIS
Access and Facilities - Ongoing		
AF1	■ No truck access via Wonboyn ■ Only people (foot traffic) access allowed between designated Nadgee Nature Reserve roads and beach areas.	9.2.1 Noise During Construction 9.3.2 Marine Vessel and Vehicular Transport
Navigation - Ongoing		
NA1	■ Recreational fishers allowed in lease area ■ Commercial fishing not allowed within lease area (confirmed by NSW Fisheries) ■ Visibility of infrastructure (to other marine users) is the highest priority – ranks above visual amenity from shore (see reference: IN1) ■ Four flashing navigational markers will delineate the lease area in accordance with regulatory requirements ■ Aquaculture Lease Security Arrangement (Bond) with NSW DPIRD Fisheries as per Class 2 Aquaculture License	9.2.4 Navigation and Interactions with Other Waterway Users 9.3 Impact On Community
Heritage - Ongoing		
HE1	■ Comply with mitigation measures detailed in Cultural Heritage Response Plan ■ For all heritage discoveries contact Heritage NSW within 24 hours, and for Aboriginal objects contact the NSW Department of Planning and Environment – Aboriginal Cultural Heritage Division within 24 hours ■ Appropriate cultural protocols will be followed, including consultation on artefact handling, avoidance measures, or repatriation ■ Targeted employment and participation for First Nations, included with cultural awareness training	9.3.3 Aboriginal, European and Environmental Heritage Appendix A5: Aboriginal Cultural Heritage Report Appendix B2: Cultural Heritage Response Plan
Management Plans		
MP1	■ Obtain departmental approval for the following management plans prior to Project construction, as follows: ○ Appendix B1: Marine Fauna Interaction Plan ○ Appendix B2: Cultural Heritage Response Plan ○ Appendix B3: Emergency Response Plan ○ Appendix B4: Traffic Management Plan ○ Appendix B5: Seaweed Aquaculture Biosecurity Plan ○ Appendix B6: Monitoring and Maintenance Plan ○ Appendix B7: Environmental Management Plan ○ Appendix B8: Waste Management Plan ○ Appendix B9: Construction Deployment Management Plan ○ Appendix B10 Decommissioning Management Plan	List of draft Management Plans are attached as Appendix B: Mitigation Plans and Measures

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Consolidated Mitigation Measures (continued)		Detailed in EIS
Economic - Ongoing		
EC1	■ Goods and services will be obtained locally where possible – internal	9.3.6 Social and Economic
Nadgee Nature Reserve - Ongoing		
NNR1	■ No drone usage within or over Nadgee Nature Reserve ■ Drone take-off points [only] below high-water mark and not within 1 km of the south end of Greenglades Beach. Where possible, a spotter should be used to ensure no interactions with local raptors	9.3.2 Marine Vessel and Vehicular Transport 9.4.8 Areas of Conservation Significance
Biodiversity - Ongoing		
BI1	■ Comply with approved Marine Fauna Interaction Management Plan (MFIMP) ■ Comply with NSW Department of Primary Industries (DPI) Aquaculture Management Guidelines and National Light Pollution Guidelines for Wildlife ■ Annual review of threatened species register ■ Seedstock derived only from wild Disaster Bay *Ecklonia radiata* (within NSW local area) with wild sori collection repeated annually to maintain genetic variation ■ Maintain minimum whale approach distances as per NSW DPI regulations ■ Notification of injured wildlife to NSW National Parks and Wildlife Services (NPWS) and NSW Fisheries as per MFIMP ■ Monitor ecological conditions (mammal interaction, entanglement, water quality, fish abundance, benthic condition) and report any unusual findings to NSW Fisheries within 7 days as per MFIMP ■ Annual reporting of significant beach-cast deposits of *Ecklonia radiata* to NSW Fisheries	9.4 Environment 10.1 Environmental Management Plan
Reporting to NSW DPIRD Fisheries – Ongoing (see codes below)		
RE1 RE2 RE3	■ 3-year fish assemblage BRUV testing - >50% farm operations ■ 3-year benthic survey testing - >50% farm operations ■ Annual reporting of excess beach cast deposits of *Ecklonia radiata* on Greenglades beach related to farming operations	9.4.1 Marine Habitat, Water Quality and Sedimentation 9.1.2 Habitat Loss and Shading 4.9 Beach-cast Kelp

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Consolidated Mitigation Measures (continued)		Detailed in EIS
Other Actions – Ongoing (see codes below)		
AC1 AC2	■ Comply with the Australian Aquaculture Code of Conduct ■ Annual consultation with commercial fishers	9.2.4 Navigation and Interactions with Other Waterway Users 6.8 Future Engagement

Table 19. Consolidated Mitigation Measures – Cross Reference Table.

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11.0 PROJECT JUSTIFICATION

11.1 Responsive Design and Mitigation

The Eden-1 Kelp Aquaculture Farm is appropriately located to support the sustainable development of offshore aquaculture in a region with suitable oceanographic, ecological, and logistical characteristics. The Project is strategically located offshore of Disaster Bay, in proximity to existing marine infrastructure at Eden and within waters that exhibit high nutrient availability, strong flushing, and exposure to oceanic conditions conducive to large-scale kelp cultivation. The feasibility of alternative sites and configurations is considered in Section 3.6, which concludes that the benefits of the Project outweigh the potential impacts.

The Project has been designed to be responsive to the site's environmental features. Specifically, the Development Footprint has been configured to avoid sensitive nearshore habitats and minimise interaction with benthic environments through the use of suspended longline infrastructure and anchoring systems designed for high-energy offshore conditions. The layout and scale of the farm have been selected to minimise potential impacts on marine biodiversity, navigation, and other marine users. Remaining environmental and social impacts have been identified in this EIS and are considered manageable through the implementation of appropriate mitigation, monitoring, and adaptive management measures.

If constructed, the Project will provide the following:

- Supporting the development of a sustainable blue economy by enabling offshore kelp aquaculture that contributes to food, feed, and bioproduct supply chains with a low environmental footprint.
- Contributing to climate change mitigation objectives through the production of kelp-based products that can support emissions reduction pathways, including substitution of more emissions-intensive inputs and enhancement of circular economy outcomes.
- Diversifying regional economic activity and strengthening marine industry capability through investment in offshore aquaculture infrastructure and associated onshore processing, logistics, and services.
- Delivering direct employment and labour opportunities during construction, operation, monitoring, and eventual decommissioning and rehabilitation of the Project. These employment opportunities would span a range of skill sets, including marine operations, vessel services, environmental monitoring, engineering, and project management.

11.2 Alignment with Government Policies and Statutory Requirements

Aquaculture is a strategically important contributor to the NSW economy, delivering gross product sales of $219.7 million in 2023 and supporting more than 2,321 full-time equivalent jobs across the State (BDO EconSearch, 2023). The NSW oyster industry currently utilises 3,189 hectares of leased estuarine waters and generates $77 million annually, making it the State's largest aquaculture sector (NSW Government, Aquaculture in NSW – Facts & Figures 2024). By comparison, the proposed Eden-1 Kelp Aquaculture Farm seeks to occupy 200-hectares of offshore waters, and introduces an entirely new production stream currently absent from the NSW aquaculture portfolio. At full development, the Project proposes to produce 1,500 tonnes of wet seaweed annually, valued at over $9 million, and to create 30 full-time jobs, addressing growing demand for domestically produced, sustainably sourced seaweed products. Importantly, none of NSW's current aquaculture revenue is derived from cultivated kelp or seaweed, highlighting a clear opportunity for diversification.

The Eden-1 Kelp Aquaculture Farm is appropriately located to support the sustainable development of offshore aquaculture in a region identified as suitable for marine-based primary industries. The Project is strategically located offshore of Eden within Disaster Bay, in proximity to existing port, wharf, and marine service infrastructure, and within waters that support high-energy, well-flushed oceanographic conditions suitable for kelp cultivation. If constructed, the Project would contribute to the long-term establishment of a sustainable offshore aquaculture industry over the operational life of the farm.

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As detailed in Section 5, the Project is consistent with and aligned with relevant local, State, and Australian Government policies and statutory instruments that support ecologically sustainable development, aquaculture, regional economic diversification, and climate change mitigation, including:

- Australian Government Environment Protection and Biodiversity Conservation Act 1999 policy objectives
- NSW Marine Estate Management Act 2014 and Marine Estate Management Strategy
- NSW Aquaculture Strategy and DPIRD Fisheries policy framework
- NSW Coastal Management Act 2016
- NSW State Environmental Planning Policy No. 62 – Sustainable Aquaculture
- NSW State Environmental Planning Policy (Transport and Infrastructure) 2021
- NSW Net Zero Plan Stage 1: 2020–2030
- Bega Valley Local Environmental Plan 2013
- South East and Tablelands Regional Plan 2036
- Bega Valley Shire Community Strategic Plan 2042
- Far South Coast Regional Economic Development Strategy (REDS) – 2023 Update

The Project has demonstrated permissibility in Section 5 of this EIS. As a State Significant Development, the Project has been assessed in accordance with the Environmental Planning and Assessment Act 1979 (EP&A Act). The Project is permissible under relevant State Environmental Planning Policies relating to sustainable aquaculture and coastal and marine development. Mandatory assessment matters have been considered, including marine biodiversity, navigation and maritime safety, hazards and risks, and native title.

11.3 Community Views and Benefits

The engagement activities undertaken throughout the EIS phase are summarised in Section 6: Consultation. Overall, the engagement program indicates that community concern regarding the Eden-1 Kelp Aquaculture Farm is generally low to moderate, with a high level of informed support for the Project when the proposed environmental safeguards, adaptive management measures, and broader community benefits are considered. Independent, University-administered surveys and structured stakeholder interviews indicate strong support for regenerative kelp aquaculture as a climate-smart industry, alongside recognition of the Project's potential to contribute to local employment, regional economic resilience, and marine stewardship.

The location of the proposed Eden-1 Project offshore of Disaster Bay has generated targeted community interest and scrutiny, reflecting the environmental sensitivity and social value of the area. Community feedback indicates that concern has been mitigated through iterative project design, including relocation of the lease area further offshore, avoidance of nearshore habitats, no reliance on access through Nadgee Nature Reserve, no requirement for land-based infrastructure within the coastal zone, and the absence of truck movements through Wonboyn. The Project's suspended longline design, limited surface expression, and avoidance of sensitive seabed habitats have further reduced perceived environmental and visual impacts.

<u>The concerns expressed by stakeholders were primarily focused on the following topics:</u>

- Potential environmental impacts, including marine mammals, water quality, microplastics, biosecurity, and the interaction of infrastructure with ecological processes.

⇒ These matters have been comprehensively assessed in the EIS by subject matter experts and specialist studies and include ecology reporting, marine fauna interaction risk, coastal processes, and biosecurity. Mitigation measures, monitoring programs, and adaptive management triggers are detailed in Sections 7 and 9 and supporting appendices.

- Navigation, access, and interaction with existing marine users, including commercial and recreational fishing and vessel traffic.

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⇒ These issues have been addressed through site selection refinements, navigational risk assessment, consultation with maritime authorities, and the development of management plans that maintain recreational fishing access while clearly defining commercial fishing restrictions within a limited proportion of Disaster Bay (the designated lease area).

- Concerns regarding cultural heritage and First Nations involvement, including potential impacts on midden and traditional artefacts.

⇒ These matters have been addressed through completion of a comprehensive Aboriginal Cultural Heritage Assessment Report (ACHAR), ongoing engagement with Registered Aboriginal Parties, and commitments to continued First Nations engagement and future employment.

⇒ These matters have been addressed via the development and adoption of a Cultural Heritage Response Plan.

- Visual amenity and community understanding of kelp infrastructure and what they will see, particularly from beaches and headlands. No residential properties are expected to see the proposed kelp farm as there are no line of sight pathways.

⇒ In response, the Project footprint was relocated further offshore (from 656 m to 1.1 km), visual assessments were undertaken, and extensive community information sessions, FAQs, and publicly available reporting have been provided.

The key benefits of the Project are considered to outweigh the potential impacts of the development. These benefits are summarised below:

- Supports the development of a >$9 million sustainable and regenerative blue-economy industry in the Bega Valley consistent with NSW and Commonwealth policy objectives.
- Contributes to climate change mitigation through the production of kelp-based food, feed, and bioproducts that support emissions reduction and circular-economy outcomes.
- Generates >30 full-time jobs in the Bega Valley, while also providing skills development, research collaboration, and economic diversification contributing >8 full time jobs.
- Provides education, training, and youth pathway opportunities through partnerships with schools, TAFE, universities, and research organisations.
- Establishes long-term community engagement mechanisms, including transparent reporting, ongoing consultation, and third-party environmental audits.
- Supports regional leadership in marine science, regenerative aquaculture, and nature-based solutions.

11.4 Environmental Impacts and Uncertainty

The environmental impacts of the Eden-1 Kelp Aquaculture Farm have been assessed through a range of experts and specialist investigations. The assessment identifies that potential impacts would be limited in extent, localised, and largely reversible. Mitigation measures identified in this EIS are considered feasible and effective. Overall, the findings of the assessment can be relied upon with moderate to high confidence.

A conservative assessment approach has been adopted. While an indicative 1-hectare farm layout plan has been provided, the assessment applies to a broader development footprint to allow for variations in final infrastructure positioning. This maximum assessment envelope ensures that all potential impacts associated with installation, operation, maintenance, and decommissioning have been identified and appropriately mitigated, regardless of ongoing design refinements.

On this basis, the assessment is considered robust and sufficient to inform the consent authority.

<u>Key sources of uncertainty and their management are summarised below:</u>

- Marine ecological systems are inherently dynamic, and surveys represent a snapshot in time. This has been addressed through conservative assumptions, multiple data sources, and the application of adaptive management supported by future continued monitoring.

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- Some ecological responses cannot be predicted with absolute certainty, particularly in relation to marine fauna behaviour. These risks are addressed through the implementation of a Marine Fauna Interaction Plan, monitoring programs, and clear adaptive management triggers.
- Environmental conditions may vary over time, including as a result of climate variability. The Project has been designed for a high-energy, well-flushed offshore environment, and monitoring will inform any required operational adjustments.
- Final anchor and infrastructure placement may vary slightly during installation in response to seabed conditions. The assessed 200-hectare development footprint accommodates this variability and ensures that all potential seabed interactions remain within the designated lease area.
- Decommissioning: All infrastructure associated with the Project is designed to be removable. In the event of decommissioning, a Decommissioning Management Plan would be prepared prior to removal and would set out procedures for infrastructure removal and waste management in accordance with regulatory requirements current at that time.

Overall, the Project has been assessed using a conservative and precautionary approach. Residual uncertainty is addressed through design controls, monitoring, and adaptive management. The assessment demonstrates that environmental impacts would be acceptable and manageable over the life of the Project.

11.5 Compliance and Monitoring

All commitments and mitigation measures associated with the Eden-1 Kelp Aquaculture Farm will be managed through the implementation of an Environmental Management System (EMS). The EMS would comprise key management plans identified in this EIS, as follows:

- Marine Fauna Interaction Plan (approved by DCCEEW)
- Cultural Heritage Response Plan
- Emergency Response Plan
- Traffic Management Plan
- Seaweed Aquaculture Biosecurity Plan
- Monitoring and Maintenance Plan
- Environmental Management Plan
- Waste Management Plan
- Construction Deployment Management Plan
- Decommissioning Management Plan
- Community Engagement Strategy 2025

The EMS would include defined performance indicators, implementation timeframes, roles and responsibilities, communication protocols, environmental monitoring programs, auditing and review arrangements, emergency response procedures, induction and training requirements, and complaints and dispute resolution processes. A structured monitoring and auditing program would be implemented to identify and verify any residual impacts following the application of mitigation measures and to enable adaptive management where required.

The management plans incorporate all relevant mitigation measures and protocols identified in this EIS, as well as any additional requirements imposed through the Conditions of Consent issued by the consent authority. The relevant management plans would be submitted to the consent authority for review and endorsement prior to the commencement of the applicable project stage. Collectively, these plans provide a comprehensive framework to ensure the Project is implemented and operated in a manner that is environmentally responsible, transparent, and compliant with statutory requirements, while enabling continuous improvement through monitoring, reporting, and adaptive management.

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11.6 Ecologically sustainable development – Conclusion

11.6.1 The Precautionary Principle

The Precautionary Principle provides that where there are threats of serious or irreversible environmental damage, a lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. This Environmental Impact Statement has been prepared in accordance with this principle. Where potential environmental risks were identified, the Eden-1 Kelp Aquaculture Farm has been subject to iterative site selection, design refinement, and the incorporation of conservative mitigation and adaptive management measures to ensure that such risks are avoided or reduced to acceptable levels.

The Project has been designed to operate with minimal environmental impact and within the natural carrying capacity of the marine environment. Disaster Bay exhibits suitable hydrodynamic, ecological, and spatial characteristics for offshore kelp aquaculture, including strong oceanic flushing, mobile sandy substrates, and an absence of sensitive habitats within the lease footprint. The lease area occupies less than 5% of Disaster Bay and avoids reefs, seagrass beds, intertidal zones, protected zones, mapped ecological communities, and EPBC Act–listed matters. The nearest terrestrial conservation areas, Nadgee Nature Reserve and Beowa National Park, are located approximately 1.1 kilometres and 3 kilometres from the lease area respectively, with no direct hydrological or ecological connectivity. The Project is also located outside recognised whale aggregation areas and predominant migration pathways.

A conservative assessment approach has been adopted throughout the EIS, including the consideration of credible worst-case scenarios for marine fauna interactions, biosecurity, navigation, and environmental performance. Environmental safeguards, including a Marine Fauna Interaction Plan, Environmental Management Plan, Cultural Heritage Response Plan, and comprehensive monitoring and maintenance programs, have been developed to ensure that potential impacts remain negligible and are adaptively managed throughout the operational life of the Project. Based on the assessments undertaken, no threats of serious or irreversible environmental damage are considered likely to arise as a result of the Project.

11.6.2 Inter-generational Equity

The principle of inter-generational equity requires that the present generation ensure the health, diversity, and productivity of the environment are maintained or enhanced for the benefit of future generations. The Eden-1 Project has been designed to meet this principle by establishing a low-impact, regenerative marine industry that does not compromise the long-term ecological function or social values of the region.

Sustainable seaweed production is a recognised priority under NSW Government aquaculture policy and aligns with national and global policy directions supporting climate resilience, low-impact blue-economy industries, and sustainable food and bioproduct systems. As the first commercial offshore kelp aquaculture development in New South Wales and Australia, Eden-1 addresses a clear industry gap at a time when wild fishery and storm-cast kelp yields are declining and demand for marine biomass is increasing across food, feed, biostimulants, bioplastics, cosmetics, and emerging climate-linked industries. By supporting the development of a nationally significant industry projected to expand substantially by 2040, the Project contributes to long-term economic and environmental resilience for future generations.

11.6.3 Conservation of Biological Diversity and Ecological Integrity

The Project has been specifically designed to maintain biological diversity and ecological integrity. Infrastructure consists of passive suspended longlines, low-profile buoys, and screw anchors that cause only localised and reversible seabed disturbance and do not generate percussive noise. There will be no permanent infrastructure, no chemical inputs, no feed or nutrient additions, and no operational discharges to the marine environment.

The cultivated species, *Ecklonia radiata*, is native to New South Wales coastal waters and occurs naturally within the broader region. Importantly, multiple studies have documented long-term declines of wild *Ecklonia radiata* kelp forests in parts of NSW, driven by marine heatwaves, ocean warming, storm disturbance, and reduced recruitment success. These declines have implications for coastal productivity, biodiversity, and ecosystem resilience, given the foundational role of *Ecklonia radiata* as a habitat-forming species.

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In this context, the Eden-1 Project supports the principles of ecologically sustainable development by contributing to the long-term understanding, resilience, and potential restoration of kelp ecosystems. Seedstock is passively propagated using locally sourced sorus under stringent biosecurity controls, ensuring no requirement of removal of kelp biomass from the wild for commercial use and avoiding genetic contamination. The Project therefore decouples future kelp supply from wild harvest, reducing pressure on natural kelp forests at a time when they are demonstrably vulnerable.

The Project provides a controlled, monitored offshore environment that enables improved understanding of *Ecklonia radiata* growth dynamics, reproductive success, climate tolerance, and resilience in high-energy oceanic conditions. Through ongoing monitoring, research partnerships, and adaptive management, Eden-1 establishes a platform for developing evidence-based restoration pathways, including future applications in kelp forest rehabilitation, climate adaptation strategies, and blue-carbon science.

Formal monitoring programs have been committed to as part of the Project addressing benthic habitats, fish assemblages and stock levels, marine fauna interactions, and other operational performance measures which can enable future adaptive management. Decades of successful local aquaculture in the local region further support the conclusion that the Project is compatible with regional biodiversity values. Mussel farming in Twofold Bay has operated for more than 35 years using comparable longline technology with no recorded marine mammal incidents and negligible impacts on recreational use. Oyster aquaculture at Wonboyn Lake has coexisted with sensitive wetlands, adjacent nature reserves and migratory bird habitats since the 1930s. These established operations demonstrate that well-managed aquaculture can coexist with high environmental and social values and support the conclusion that kelp aquaculture presents an even lower ecological risk profile than other marine industries.

11.6.4 Appropriate Evaluation of Environmental Matters

Environmental matters have been systematically evaluated throughout the planning and design of the Eden-1 Project to ensure consistency with the principles of ecologically sustainable development. The Project incorporates staged expansion, conservative infrastructure design, stringent biosecurity protocols, and ongoing environmental monitoring to manage uncertainty and address data gaps. Comparative risk assessment indicates that kelp aquaculture represents one of the lowest environmental risk profiles of any aquaculture sector globally, with no faecal waste, no feed inputs, limited disease vectors, no nutrient release, and full utilisation of harvested biomass.

Social and economic considerations have also been appropriately evaluated. Extensive community and Aboriginal consultation demonstrates generally broad support for kelp aquaculture as a regenerative, climate-positive industry that provides employment, training pathways, research opportunities, and economic activity. The Project does not unduly restrict public access, does not displace recreational fishing, affects only a small proportion of available NSW commercial fishing grounds, and has no impact on residential amenity or cultural landscapes. Community concerns raised during consultation have been directly addressed and have informed Project refinements, including relocation of the lease area further offshore.

11.6.5 Overall Conclusion

This EIS provides a transparent and evidence-based assessment of the Eden-1 Kelp Aquaculture Farm, supported by detailed specialist studies, mitigation measures, monitoring programs, and adaptive management frameworks that comply with State and Commonwealth legislative requirements. Having regard to the precautionary principle, inter-generational equity, conservation of biological diversity and ecological integrity, and the appropriate evaluation of environmental matters, the Project is considered consistent with the principles of ecologically sustainable development. On the basis of scientific evidence, regulatory guidance, operational precedent, and extensive community consultation, the Eden-1 Project presents low environmental, social, and economic risk and delivers clear long-term benefits to the region and the State.

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Where to from here?

During the public exhibition of this EIS, the community, local council and government agencies are invited to make informed submissions in relation to the Project. The consent authority would consider any formal submissions made during the exhibition period. The Applicant's response to all matters raised in submissions will also be exhibited as Department of Planning, Housing and Infrastructure (DPHI) in commencing preparation of their own assessment of the Project's impacts and its merits and make a recommendation regarding its ability to be approved. Please take the opportunity to make a submission directly to the DPHI and to participate in the Project's approval process.

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12.0 SEARS – CROSS REFERENCE TABLE

Eden-1 Kelp Aquaculture Farm

The following cross reference table is provided to demonstrate the EIS has addressed the Project-specific Secretary's Environmental Assessment Requirements (SEARs) issued for the Project. This table replicates the SEARs issued on 23 May 2022 and provides a direct cross-reference to each sub-requirement to demonstrate completeness. Where a requirement is not applicable to the offshore development, justification is provided.

Issue Summary	Addressed in EIS
The Environmental Impact Statement (EIS) for the development must meet the minimum form and content requirements in Part 8 of the Environmental Planning and Assessment Regulation 2021 (the Regulation) and must have regard to the State Significant Development Guidelines, and any relevant planning circulars. In particular, the EIS must include:	
■ A stand-alone executive summary.	EXECUTIVE SUMMARY
General Requirements	
Preparation of the EIS in accordance with the Environmental Planning & Assessment Regulation 2021 and State Significant Development Guidelines, including provision of sufficient information to enable informed assessment, public exhibition, and determination, as well as the following: ■ Meet the form and content requirements of sections 190 and 192 of the Environmental Planning and Assessment Regulation 2021. ■ Have regard to the State Significant Development Guidelines.	1.0 Introduction 4.0 Project Description 5.0 Statutory Framework
Consideration of advice and requirements from relevant public authorities during preparation of the EIS.	6.0 Consultation 6.7 Issues Raised by Regulatory Authorities 10.2 Consolidated Mitigation Measures – Cross Reference Table Appendix A6 Appendix A11
Description of the existing environment likely to be affected, supported by adequate baseline data and surveys.	7.0 Existing Coastal Environment Appendix A3 Appendix A4 Appendix A8 Appendix A9
Identification of measures to avoid, minimise, mitigate and manage environmental impacts.	9.0 Assessment of Key Issues 10.0 Environmental Management Appendix Group B: Mitigation Plans and Measures

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Issue Summary	Addressed in EIS
Consolidated summary of environmental management and monitoring measures.	1.5 Cumulative Impact Assessment 10.2 Consolidated Mitigation Measures – Cross Reference Table Appendix B6 Appendix B7
Consideration of related or ancillary development (including hatchery, processing, and logistics).	1.4 Related Developments 4.10 Land Based Site 11.0 Project Justification
Provision of high-quality maps, figures and spatial data.	4.7 Lease Location 9.2.3 Structural Integrity and Stability – Longline Infrastructure Appendix A15
Capital Investment Value prepared by a suitably qualified AQIS Certified Quantity Surveyor (CQS).	3.3 Estimated Development Cost Appendix A14
Estimate of construction and operational employment.	9.3.6 Social and Economic
Certification of accuracy and completeness.	Document Verification REAP Declaration
Declaration from a Registered Environmental Assessment Practitioner (REAP) that the EIS includes the information specified in the Department's Registered Environmental Assessment Practitioner Guidelines.	REAP Declaration
1. Statutory and Strategic Context	
Demonstration of site suitability and justification for the proposed ocean location and permissibility.	3.5 Disaster Bay Selection Criteria 3.8 Justification of Preferred Option 11.0 Project Justification
Identification of permissibility and planning approval pathway.	5.2 Permissibility 5.7 Power to Grant Approval
Consistency with relevant SEPPs, legislation and strategic planning instruments, including:. ○ SEPP (Biodiversity and Conservation) 2021 ○ SEPP (Planning Systems) 2021 ○ SEPP (Primary Production) 2021 ○ SEPP (Resilience and Hazards) 2021 ○ SEPP (Transport and Infrastructure) 2021 ○ NSW Marine Waters Sustainable Aquaculture Strategy ○ NSW Marine Estate Management Strategy 2018–2028 ○ NSW Marine Estate Statewide Threat and Risk Assessment 2017 ○ National Conservation Management Plan for the Southern Right Whale 2011–2021 ○ South East and Tablelands Regional Plan 2036	5.3 Relevant State (NSW) Legislation and Regulations

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Issue Summary	Addressed in EIS
Consistency with the Marine Waters Sustainable Aquaculture Strategy (MWSAS) and marine estate policies.	5.4 Relevant Plans and Guidelines
Consistency with regional and local strategic planning documents.	5.6 Local Planning Instruments and Plans
2. Community and Stakeholder Engagement	
During the preparation of the EIS, you should consult with the relevant local, State or Commonwealth Government authorities, infrastructure and service providers, community groups, affected landowners or communities.	6.0 Consultation 9.3 Impact On Community 6.9 Summary of Consultation
Consultation undertaken consistent with Undertaking Engagement Guidelines for State Significant Projects.	6.0 Consultation Appendix C1
Identification of issues raised and how these influenced project design and mitigation.	6.6 Issues Raised by Community 6.9 Summary of Consultation
Strategy for ongoing community and stakeholder engagement.	6.8 Future Engagement Appendix C1
3. Biodiversity	
Description of marine habitats, benthic communities and ecological values within and adjacent to the site. a baseline assessment to determine: ○ habitat types and species types/assemblages beneath and within the vicinity of the proposed lease area ○ biological, chemical and physical properties of the benthic environment	2.0 Review of Existing Information on Seaweed Aquaculture 3.0 Strategic Context 7.9 Benthic Habitats 7.10 Flora and Fauna Appendix A8 Appendix A9
Provide assessment of any direct or indirect impacts on critical habitats, threatened or protected species, populations or ecological communities and their habitats in and around the lease area and in the region	9.4.6 Threatened/Protected Species and MNES 11.0 Project Justification Appendix A7 Appendix A13
Assessment of marine fauna interactions including whales, dolphins, seals and turtles including the following: ○ the potential for entanglement of marine fauna in the lease infrastructure during deployment, operation and decommissioning ○ potential disturbance of whale resting behaviour, in particular the Southern Right Whale and Humpback Whale ○ impacts on marine fauna from lease lighting or navigational features, potential for vessel strike and acoustic impacts ○ operational and maintenance procedures, observer protocols and monitoring and recording procedures to minimise entanglement risk and manage all interactions between marine fauna, lease infrastructure, vessels and humans.	9.4.6 Threatened/Protected Species and MNES 9.4.7 Behavioural Changes 9.2.4 Navigation and Interactions with Other Waterway Users Appendix B1

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Issue Summary	Addressed in EIS
Assessment of potential disturbance, vessel strike and entanglement risks to marine megafauna.	9.4.5 Vessel Strike and Acoustic Pollution 9.4.4 Entanglement and Ingestion of Marine Debris
Assessment of artificial lighting impacts on seabirds and marine fauna.	9.4.3 Artificial Lights
Assessment of marine debris and plastic ingestion risk. Consideration of the potential loss of plastic or other debris from lease infrastructure and mitigation measures to prevent ingestion by marine fauna.	9.4.4 Entanglement and Ingestion of Marine Debris 9.4.9 Resource Use and Waste
Assessment of biofouling and benthic ecological effects. Consideration of potential impacts of biofouling on the benthic environment, including details of biofouling removal methods and assimilation capacity of the marine environment, plus: ○ an outline of a benthic monitoring program for benthic areas within and around the lease area prior to (baseline) and during farm operation.	9.1.2 Habitat Loss and Shading 9.4.1 Marine Habitat, Water Quality and Sedimentation
BDAR preparation or waiver documentation. Assessment of any terrestrial biodiversity impacts in accordance with the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR), except where a waiver for preparation of a BDAR has been granted.	5.3 Relevant State (NSW) Legislation and Regulations - 5.3.3 9.4.6 Threatened/Protected Species and MNES 9.4.8 Areas of Conservation Significance Appendix A10 BDAR Waiver
Monitoring program for marine ecology and fauna interactions.	9.4 Environment 9.4.2 Genetics, Disease and Introduced Pests 9.4.7 Behavioural Changes Appendix B1 Appendix B6 Appendix B7
Mitigation and adaptive management measures.	9.0 Assessment of Key Issues 10.2 Consolidated Mitigation Measures – Cross Reference Table Appendix B7
4. Navigation and Safety	
Assessment of impacts on navigation, commercial shipping, recreational boating and maritime safety. Navigation risk and impact assessment prepared in accordance with Port Authority of NSW and NSW Roads and Maritime.	9.2.4 Navigation and Interactions with Other Waterway Users

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Issue Summary	Addressed in EIS
Assessment of interactions with port operations and vessel movements. Description and assessment of impacts from vessel movements associated with the development on port operations, commercial and recreational/tourism shipping movements and boating/fishing activities	9.3.2 Marine Vessel and Vehicular Transport Appendix B4
Identification of safety buffers, marking, lighting and exclusion measures. an assessment of the potential impacts of the lease infrastructure and associated navigational features on water-based traffic, including details of any proposed vessel exclusion zones and risk of vessel entanglement. Consideration of measures to ensure the safety of all recreational users of Disaster Bay and Twofold Bay.	9.2.4 Navigation and Interactions with Other Waterway Users
Consideration of Defence activities and restricted areas.	7.17 Naval Operations and Commonwealth Waters
Assessment of safety risks to recreational users and fishers. an assessment of the potential impacts of the lease infrastructure and associated navigational features on water-based traffic, including details of any proposed vessel exclusion zones and risk of vessel entanglement.	9.2.4 Navigation and Interactions with Other Waterway Users
5. Coastal Processes & Suitability of Infrastructure	
Demonstration that site depth, seabed conditions and clearance are suitable for infrastructure.	7.0 Existing Coastal Environment 7.2 Bathymetry 7.3 Substrate Characteristics 9.1.1 Coastal Process and Suitability of Infrastructure
Assessment of wave climate, swell direction and hydrodynamic forces.	7.6 Wave Climate 9.1.1 Coastal Process and Suitability of Infrastructure Appendix A3
Assessment of infrastructure resilience to extreme weather and storm events.	9.1.1 Coastal Process and Suitability of Infrastructure 9.2.3 Structural Integrity and Stability – Longline Infrastructure
Assessment of potential biofouling and flow effects.	9.1.2 Habitat Loss and Shading
Emergency response measures for severe weather events.	Appendix B3 Emergency Response Plan Appendix B6 Monitoring and Maintenance Plan
6. Biosecurity and Health Management	
Assessment of disease and pest risks associated with aquaculture operations. detailed disease and pest management protocols for seaweed seedstock harvested at the land-based hatchery (including the use of any chemicals), prior to transfer to the lease area, and following placement in the lease area.	9.4.2 Genetics, Disease and Introduced Pests Appendix B5

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Issue Summary	Addressed in EIS
Measures to protect genetic integrity of cultured species.	9.4.2 Genetics, Disease and Introduced Pests
Hatchery and operational biosecurity protocols. Must include procedures for handling, treating and disposing of wastes, infrastructure and other materials that are potential carriers of disease agents or pests.	Appendix B5 Seaweed Aquaculture Biosecurity Plan
Monitoring and reporting measures.	Appendix B6 Monitoring and Maintenance Plan
7. Water Quality	
Baseline water quality and nutrient conditions.	7.7 Water Quality Characteristics Appendix A4
Assessment of potential impacts on water quality. Assessment of potential marine water quality impacts associated with the development in accordance with the requirements of the National Water Quality Management Strategy and Marine Water Quality Objectives, including: details of existing background conditions and associated trigger values for all relevant water quality parameters.	9.4.1 Marine Habitat, Water Quality and Sedimentation
Suitability of water conditions for seaweed growth. Evidence that water quality parameters are within the acceptable range for the proposed end use of the seaweed and for all the physiological requirements of the seaweed species selected, having regard to the relevant Australian Government water quality guidelines.	2.0 Review of Existing Information on Seaweed Aquaculture 7.0 Existing Coastal Environment 7.8 Ocean Temperature 9.0 Assessment of Key Issues Appendix A4
Investigation on any dredging activities that occur in the region.	9.4.1 Marine Habitat, Water Quality and Sedimentation
Monitoring and spill response procedures and proposed water quality mitigation and management measures.	9.4.1 Marine Habitat, Water Quality and Sedimentation 9.1.2 Habitat Loss and Shading 4.9 Beach-cast Kelp Appendix B7
8. Traffic and Transport	
Assessment of marine and land transport impacts associated with construction and operation.	4.12.1 Transportation 9.3.2 Marine Vessel and Vehicular Transport
Assessment of port access and logistics routes. details of all daily and peak traffic volumes likely to be generated during all key stages of construction and operation, including a description of key access / transport routes, vehicle types and potential queuing impacts: ○ details of proposed access arrangements for the Edrom Multi-Purpose Wharf (not required). ○ an assessment of the predicted impacts of development traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts Note: Road impacts considered negligible	4.12.1 Transportation 9.3.2 Marine Vessel and Vehicular Transport Appendix B4 Traffic Management Plan

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Issue Summary	Addressed in EIS
Emergency and operational access arrangements: ○ details of access arrangements for monitoring, maintenance and emergencies, including identification and assessment of impacts of any emergency access arrangements to Greenglades or Wonboyn beaches.	9.3.5 Work Health and Safety Appendix B3 Emergency Response Plan
9. Aboriginal Cultural Heritage	
Aboriginal Cultural Heritage Assessment and consultation process including a detailed Aboriginal Cultural Heritage Assessment Report (ACHAR) prepared in accordance with relevant Heritage NSW and Environment and Heritage guidelines. The ACHAR must: ○ identify, describe and assess impacts on any Aboriginal cultural heritage sites or values associated with the site ○ provide evidence and details of consultation with Aboriginal people in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW 2010)	6.4 Aboriginal Consultation and ACHAR Process 7.18.1 Aboriginal Heritage 9.3.3.1 Aboriginal Heritage in Disaster Bay Appendix A5: Aboriginal Cultural Heritage Report Appendix B2: Cultural Heritage Response Plan
Assessment of impacts on cultural values and fishing practices.	7.18.1 Aboriginal Heritage
Consider potential impacts on native title in accordance with the Commonwealth Native Title Act 1993.	5.5 Relevant Commonwealth Legislation
10. Environmental Heritage	
Provide a heritage impact assessment which detail potential impacts on heritage assets, including maritime archaeology (shipwrecks), in accordance with relevant Heritage NSW guidelines.	7.18 Heritage 9.3.3 Aboriginal, European and Environmental Heritage
11. Visual Amenity	
Assess visual impacts of lease infrastructure and associated navigational equipment on any private properties, key vantage points (Wonboyn and Greenglades Beach, Baycliff and lookouts along Greencape Lighthouse access road), publicly accessible areas and other waterway users.	9.3.1 Visual Amenity 9.4.3 Artificial Lights Appendix A15
12. Noise and Vibration	
Provide a quantitative noise and vibration impact assessment undertaken by a suitably qualified acoustic consultant in accordance with the relevant Environment Protection Authority guidelines and Australian Standards, including any impacts on aquatic ecology (particularly cetaceans) during all stages of the development (construction, deployment, operation and decommissioning). Utilised NSW DPIRD Noise calculation modelling. Note: NSW DPIE Fisheries method adopted for noise assessment.	9.2.1 Noise During Construction 9.3.4 Noise During Operation
Assessment of underwater acoustic impacts on marine fauna.	9.4.5 Vessel Strike and Acoustic Pollution
13. Waste	
Identification and management of waste streams. Details of waste storage, handling and disposal,	9.4.9 Resource Use and Waste Appendix B8

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Issue Summary	Addressed in EIS
Monitoring and management of marine debris. Procedures to monitor Wonboyn and Greenglades Beach for waste/debris from the lease area during operations.	4.9 Beach-cast Kelp 9.1.2 Habitat Loss and Shading 9.4.9 Resource Use and Waste Appendix B8
14. Offshore Resources	
Consideration of offshore resource uses and potential conflicts, plus a description and identification of impacts on any offshore resources, exploration and mining.	4.7 Lease Location 7.16 Commercial and Recreational Activities 9.4.10 Offshore Resources
15. Socio-Economic	
Provide a social impact assessment in accordance with the Department's Social Impact Assessment Guideline for State Significant Projects.	7.20 Social Impact Assessment Appendix A6 Appendix A11
Assessment of economic benefits and regional employment.	7.19 Social and Economic 9.3.6 Social and Economic Appendix A12
16. Ecologically Sustainable Development	
Include a description of how the proposal will incorporate the principles of ecologically sustainable development in the design, construction and ongoing operation of the development, comply with the Australian Aquaculture Code of Conduct, and include consideration of climate change impacts through choice of materials for lease infrastructure, use of low emission vehicles/vessels, reducing energy use, and the re-use and recycling of materials and waste.	5.4 Relevant Plans and Guidelines 8.0 Risk Assessment 8.9 Summary of Risk Evaluation 9.0 Assessment of Key Issues 11.0 Project Justification
17. Construction	
Construction and deployment methodology and environmental safeguards.	4.12 Construction and Operation of the Project Appendix B9
18. Decommissioning	
Decommissioning – a draft decommissioning management plan that includes a process description, waste disposal measures, schedule and monitoring.	4.15 Decommissioning 9.2.5 Decommissioning Appendix B10
19. Consultation	
During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. The EIS must detail the engagement undertaken and demonstrate how it was consistent with the Undertaking Engagement Guide: Guidance for State Significant Projects. The EIS must detail how issues raised and feedback provided have been considered and responded to in the project. Where amendments have not been made to address an issue, a short explanation should be provided.	6.0 Consultation Appendix A6

Table 20. Secretary's Environmental Assessment Requirements – Cross Reference Table.

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14.0 SUPPORTING DOCUMENTS

14.1 Appendix A: Specialist and Technical Appendices

- Appendix A1: EPBC Approval 20 June 2025 (EPBC 2025/10149) 2025
- Appendix A2: NSW Crown Lands Division: Landowner's Consent (not required) 2025
- Appendix A3: BMT Disaster Bay Coastal Processes 2022
- Appendix A4: Disaster Bay Nutrient Availability Report 2024
- Appendix A5: Aboriginal Cultural Heritage Report (AL21/004) July 2024
- Appendix A6: Community Consultation Report - Socio-Economic Considerations for Regenerative Aquaculture on the NSW South Coast 2024
- Appendix A7 Commonwealth and NSW Threatened and Protected Species Register
- Appendix A8: Disaster Bay Seafloor Survey 2024
- Appendix A9: Elgin Benthic Survey, Fish Assemblages and Seafloor Mapping 2025
- Appendix A10: NSW DPHI Biodiversity Development Assessment Report (BDAR) waiver 2025
- Appendix A11: Community Engagement Considerations for Regenerative Aquaculture on the NSW South Coast 2024
- Appendix A12: Regenerative Aquaculture Farming on the NSW South Coast – Investigation of Business Cluster 2024
- Appendix A13 Eden-1 Protected Species Register Summary 2025
- Appendix A14 Estimated Development Cost AQIS Certified 2026
- Appendix A15 Disaster Bay Site Mapping and Figures 2025

14.2 Appendix B: Mitigation Plans and Measures

- Appendix B1: Marine Fauna Interaction Plan (approved by DCCEEW)
- Appendix B2: Cultural Heritage Response Plan
- Appendix B3: Emergency Response Plan
- Appendix B4: Traffic Management Plan
- Appendix B5: Seaweed Aquaculture Biosecurity Plan
- Appendix B6: Monitoring and Maintenance Plan
- Appendix B7: Environmental Management Plan
- Appendix B8: Waste Management Plan
- Appendix B9: Construction Deployment Management Plan
- Appendix B10 Decommissioning Management Plan

14.3 Appendix C: Community Engagement and FAQs

- Appendix C1: Community Engagement Strategy 2025
- Appendix C2: Frequently Asked Questions (FAQ-1)
- Appendix C3: Frequently Asked Questions -2 (FAQ-2)
- Appendix C4: Auskelp FY22 Annual Report
- Appendix C5: Auskelp FY23 Annual Report
- Appendix C6: Auskelp FY24 Annual Report
- Appendix C7: Auskelp FY25 Annual Report

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14.4 Additional Document Links

- NSW Seaweed Prospectus 2024
- Far South Coast Regional Economic Development Strategy (REDS) 2023 Update
- Bega Valley Shire Community Strategic Plan 2042
- South East and Tablelands Regional Plan 2036
- NSW Government Regional Economic Development Strategies
- BECRC Socio Economic Considerations for Regenerative Aquaculture on the NSW South Coast 2024
- BECRC Community Engagement Considerations for Regenerative Aquaculture on the NSW South Coast 2024
- BECRC First Nation Considerations for Regenerative Aquaculture on the NSW South Coast 2024
- BECRC Regenerative Aquaculture Farming on the NSW South Coast - Business Cluster 2024
- Global Seaweed Report 2023 [World Bank]
- NSW Government Marine Estate Strategy & Aquaculture Guidelines
- Australian Seaweed Industry Blueprint [Agrifutures] 2020
- FRDC Information Portal 2025
- Unlocking the Growth and Innovation of the Australian Seaweed Industry (2023)

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