



Eden-1 Environmental Management Plan

Disaster Bay & Twofold Bay, NSW

DOCUMENT DETAILS

Document details	The details entered below are automatically shown on the cover and the main page footer. PLEASE NOTE: This table must NOT be removed from this document.
Document title	Eden-1 Environmental Management Plan
Document subtitle	Disaster Bay & Twofold Bay, NSW
Applicant	Auskelp Pty Ltd ABN 33 644 315 613
Lease Area	Issued by NSW Department of Primary Industries – Fisheries (NSW DPI Fisheries) [note: now called DPIRD Fisheries] awarded lease area AL21/004 to Auskelp Pty Ltd on 18 May 2021, following a competitive tender process
Lease Size	200 ha
Kelp Species	Ecklonia radiata
NSW Case ID	SSD-41680467
Date	18 June 2026
Version	v2.3
Previous Version	V2.2
Author	Christopher Ride
Cover Image Credit	Greencape Lighthouse, Auskelp, 2025
Disclaimer	The information contained in this publication is based on knowledge and understanding at the time of writing (May 2026)
Document Update	Annual review of EMP to incorporate monitoring outcomes, improvements, corrections, and ongoing Agency and DPIRD Fisheries and relevant Agency feedback.
Copyright	© Auskelp Pty Ltd 2025 This document is protected by copyright. You may download, display, print and reproduce this material in an unaltered form only (retaining this notice) for your personal use or for non-commercial use
Project Definition	Kelp Aquaculture Farm

TABLE OF CONTENTS

DOCUMENT DETAILS	II
TABLE OF CONTENTS	III
SECTION A – ENVIRONMENTAL CONTACT DIRECTORY.....	V
SECTION B – KEY METRICS	VII
SECTION C – REPORTING COMMITMENTS	VIII
SECTION D – WATER QUALITY VALUES.....	IX
1.0 ENVIRONMENTAL MANAGEMENT PLAN.....	10
1.1 Project Overview	10
1.2 Introduction	10
1.3 Objectives	10
1.4 Description of Activities	11
1.5 Infrastructure Guidelines.....	12
1.6 Key Environmental Values and Risks	12
1.7 Waste and Debris	12
1.8 Benthic and Habitat Management	12
1.9 Marine Fauna Interaction Management	12
1.10 Water Quality	12
1.11 Vessel Operations and Navigation	12
1.12 Monitoring and Adaptive Management	13
1.13 Community and Cultural Heritage Engagement.....	13
1.14 Roles and Responsibilities	13
1.15 Reporting and Compliance.....	13
2.0 FARM INFRASTRUCTURE.....	14
2.1 Anchor and Rope Specifications	14
2.2 Weekly Visual Inspections	16
2.3 Alternate Visual Inspections – Greenglades Beach	16
2.4 Monthly Monitoring	17
2.5 Annual Diver-assisted Inspections.....	17
2.6 Annual Servicing.....	17
2.7 Post-storm Inspections	17
2.8 Biofouling Management.....	18
2.9 Equipment Design and Redundancy.....	18
2.10 Infrastructure Labelling and Recovery	18
2.11 Recordkeeping and Reporting	18
2.12 Best Practice Alignment	19
2.13 Adaptive Management	19
2.14 Mooring and Anchoring System.....	19
2.15 Longline and Backbone Cables	20
2.16 Dropper Lines and Grow-Out Assemblies	20
2.17 Surface Buoys and Marking.....	20
2.18 Inspection and Maintenance.....	20
2.19 Debris Management and Retention.....	20
2.20 End-of-Life Gear Management	21
2.21 Detached Gear.....	21
2.22 Ongoing Reporting	21
3.0 HATCHERY PROTOCOLS.....	23

3.1 Genetic Source and Seedstock	23
3.2 Species, provenance and genetic controls	23
3.3 Hatchery biosecurity and propagation controls.....	24
3.2 Biosecurity and Containment	24
3.3 Spore Release and Cultivation.....	25
3.4 Juvenile Cultivation Conditions	25
3.5 Pre-Deployment and Transport.....	25
3.6 Recordkeeping and Reporting	26
3.7 Waste and Discharge Management.....	26
4.0 HARVESTING PROTOCOLS	27
4.1 Harvesting Protocols.....	27
4.2 Harvest Timing.....	27
4.3 Reproductive Maturity Controls.....	27
4.4 Harvest Method	27
4.5 Zero-Waste Utilisation	27
4.6 Infrastructure Recovery	27
4.7 Environmental Controls	27
5.0 VESSEL OPERATIONS.....	29
5.1 Vessel Type and Specifications	29
5.2 Navigation and Safety Compliance – Working Boats	29
5.3 Biosecurity and Environmental Controls	29
5.4 Operating Conduct in and Around the Lease	30
5.5 Maintenance and Monitoring Operations	30
5.6 Emergency Response and Incident Reporting	30

SECTION A – ENVIRONMENTAL CONTACT DIRECTORY

Eden-1 Kelp Aquaculture Farm • Disaster Bay & Twofold Bay, NSW

Lease AL21/004 • 200 ha • NSW Case ID SSD-41680467 • Auskelp Pty Ltd (ABN 33 644 315 613)

Report any marine-fauna entanglement within 4 hours of notification (NPWS and NSW DPIRD Fisheries), and any unusual ecological finding to NSW DPIRD Fisheries within 7 days. Report pollution or spills to the NSW EPA Environment Line on 131 555. The Environment Manager is responsible for ensuring incidents are reported, logged and tracked to close-out.

Auskelp Emergency Contacts

Primary Auskelp personnel for biosecurity notifications. The Farm Manager is responsible for ensuring **marine-based** reportable events are notified and recorded in the biosecurity incident register. The Lead Scientist is responsible for ensuring all **land-based** reportable events are notified and recorded in the biosecurity incident register.

Auskelp Contact	Role	Mobile
Christopher Ride	Director	0437 555 555
Jake Bailey	Operations Manager	0408 556 944
Ignacio Retamal	Hatchery Manager / Lead Scientist	0468 523 506
Andre Robert	Farm Manager	0439 393 081

Environmental Incident & Pollution Reporting

Organisation / Contact	Phone / Email	When to use
NSW EPA – Environment Line (24/7)	131 555	Water pollution, fuel or chemical spills, marine debris loss, and waste classification/disposal queries (POEO Act; NSW Waste Classification Guidelines). Also used to report harm to Aboriginal objects or sites.
NSW DPIRD Fisheries – Information Line	1300 550 474	Report unusual ecological findings within 7 days (per MFIMP); annual environmental performance and deployment report; major inspection issues within 24 hours.

Aquaculture Regulator – NSW DPIRD Fisheries

Organisation / Contact	Phone / Email	When to use
NSW DPIRD Fisheries – Information Line	1300 550 474	Annual reporting; beach-cast Ecklonia deposits; 3-yearly BRUV fish-assemblage and benthic survey reporting; audits and licence compliance.
NSW DPIRD – Aquaculture Service Desk	02 4916 3900	Lease AL21/004 and aquaculture permit

Organisation / Contact	Phone / Email	When to use
		administration and operational notifications.
NSW DPIRD – Marine Environment	marine.environment@dpi.nsw.gov.au	Marine environment and aquatic matters; written notifications and submissions.

Marine Fauna & Wildlife

Organisation / Contact	Phone / Email	When to use
NSW NPWS	1300 PARKS 1300 072 757	Injured, entangled or vessel-struck marine wildlife (per MFIMP / B11). Also Greenglades Beach information-board arrangements.
NSW DPIRD Fisheries	1300 550 474	Fauna interaction and entanglement notification (per MFIMP) and threatened-species matters.

Maritime Safety, Navigation & Security

Organisation / Contact	Phone / Email	When to use
AMSA Response Centre (JRCC Australia)	1800 641 792	Vessel notification, maritime distress and search and rescue, and ship-sourced pollution.
Transport for NSW – Maritime (24 hr)	02 9962 9072	Navigation guidelines, navigation aids / IALA corner markers, and marine incident reporting.
Port Authority of NSW – Port of Eden Harbour Master	02 6496 1719 / edenpilots@portauthoritynsw.com.au	Snug Cove vessel-base arrangements and port navigation advice.
NSW Police – Eden (Water Police / Marine Area Command)	02 6496 0699 / 131 444	Malicious damage to infrastructure (report to Maritime Police within 24 hours); on-water incidents and unauthorised access.

Cultural Heritage & Community

Organisation / Contact	Phone / Email	When to use
Heritage NSW – Aboriginal Cultural Heritage	02 9873 8500 / heritagemailbox@environment.nsw.gov.au	Aboriginal cultural heritage matters and unanticipated finds. Report harm to Aboriginal objects or sites via the EPA Environment Line (131 555).
AHIMS (Aboriginal Heritage Information Management System)	02 9585 6345 / ahims@environment.nsw.gov.au	Aboriginal site searches and registration.
Registered Aboriginal Parties (RAP)	Via email RAP List	Ongoing Aboriginal engagement and cultural-heritage liaison (per Cultural Heritage Response Plan).
Community feedback / complaints	www.auskelp.net	Public complaints and feedback channel; annual reports published online.

SECTION B – KEY METRICS

Key Environmental Values / Review

- Vessel Base: Snug Cove
- Hatchery Base: Unit 9, 18-20 Weecoon St Eden 2550
- Processing Base: Edrom
- Corner Markers: Must meet IALA standards and be approval by Port Authority of NSW
- Significant Storm Event: Wave height >6m Hs
- GPS Farm locations: Quarterly review
- Mammal Entanglement Reporting: within 4 Hours of notification
- DPIRD Fisheries Reporting: As per Section C – Reporting Commitments
- Water Quality: See attached baseline values on Page ix
- Benthic Review: 3 years
- Fish Assemblages Review: 3 years
- Community Updates: Annual Reports published online
- Fouling Assessment: 30 Days
- Mammal Entanglement or Incident Reporting: Ongoing reporting
- Biofouling Removal: As per Monitoring and Maintenance Plan
- Ocean Rig Inspection: Post Storm event (>6m Hs)
- Diver or Drone RIG Inspection: Annual
- Maximum Farm Area: 200 hectares
- Maximum Rigs (1-Hectare): 100 total
- Mainline Rope Gauge: Minimum 25 mm
- Attachment to seabed, Screw anchors or concrete blocks (temporary only)
- Screw Anchor Depth: Minimum 3 m, maximum 5 m
- Labelling: Mandatory for mainlines and major buoys
- Removal of Detached Infrastructure: 48 hours (if weather permits)
- Malicious Damage: Must be reported to Maritime Police within 24 Hours
- Vessel Safety: All vessels carry EPIRB, First Aid kit and all required safety gear
- Complaints reporting: Online via Auskelp Website
- Hatchery protocols: Biosafe environment, UV and filtered water
- Water collection: Hatchery ocean water not to be taken 1 nm of cruise liner, military vessel, cargo vessel at any time, or within a 48 hour period after vessel departure
- Seedstock: Collected from local area only (within 10km)
- Seedstock Heath: No contamination deployed to ocean farm
- Waste Disposal: No artificial waste disposal to ocean environment
- Ropes Re-use: post-harvest ropes will be removed and reused each season
- Zero Waste Biomass: All harvested biomass will be processed

SECTION C – REPORTING COMMITMENTS

The following reporting is mandatory as committed in the EIS-Auskelp-Kelp-Aquaculture-Farm-v9.4-FINAL dated 13 March 2026, as follows:

Biodiversity	
BI1	■ Comply with approved Marine Fauna Interaction Management Plan (MFIMP) ■ Comply with NSW DPIRD Aquaculture Management Guidelines and National Light Pollution Guidelines for Wildlife ■ Annual review of threatened species register ■ Seedstock derived only from wild Disaster Bay <i>Ecklonia radiata</i> (within NSW local area) with wild sori collection repeated bi-annually to maintain genetic variation ■ Maintain minimum whale approach distances as per NSW DPIRD, DCCEEW and NPWS regulations and requirements ■ 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 <i>Ecklonia radiata</i> to NSW Fisheries
Reporting to NSW DPIRD Fisheries – See Section 2.22 Ongoing Reporting	
RE1	■ 3-year fish assemblage BRUV testing – commences once >50% farm operations deployed
RE2	■ 3-year benthic survey testing – commences once >50% farm operations deployed
RE3	■ Annual reporting of excess beach cast deposits of <i>Ecklonia radiata</i> on Greenglades beach related to farming operations

Note 1: Auskelp confirms that this Environmental Management Plan (EMP) has been prepared in accordance with the requirements of the Environmental Planning and Assessment Regulation 2021 and the Planning Secretary's Environmental Assessment Requirements (SEARs) for the Eden-1 Kelp Aquaculture Farm and Environmental Impact Study dated 13 March 2026. To the best of our knowledge this EMP contains all information relevant to the environmental assessment of the proposed development.

SECTION D – WATER QUALITY VALUES

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 <i>E. radiata</i>)
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)

Note 2: Water quality is not expected to be adversely affected by the Project. The Eden-1 farm is a non-intensive, extractive aquaculture system that uses no feed, fertilisers or chemical inputs, generates no effluent or nutrient discharge, and produces no operational waste. Cultivation of native *Ecklonia radiata* draws down dissolved nutrients and carbon rather than adding them, and the farm is located in a high-energy offshore environment with strong natural flushing. On this basis, routine water quality testing is not considered necessary; however, key water quality parameters will be monitored against baseline data so that any change can be detected and managed adaptively.

1.0 ENVIRONMENTAL MANAGEMENT PLAN

Eden-1 Kelp Aquaculture Farm

Auskelp Pty Ltd | 2025

1.1 Project Overview

- Project Title: Eden-1 Kelp Aquaculture Farm
- Location: Offshore in Disaster Bay, launching from Eden Snug Cove and Edrom (Pentarch) private ramp
- Operational Period: Autumn, Winter, Spring (February–December)
- Hours of Operation: 0700–1700 AEST, no night operations (except emergency)
- Key Operational Activities: Hatchery, deployment, monitoring, maintenance, and harvesting of kelp longline infrastructure
- Vessel Base: Snug Cove, Port of Eden (to be confirmed with Port Authority of NSW and Transport for NSW)
- Hatchery Base: 18–20 Weecoon St Eden NSW 2550
- Stage 1 Processing Base: 18–20 Weecoon St Eden NSW 2550
- Stage 2 Processing Base: Edrom (Pentarch) Industrial Area TBA

1.2 Introduction

Auskelp Pty Ltd is developing an offshore kelp aquaculture farm (Eden-1) in Disaster Bay, NSW. This EMP outlines procedures to minimise and manage environmental risks during the establishment and ongoing operations of the farm. It has been designed to comply with NSW aquaculture regulations, the Environmental Planning and Assessment Act 1979 (NSW), and the Environment Protection and Biodiversity Conservation Act 1999 (Cth).

The purpose of the Environmental Management Plan (EMP) for the Eden-1 Kelp Aquaculture Farm is to provide a comprehensive, structured framework that guides all operational, environmental, and compliance-related activities associated with the development, installation, and ongoing management of the farm. The EMP is designed to ensure that the farm operates in an ecologically sustainable manner by identifying potential environmental risks and detailing specific mitigation strategies, performance standards, and monitoring (reporting) protocols to manage those risks effectively. It outlines procedures and related specialist documents for infrastructure deployment, vessel operations, biosecurity, waste handling, marine fauna interactions, installation, decommissioning and emergency response, ensuring that every aspect of the project adheres to relevant legislative requirements and best-practice guidelines.

The EMP also serves as a critical tool for regulatory compliance, providing evidence to NSW and Commonwealth agencies that appropriate environmental safeguards are in place and that adaptive management is embedded into the project lifecycle. It enables ongoing evaluation and continual improvement through routine monitoring, incident reporting, and feedback, fostering transparency and accountability. Moreover, the EMP supports Auskelp's broader environmental objectives, including climate resilience, habitat protection, and marine ecosystem stewardship, while also facilitating community confidence in the project's environmental integrity. By articulating clear responsibilities, standards, and review mechanisms, the EMP ensures that the Eden-1 Kelp Aquaculture Farm contributes positively to the local marine environment and regional sustainability goals.

1.3 Objectives

- 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 manager, with periodic reporting provided to NSW DPIRD Fisheries to confirm mitigation, monitoring, and management measures are adhered to as per the aquaculture licence.
- Prevent, mitigate or manage adverse impacts on the marine and coastal environment.
- Ensure operations are consistent with ecosystem-based management principles.
- Guide monitoring and adaptive management throughout the project lifecycle.
- Maintain compliance with permit conditions, regulations, and stakeholder expectations.

This EMP is required to comply with the detailed policies and protocols set out in the following management documents:

- B1 Marine Fauna Interaction Plan
- B2 Cultural Heritage Response Plan
- B3 Emergency Response Plan
- B4 Traffic Management Plan
- B5 Biosecurity Plan
- B6 Monitoring and Maintenance Plan
- B7 Environmental Management Plan (this document)
- B8 Waste Management Plan
- B9 Construction Deployment Management Plan
- B10 Decommissioning Management Plan

1.4 Description of Activities

- Deployment of up to 100 one-hectare kelp rigs over 200 ha.
- Use of longline infrastructure fixed with screw anchors.
- Regular inspection, harvesting, and seasonal maintenance.

- No use of feed, chemicals, or netted enclosures.
- Mandatory rig inspection post storm events >6m Hs wave height

1.5 Infrastructure Guidelines

- Minimum 25mm longlines
- Deployment of screw anchors
- All longlines and buoys labelled

1.6 Key Environmental Values and Risks

- Benthic Environment: Dominated by soft sediments with no mapped seagrass or reef habitat.
- Water Quality: High natural flushing; no nutrient discharge from operations.
- Marine Fauna: Presence of cetaceans, pinnipeds, and pelagic fish species.
- Navigation and Visual Amenity: Remote location with minimal traffic and limited visual impact.

1.7 Waste and Debris

- Kelp is fully utilised in harvest; no effluent discharge.
- All damaged ropes and infrastructure will be reused or disposed of under NSW EPA guidelines.
- Kelp collection protocols in place.

1.8 Benthic and Habitat Management

- Screw anchors selected to minimise footprint (~4 m deep, small diameter).
- Design avoids critical habitats, archaeological finds and sensitive substrata.
- Longlines suspended ~10 m above seafloor to reduce shading.

1.9 Marine Fauna Interaction Management

- Marine Fauna Interaction Plan (MFIP) and Observer Protocols implemented.
- Taut-rope system minimises entanglement risk.
- Entanglement risk treated as moderate to ensure precautionary principles are implemented.
- Real-time entanglement response procedure in place.

1.10 Water Quality

- No additional effluent input or sedimentation from operations.
- Water quality reporting not required due to no inputs (feed, fertiliser, pesticides, chemicals, waste); however water quality metrics will be actively monitored against baseline data to measure water quality degradation/improvement over time.

1.11 Vessel Operations and Navigation

- All vessels to adhere to NSW navigation guidelines and use designated access routes.
- Notification of lease locations to AMSA.
- Locations and mapping on Auskelp's website.
- Navigation aids maintained as per IALA, NSW Port Authority and NSW Maritime recommendations.

- Information boards located at the following boat ramps: Wonboyn, Eden Quarantine Bay, Eden Snug Cove.

1.12 Monitoring and Adaptive Management

- Post storm inspections.
- Structural Integrity and Stability Monitoring Program (SISMP).
- Annual visual inspections by divers or ROV.
- Entanglement and fauna incident logs maintained and reported.

1.13 Community and Cultural Heritage Engagement

- Aboriginal Cultural Heritage Assessment and ongoing First Nations engagement.
- Community information sessions if required as determined by (NSW DPIRD Fisheries); annual reports published online.
- Feedback incorporated into site design and operations.
- Ongoing annual reports and community feedback available via website: www.auskelp.net
- Information posters displayed at Greenglades Beach information board (in agreement with NSW Parks and Wildlife).

1.14 Roles and Responsibilities

- Auskelp Environment Manager oversees implementation and ongoing update of the EMP.
- Marine Operations Crew trained in the following protocols:
 - Emergency Response Plan
 - Marine Fauna Interaction Plan
 - Cultural Heritage Response Plan
 - Seaweed Aquaculture Biosecurity Plan
 - Monitoring and Maintenance Plan
 - Traffic Management Plan
 - Waste Management Plan
 - Construction Deployment Management Plan
 - Decommissioning Management Plan
- Annual Environmental Management Plan (EMP) review to incorporate monitoring outcomes, improvements, corrections, and ongoing DPIRD Fisheries, stakeholder and community feedback.

1.15 Reporting and Compliance

- Environmental performance reports submitted to DPIRD Fisheries as per SECTION C, or as agreed.
- Immediate reporting of any entanglement or significant incidents for relevant agencies (DPIRD Fisheries and NPWS) as per relevant reporting and management documents.

2.0 FARM INFRASTRUCTURE

2.1 Anchor and Rope Specifications

The Eden-1 Kelp Aquaculture Farm longline infrastructure will be aligned parallel to the predominant 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-metre 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 (Figure 3) 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.

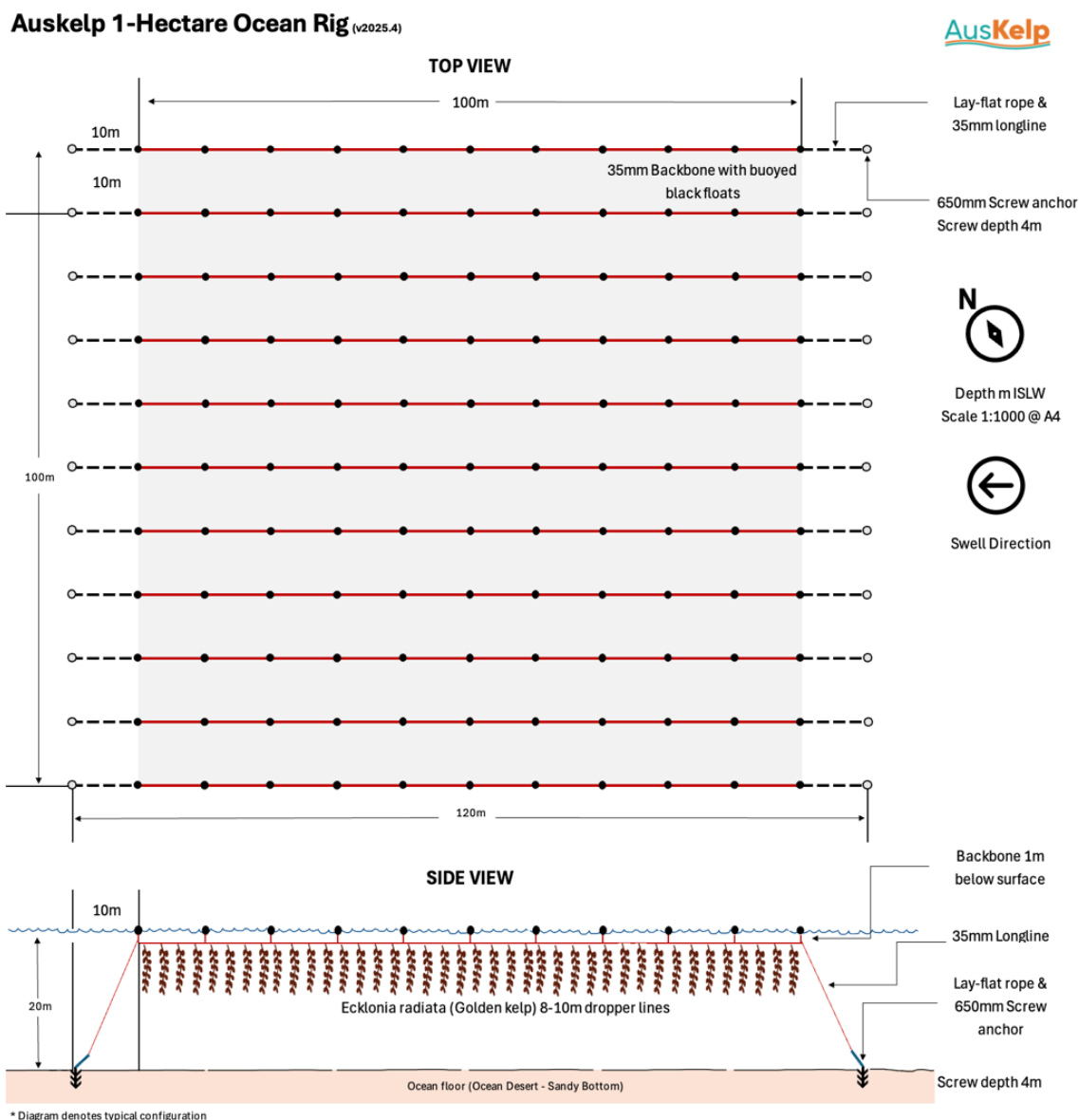


Figure 1: Auskelp 1-Hectare Ocean Rig (Credit: Auskelp 2025).

Attached along each longline are marine grade 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 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 – see Figure 3) 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 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).
- **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.

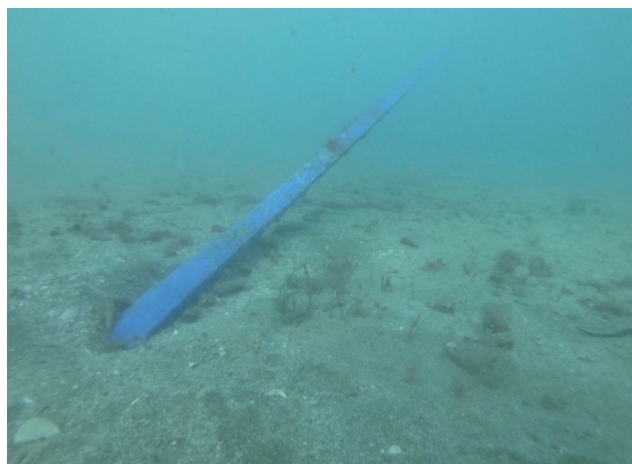


Figure 2: Typical screw anchor shaft with helix and pivot point (Credit: Blue Harvest 2025).

Figure 3: Installed screw anchor lay-flat pivot, located Jervis Bay, NSW (Credit: Blue Harvest 2025).

2.2 Weekly Visual Inspections

On-water inspections are to be conducted weekly, weather permitting, using support vessels equipped with safety and inspection tools including underwater drone. Inspections include:

- Surface condition of buoys, longlines, and floats.
- Tension levels of longlines and droplines.
- Evidence of rope chafing, slack, twisting, or visible wear.
- Visual signs of marine growth or surface biofouling.
- GPS position cross-checks against lease boundary coordinates.
- Visibility and condition of corner markers.
- Integrity of any signage or labels (e.g. "Auskeep" IDs).

All findings are to be logged using standardised field inspection sheets. Minor issues are to be rectified immediately; major issues must be reported within 24 hours to management and, if applicable, to DPIRD Fisheries.

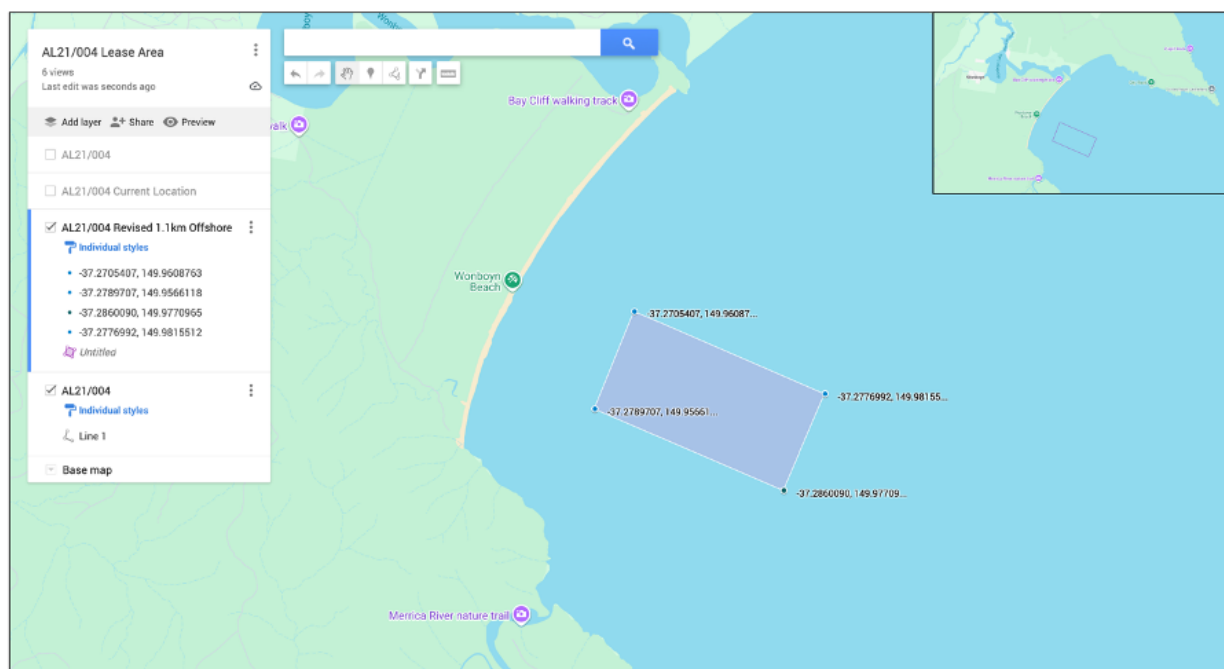


Figure 4: AL21/004 Lease Coordinates, Disaster Bay, NSW (Credit: Google).

2.3 Alternate Visual Inspections – Greenglades Beach

If ocean conditions prevent vessel access, alternate visual inspections will be carried out from the shoreline at Greenglades Beach using binoculars, drone-mounted cameras, or high-resolution still/video footage. Key items observed include:

- Buoy and float positioning.
- Surface swell and interaction with visible infrastructure.
- Presence of floating or beached debris.
- Potential marine wildlife interactions.

This alternative procedure ensures continued monitoring even during adverse sea conditions and supports early detection of failures that may be drifting toward the coast.

2.4 Monthly Monitoring

Monthly tasks form the second tier of regular maintenance and include:

- Verification of all GPS anchor and marker positions.
- Spot checks of mooring line integrity and tension.
- Photographic documentation of structural components.
- Water testing for key parameters (temperature, wave height, direction, wave period).
- Inspection and maintenance of mooring line attachments and lines.
- Analysis of growth rates and kelp canopy coverage, via removal, drop-camera or drone.

2.5 Annual Diver-assisted Inspections

Every 12 months, divers or drones will conduct underwater infrastructure inspections. This includes:

- Examination of seabed anchor points and screw anchors.
- Identification and classification of marine growth and fouling organisms.
- Verification of mooring line embedment and wear.
- Photo and or video documentation for reporting and analysis.
- Where fouling or wear is identified beyond acceptable thresholds, manual cleaning or rotation/replacement of components will be undertaken.

2.6 Annual Servicing

Once per year, all structural components will undergo full service and, where necessary, replacement. The servicing includes:

- Replacement of any line or shackle with >20% visible wear or ageing.
- Manual cleaning of buoys, ropes and floatation devices.
- Cleaning and retagging of all marked components.
- Audit of Auskelp ID tags and infrastructure labelling.
- Review of operations against annual performance metrics.

2.7 Post-storm Inspections

After significant storm events exceeding the below parameters, a full inspection must occur within 48 hours, subject to safe weather conditions:

- Wave heights >6 m Hs or
- Sustained winds above 80 km/h

These inspections will focus on:

- Dislodged, twisted, or broken longlines.
- Changes in buoyancy levels.
- Signs of anchor drag or seabed disturbance.
- Tangled droplines or clumped biomass.
- Missing floats or markers.

If needed, divers or drones will be deployed for underwater checks when safe. Initial inspections may rely on drone imagery or surface vessels with sonar.

2.8 Biofouling Management

Biofouling is a major maintenance focus in long-term kelp farming.

Management practices include:

- Regular cleaning of high-growth areas such as buoys and risers.
- Rotation of lines out of the water for drying and mechanical brushing.
- Recording of fouling levels in annual reports, including type of fouling and extent.

2.9 Equipment Design and Redundancy

To minimise systemic failure:

- All longlines are independent, not daisy-chained.
- Anchors use 4-metre deep insertion of screw anchors for increased holding power.
- Lines are tensioned for vertical and horizontal compliance.

According to Bui et al. (2023), infrastructure that aligns with prevailing swell significantly reduces tensile loading, which supports the long-term success of the designated Eden-1 layout.

2.10 Infrastructure Labelling and Recovery

In the unlikely event of a longline detachment, 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 eastward swell direction, the farm's proximity to the coastline and the hydrodynamics of Disaster Bay. The longline system's orientation, parallel to the dominant swell, minimizes 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.

All infrastructure components, including buoys and corner markers, must be clearly stamped or labelled with the "Auskelp" designation, facilitating prompt identification and recovery. In accordance with regulatory requirements, Auskelp is committed to the immediate collection of any detached infrastructure to mitigate environmental impacts and navigational hazards.

In accordance with NSW DPIRD Fisheries requirements:

- Equipment is labelled "Auskelp" with the unique Lease ID.
- Displaced items must be reported to Fisheries NSW within 48 hours.
- Retrieval must occur within 72 hours.
- A shoreline clean-up protocol will be enacted for any Project-related debris drifting ashore at Greenglades Beach, Wonboyn Beach, or any other zone within Disaster Bay, with the recovery method determined by the size and nature of the material. Small, hand-portable items (for example, a detached float) will be collected on foot by an Auskelp representative. Larger items, such as sections of rope or backbone line, will be secured and towed offshore for retrieval by vessel. All beach access for clean-up will be on foot via designated pathways, consistent with NPWS access requirements, and any debris washing ashore within Nadgee Nature Reserve will be notified to NPWS and cleaned up promptly. NPWS will be notified of any lost or detached equipment within 24 hours where there is any overlap above the high-water mark.

2.11 Recordkeeping and Reporting

Auskelp will maintain digital recording systems to track the following:

- Monthly inspections.
- Diver or drone footage and condition ratings.

- Incident and repair logs.
- Reporting deadlines and permits.
- All records are stored for minimum 10-years and made available upon request by regulators.

2.12 Best Practice Alignment

The Eden-1 Monitoring and Maintenance Program has been developed to align with recognised national and international aquaculture industry standards for environmental sustainability, infrastructure integrity, and compliance with regulatory expectations. The program includes regular inspections, infrastructure audits, marine fauna interaction reporting, and adherence to ecologically sustainable practices, and it will continue to be adaptive—refining and evolving as new information, operational experience, and scientific insights become available. The program draws upon the following key standards and protocols:

- NSW Department of Primary Industries and Regional Development (DPIRD Fisheries) Aquaculture Strategy
- National Guidelines for the Ecologically Sustainable Development of Marine Aquaculture in Australia (FRDC & DAWE)
- Environmental Risk Assessment Guidelines for Aquaculture (DAWE/FRDC, 2020)
- Ecosystem-Based Fisheries Management (EBFM) Framework
- FAO (2021) Seaweed Aquaculture Best Practice Guidelines (Food and Agriculture Organization of the United Nations)
- UNEP (2022) Global Standards for Sustainable Seaweed Farming (Food and Agriculture Organization of the United Nations)
- Norwegian Directorate of Fisheries (2018) Mooring and Net Pen Standards
- GreenWave (2020) Offshore Regenerative Seaweed Cultivation Protocols

2.13 Adaptive Management

Auskelp's Monitoring and Maintenance Program will undergo:

- Ongoing review of infrastructure failure or repair rates.
- Performance benchmark update based on global data.
- External technical audit (if triggered).
- Re-training of staff on any procedural changes.

2.14 Mooring and Anchoring System

- Anchor Type: Helical screw anchors used to secure infrastructure to the seafloor.
- Installation Depth: Screw anchors must be embedded to a depth of >3.0 metres into soft sediment to ensure holding capacity and reduce risk of dislodgement.
- Anchor Material: Anchors must be marine-grade galvanised or stainless steel, corrosion-resistant for a minimum 10-year marine service life.
- Anchor Load Testing: 10% of installed anchors per rig must be randomly selected and load-tested to minimum expected storm loads.
- Anchor Spacing: Anchors must be spaced to maintain a minimum 10m clearance between anchor points on neighbouring longlines.

2.15 Longline and Backbone Cables

- Main Backbone Line Diameter: Minimum 25 mm marine-grade rope, or equivalent strength mooring cable.
- Breaking Strain: Rope must have a certified minimum breaking load of 45 tonnes.
- Buoyancy Compensation: Longlines must be tensioned using flotation buoys (minimum every 20 m or as required) to maintain vertical clearance from seabed and avoid sagging.
- Rope Material: Only UV-stabilised, marine-grade ropes shall be used.
- Taut-Rope Design: Ropes must be kept under constant tension with no slack lines permitted at any time.
- Identification: All longlines will carry visible ID tags coded by rig number.

2.16 Dropper Lines and Grow-Out Assemblies

- Dropper Line Spacing: Must be spaced no closer than 1.0 m apart to avoid shading and allow for kelp movement.
- Dropper Length: Dropper lines must terminate on average >10 m above the seabed.
- Connection Hardware: Use corrosion-resistant shackles, swivels, and quick-release clips to minimise gear failure.

2.17 Surface Buoys and Marking

- Navigation Buoys: Perimeter of lease must be marked by IALA-compliant cardinal or special markers, with reflective and radar-visible surfaces as agreed with Maritime and Port Authority.
- Farm Identification: Each farm unit must have a clearly visible nameplate with DPIRD Lease ID.
- Buoy Anchoring: Surface buoys must be securely attached to separate mooring lines from production infrastructure to avoid entanglement.
- Identification: Buoys to be marked with visible ID tags.

2.18 Inspection and Maintenance

- Monthly Inspections: Visual inspection of infrastructure (anchors, ropes, buoys, dropper lines) must be conducted at least once every 30 days.
- Storm Inspection: Additional inspection is mandatory after any storm exceeding 6 m significant wave height (as reported by Eden Waverider buoy).
- Integrity Checklist: All inspections must be documented with checklists covering:
 - Tension and wear of ropes
 - Anchor position/holding
 - Dropper wear and fouling
 - Buoyancy and line sagging
 - Marine growth removal
- Annual Diver or ROV Survey: A seabed survey must be conducted annually to inspect for anchor scouring, debris accumulation, and benthic disturbance.

2.19 Debris Management and Retention

- Rope Ends and Offcuts: All rope trimmings, old gear, and floats must be retained onboard and disposed of on land per EPA guidelines.
- Waste Collection Kit: Each vessel must carry a dedicated marine debris retrieval kit including nets, gloves, and storage bins.

- Recovery Response Plan: Immediate action must be taken to recover any lost gear or detached kelp infrastructure within 48 hours of detection.

2.20 End-of-Life Gear Management

- Component Tracking: All structural components must be tagged and recorded for life-cycle tracking and replacement scheduling.
- Reuse Policy: Reusable gear must be cleaned and redeployed where appropriate; degraded gear must be recycled or disposed on land.
- All equipment removed in accordance with the current Decommissioning Management Plan.

2.21 Detached Gear

- Any detached infrastructure to be removed within 48 hours of notification.

2.22 Ongoing Reporting

- **RE1 – Three-Yearly Fish Assemblage Audit:** An independent (third-party) fish assemblage assessment will be undertaken using Baited Remote Underwater Video (BRUV) survey methods to verify that operation of the farm does not result in meaningful adverse change to local fish assemblages. The audit cycle commences once 50% of the planned farm infrastructure has been deployed; from that point, assessments are conducted every three years. Each assessment samples stations both within the farm footprint and across the wider Disaster Bay environment, including reference areas outside the lease, so that species richness, relative abundance and assemblage composition within the farm can be compared against the surrounding bay and against established baseline data. The objective of this measure is to determine whether any meaningful change in fish assemblages is occurring within the farm relative to the broader bay and baseline conditions. Where an audit identifies a material and sustained change attributable to farm operations – beyond natural variation observed at the reference areas – corrective action will be triggered in consultation with DPIRD Fisheries, which may include review of infrastructure configuration, rig density or operational practice. The findings of each three-yearly audit will be documented and made publicly available via the Auskelp website. Note: this measure addresses the matters assessed at EIS Section 9.4.1 (Marine Habitat, Water Quality and Sedimentation).
- **RE2 – Three-Yearly Benthic Habitat Audit:** An independent (third-party) benthic survey will be undertaken to confirm that the farm does not cause meaningful adverse change to the seabed beneath and adjacent to the infrastructure. The audit cycle commences once 50% of the planned farm infrastructure has been deployed; from that point, surveys are conducted every three years. Each survey samples stations both within the farm footprint and across the wider Disaster Bay environment, including reference areas outside the lease, to assess sediment condition, organic enrichment, epibenthic cover, and any shading-related change to benthic habitat. The objective of this measure is to determine whether any meaningful change in benthic habitat condition is occurring within the farm relative to the broader bay and baseline conditions, with particular attention to habitat loss and light-attenuation (shading) effects beneath the longlines. Where a survey identifies a material and sustained change attributable to farm operations – beyond natural variation observed at the reference areas – corrective action will be triggered in consultation with DPIRD Fisheries, which may include increased longline spacing, rotation or fallowing of affected rigs, or adjustment of canopy density. The results of each survey will be documented and made publicly available via the Auskelp website. Note: this measure addresses the matters assessed at EIS Section 9.1.2 (Habitat Loss and Shading).
- **RE3 – Annual Beach-Cast Kelp Reporting:** Auskelp will undertake annual monitoring and reporting of significant (excess) beach-cast deposits of *Ecklonia radiata* on Greenglades Beach, regardless of whether those deposits are attributable to farming operations. Monitoring will apply a documented methodology to distinguish farmed kelp originating from the lease from naturally occurring wild wrack derived from the surrounding rocky-reef kelp forests – including assessment of holdfast and stipe characteristics, the presence or absence of cultivation substrate, and the spatial and temporal pattern

of deposition relative to farm operations and prevailing swell. The objective of this measure is to identify, quantify and report any farm-derived contribution to beach-cast accumulation, recognising that the dominant source of beach-cast kelp at Disaster Bay is, and is expected to remain, wild kelp. Any significant farm-related deposit will be recorded in the annual environmental report and, where project-related debris washes ashore within Nadgee Nature Reserve, NSW DPIRD Fisheries will be notified. Note: this measure addresses the matters assessed at EIS Section 4.9 (Beach-cast Kelp).

3.0 HATCHERY PROTOCOLS

- Hatchery Base: 18–20 Weecoon St Eden NSW 2550

Intellectual Property and Commercial Confidentiality: certain hatchery protocols described in this Plan – including but not limited to zoospore selection and conditioning methods, sori induction and spore-release techniques, gametophyte culture and storage methods, seeding densities and substrate preparation, and the specific environmental parameters used to optimise juvenile cultivation – may be subject to intellectual property protections and commercial confidentiality. These methods represent proprietary know-how developed by Auskelp through its research and ocean-testing program. Accordingly, the descriptions provided in this Plan are intended to demonstrate that hatchery operations are conducted to a standard that satisfies the relevant biosecurity, environmental and regulatory requirements, rather than to disclose the full technical detail of each process. Where specific protocols are commercially sensitive or protected, Auskelp will make complete records available on a confidential basis to DPIRD Fisheries, the EPA, or other relevant regulatory authorities for the purposes of audit, compliance verification or inspection, while reserving its rights in respect of that intellectual property. Nothing in this provision limits Auskelp's obligation to comply with all applicable biosecurity, genetic-integrity, recordkeeping and reporting requirements set out elsewhere in this Plan.

3.1 Genetic Source and Seedstock

- Local Genetic Integrity:
 - All seedstock must be sourced from wild or farmed kelp collected within the Disaster Bay bioregion to preserve local genotypes of *Ecklonia radiata*.
 - All zoospores will be collected from within 10km of AL21/004 lease area.
 - No genetic modification of *Ecklonia radiata* will be undertaken at any stage of the hatchery, cultivation or deployment process. Auskelp does not use, and will not use, genetically modified organisms (GMOs), gene-editing techniques (including CRISPR or equivalent technologies), transgenic methods, induced polyploidy, or any other form of artificial genetic alteration in the production of seedstock or cultivated kelp. All cultivated stock is derived from wild-sourced sporophytes collected within the Disaster Bay bioregion through natural sexual reproduction (spore release and gametophyte culture), preserving the natural genetic diversity and local provenance of the wild population. Selective breeding, where undertaken, is limited to the propagation of naturally occurring local genotypes and does not involve any modification of the genome. This approach ensures that the cultivated population remains genetically representative of, and compatible with, the wild *Ecklonia radiata* population, and that any incidental release of spores or biological material to the surrounding environment carries no risk of introducing modified genetic material. The Project is therefore not assessed under the *Gene Technology Act 2000* (Cth) and does not require a licence from the Gene Technology Regulator. Auskelp's genetic-integrity, broodstock and provenance-tracking commitments are set out further in Section 3.1 of this Plan.

3.2 Species, provenance and genetic controls

- The Project cultivates only the native endemic NSW kelp species *Ecklonia radiata*.
- No exotic, introduced or non-native seaweed species are used at any stage of the Project.
- All broodstock is sourced exclusively from wild specimens collected within 10 km of the lease, within the Disaster Bay bioregion, maintaining genetic compatibility with surrounding wild populations and eliminating the introduction-of-non-native-species pathway responsible for most reported seaweed-aquaculture biosecurity incidents globally.
- Broodstock collection is undertaken only under a valid Section 37 permit issued by DPIRD Fisheries under the Fisheries Management Act 1994 (NSW), with >12 separate wild parent individuals used in each annual broodstock collection, and wild replenishment undertaken every 12 months throughout

the operational life of the Project to maintain genetic diversity and continuing genetic exchange with wild populations.

- The plant is not removed, and no more than 5% of plant biomass is taken to obtain zoospore sori areas for propagation material, with collection approved under permit or to storm-cast (wrack) kelp.
- No genetically modified organisms (GMOs), gene-editing technologies, transgenic methods, induced polyploidy or other forms of artificial genetic modification are used at any stage of hatchery propagation, cultivation or deployment.
- The Project will evaluate Reef Adapt and equivalent genetic tools for the mapping of local genetic seedstock provenance in Southern NSW, supporting alignment between cultivated provenance and natural population genetic structure.

3.3 Hatchery biosecurity and propagation controls

- Hatchery propagation occurs within a fully enclosed, controlled-access biosecure facility with separate entry and viewing zones, PPE protocols, life-stage separation (spores, gametophytes, sporophytes, juveniles), and pre-deployment health verification. All propagation work is conducted within a laminar flow hood, with autoclaved instruments and flasks used throughout to maintain aseptic conditions.
- Hatchery intake seawater is filtered to 0.2 µm and pasteurised, with pasteurised water used for all seed bank work and UV treatment applied during spore induction events, reducing the risk of pathogen, pest, propagule or contaminant introduction from surrounding marine waters.
- The hatchery water-source pathway – including proximity of intake to international shipping movements in Twofold Bay, a recognised introduced marine pest (IMP) vector – has been explicitly assessed within the Biosecurity Plan, with intake filtration, pasteurisation and contamination-testing controls applied to manage that pathway.
- Ongoing contamination testing of hatchery water and culture tanks is undertaken for bacterial contamination (including *Vibrio* spp.), fungal spores, protozoa and algal competitors or pests (diatoms, cyanobacteria), with response procedures if abnormal results are detected.
- All incoming wild kelp material is inspected for disease, fouling and abnormalities prior to sori induction; and a population of pathogen-free broodstock is retained in an alternate hatchery facility as an emergency contingency in the event of a hatchery-wide incident.

3.2 Biosecurity and Containment

- Bio-secure Environment:
 - The hatchery must be a fully enclosed, controlled-access facility with separate entry and viewing zones, disinfection areas, and biosecure requirements. Air will be filtered and water treatment and air systems will be dedicated to the hatchery facility only.
- Water Source and Filtration:
 - Hatchery ocean water not to be taken 1 nm of cruise liner, military vessel, cargo vessel at any time, or within a 48 hour period after vessel departure.
 - Intake seawater must be filtered to <1 µm and UV sterilised.
 - Recirculation systems must be isolated by life-stage (spores, gametophytes, sporophytes, juveniles).
 - Contamination testing will be conducted weekly, minimum during sporophyte production periods.
- Weekly testing of water and culture tanks for:
 - Bacterial contamination (e.g. *Vibrio* spp.)
 - Fungal spores and protozoa
 - Algal competitors or pests (e.g. diatoms, cyanobacteria)

- Fouling Management:
 - Tanks and substrates may only be cleaned using non-toxic, marine-safe agents.
 - Biofilm must be removed from tank walls and settlement substrates (e.g. twine or string).
- Quarantine Protocols:
 - All incoming wild kelp must be inspected for disease or fouling prior to sori induction.

3.3 Spore Release and Cultivation

- Spore Collection Standards:
 - Induction events must be conducted under sterile conditions using filtered, UV-treated seawater, autoclaved and pasteurised.
 - Monitoring to ensure balanced ratio between male and female gametophytes.
- Density Management:
 - Spore loading must be <100,000 spores/ml to avoid over-colonisation.
- Substrate Specification:
 - Only natural fibre twine (cotton) used for settlement media.
 - Substrates must be manufacturer certified as sterile prior to use, or manually sterilised prior to use.
- Attachment Monitoring:
 - Attachment success must be visually assessed within 48–72 hours of gametophyte attachment.
 - Ongoing monitoring to ensure healthy and symmetrical blade growth of sporophytes.

3.4 Juvenile Cultivation Conditions

- Light and Temperature Control

Cultivation tanks must maintain:

 - Temperature: 14–18°C
 - Light: 12:12 or 16:8 L:D cycle at 60–100 $\mu\text{mol photons m}^2/\text{s}$
- Aeration and Mixing:
 - Adequate aeration must be provided to ensure even nutrient distribution and prevent anoxia.
- Growth Assessment:
 - Juvenile sporophyte length and density must be measured weekly to ensure uniform development.
 - Any signs of dieback, discoloration, mutation, or fungal growth must be investigated and quarantined, and if disposed, will be UV sterilised prior to disposal.

3.5 Pre-Deployment and Transport

- Deployment Criteria:
 - Juveniles must reach a minimum size of 1–3 mm before ocean out-planting to ensure resilience.
- Health check – each batch must undergo a pre-deployment health check confirming absence of:
 - Pathogens
 - Competing algae
 - Visible fouling
 - Mutation
- Transport Protocols:
 - Twines must be transported in moist, cool conditions with no direct sunlight.
 - Maximum time from hatchery to ocean deployment: <24 hours.

3.6 Recordkeeping and Reporting

- Culture Logbooks:
 - Daily records of temperature, light, water changes, growth metrics, and mortalities.
 - Detailed records of seedstock deployed on a per longline basis.

- Batch Identification:

Each batch must have a unique ID code linking to:

- Source seedstock location
- Culture conditions
- Specific plant identifier
- Date of seeding
- Age at deployment
- Deployment rig
- Ocean conditions

3.7 Waste and Discharge Management

- Effluent Treatment:
 - No effluent is expected.
- Zero Waste Operations:
 - All harvested biomass from the Project (that is not food grade) will be utilised as part of Auskelp's biostimulant production process, supporting a zero-waste operating model. This includes cultivated kelp biomass as well as any naturally occurring marine organisms or biofouling that may be incidentally present on harvested material, such as hydroids, native fouling organisms, juvenile mussels, and other naturally settled epibiota. Following harvest, the biomass is mechanically shredded, minced and processed into liquid biostimulant products, ensuring that all organic material is beneficially reused. No harvested kelp biomass or associated natural marine growth is intentionally discarded to landfill or returned to the marine environment. This approach maximises resource utilisation, minimises waste generation and aligns with the principles of circular economy and sustainable aquaculture.
- End of Life Infrastructure
 - Any damaged, worn or end-of-life infrastructure components, including ropes, floats, buoys, shackles, chains, mooring components, netting, packaging materials and other operational equipment, will be recovered from the marine environment and removed from the site. Materials that cannot be repaired or reused will be transported to an appropriately licensed and approved waste management or recycling facility for disposal or recycling in accordance with the Waste Avoidance and Resource Recovery Act 2001 (NSW), applicable local government requirements, and any relevant conditions of approval. No damaged infrastructure, plastics, synthetic materials or operational waste will be intentionally discarded into the marine environment. Where practical, materials will be reused, repurposed or recycled to minimise waste generation and support the Project's commitment to responsible resource management and environmental stewardship.
- Re-use of Ropes
 - At the completion of each cultivation season, grow-out ropes and associated cultivation lines will be recovered from the marine environment, inspected for wear, cleaned of residual biofouling and organic material, and dried prior to storage. Suitable ropes will be rewound onto spools and retained for reuse in subsequent cultivation cycles, extending asset life and reducing the need for replacement materials. This approach minimises waste generation, reduces resource consumption and supports the Project's commitment to circular economy principles and sustainable aquaculture operations. Any ropes or infrastructure components that are damaged beyond practical repair or reuse will be recycled where possible or disposed of at appropriately licensed waste management facilities.

4.0 HARVESTING PROTOCOLS

4.1 Harvesting Protocols

- Harvesting Base:
 - Harvesting operations will be conducted from approved vessel facilities at Snug Cove, Eden and/or Edrom, subject to operational requirements and weather conditions.

4.2 Harvest Timing

- Harvesting will occur seasonally during the operational period and will be scheduled to optimise biomass quality, product outcomes and environmental performance.

4.3 Reproductive Maturity Controls

- All cultivated *Ecklonia radiata* must be harvested prior to Stage 3 reproductive maturity and before significant sori development, spore release or reproductive dispersal occurs. Reproductive condition will be monitored through routine farm inspections and harvest schedules adjusted where necessary to ensure cultivated biomass is removed prior to fertility. This measure is intended to minimise opportunities for reproductive interaction with surrounding wild populations and maintain consistency with the Project's genetic integrity commitments.

4.4 Harvest Method

- Harvesting must be undertaken using vessel-based mechanical or manual methods designed to minimise biomass loss, infrastructure damage and environmental disturbance. Harvest activities must avoid unnecessary contact with the seabed and minimise the release of detached biomass into the surrounding marine environment.
- All harvested biomass must be recovered and transported to shore-based processing facilities. Reasonable measures must be taken to minimise harvesting losses and recover any significant detached biomass associated with harvesting operations.

4.5 Zero-Waste Utilisation

- The Project operates under a zero-waste biomass utilisation model. All harvested kelp biomass must be beneficially reused through food-grade processing, animal feed production, biostimulant manufacture, hydrolysate production or other approved value-added uses. Naturally occurring marine organisms and incidental fouling associated with harvested biomass, including hydroids, juvenile mussels and other epibiota, may be incorporated into hydrolysate and biostimulant production streams. No harvested biomass is to be intentionally discarded to the marine environment.

4.6 Infrastructure Recovery

- Where cultivation lines are removed during harvesting operations, ropes and cultivation materials suitable for reuse must be cleaned, dried, inspected and rewound onto storage spools for future deployment. This process extends asset life, reduces waste generation and supports circular economy principles. Damaged ropes, floats or infrastructure that cannot be reused must be recycled where practicable or disposed of at appropriately licensed waste management facilities.

4.7 Environmental Controls

- Harvesting operations must:
 - minimise biomass loss to the surrounding environment;
 - avoid disturbance to marine fauna;
 - comply with the Marine Fauna Interaction Management Plan;
 - maintain vessel biosecurity requirements;

- recover any detached infrastructure where practicable; and
- comply with all relevant environmental and operational management plans.

5.0 VESSEL OPERATIONS

5.1 Vessel Type and Specifications

- Vessel Suitability (Working Boats):
 - Only commercial vessels suitable for offshore operations in exposed marine conditions may be used. The Project will utilise appropriately certified commercial vessels, typically Class 3B or Class 3C vessels, suitable for offshore aquaculture operations within the operating area.
 - Skippers must hold a valid NSW Coxswain Grade 1 or higher certification.
- Engine Type:
 - Where possible, engines must be four-stroke or equivalent low-emission types to reduce fuel, noise, and oil pollution. If required, marine grade diesel engines will be used for working boats.
- Working Boat Length and Draft Limits:
 - Maximum vessel length: <25 m.
 - Maximum draft: <1.5 m.
- Support or Emergency Response Vessel:
 - Minimum 7.5m.
 - Maximum draft 600 mm.
 - Only vessels suitable for offshore operations in exposed marine conditions may be used.
 - Not used for harvesting.
- Noise Mitigation:
 - All vessels must be fitted with mufflers and compliant with marine noise standards.
 - Vessel operations must adhere to Marine Fauna Interaction Plan (MFIP) regarding acoustic proximity to whales and dolphins.

5.2 Navigation and Safety Compliance – Working Boats

- Access: Operation via Twofold Bay (Sug Cove and Edrom).
- Restriction: No access for via Wonboyn Lake Entrance.
- Licensing:
 - All skippers must hold a valid NSW Coxswain Grade 1 or higher certification.
 - All crew must complete NSW Maritime safety induction and biosecurity protocols.
- Vessel Registration:
 - All boats must be registered and marked in accordance with NSW maritime laws.
- Navigation Aids:

Vessels must be equipped with:

 - GPS
 - AIS transponders (where applicable)
 - Radar reflectors
 - Marine radio (VHF)
- Lighting:
 - All boats must use navigational lighting compliant with IALA standards.
 - Night operations must be minimised or avoided unless for emergency purposes.

5.3 Biosecurity and Environmental Controls

- Vessel Cleaning:

- Boats must be cleaned and inspected regularly to avoid biofouling transfer.
- Hulls, props, and bilge areas should be free of marine pests, sediment, and algae.
- Waste Protocols:
 - No discharges of oil, litter, sewage, or bilge water are permitted within the lease area or NSW waters.
 - A spill response kit must be carried onboard Working Boats at all times.
- Ballast Water Management:
 - If utilised, no uptake or release of ballast water within the lease area unless treated and logged in accordance with Australian Ballast Water Management Requirements (DAWE, 2021).

5.4 Operating Conduct in and Around the Lease

- Speed Restrictions:
 - Maximum speed within 200 m of deployed longlines: <6 knots
- Approach Guidelines:
 - Vessels must maintain minimum separation distances from marine mammals as per NSW approach distance rules – See Marine Fauna Interaction Plan (MFIP).
- Mooring and Anchoring:
 - No anchoring allowed within the lease other than on designated service moorings.
- Vessel Traffic:
 - Vessel movement within the lease must follow designated paths between rows to avoid damage to infrastructure.

5.5 Maintenance and Monitoring Operations

- Minimum Inspection Frequency:
 - All deployed infrastructure (longlines, floats, anchors) must be visually inspected by vessel at least once per month.
 - After storm event with wave heights >6m Hs
- Data Collection Support:
 - Vessels must assist with routine water sampling, seabed observation, and fauna monitoring, as required by the EMP or Marine Fauna Management Plan.
- Weather and Sea State Policy:

No vessel operations permitted during:

 - Sustained winds >25 knots
 - Significant wave height >2.5 m Hs
 - Visibility <1 nautical mile

5.6 Emergency Response and Incident Reporting

- Emergency Equipment:

All vessels must carry:

 - First aid kits
 - Lifejackets for all personnel
 - EPIRBs or PLBs
 - Fire extinguisher and flares
- Incident Protocol:

- Any entanglement, gear loss, oil spill, or marine fauna collision must be reported within 24 hours to both Auskelp management and the relevant NSW authority.
 - Any workplace injury must be reported immediately.
 - Any altercation or incident relating to other maritime users must be documented immediately and reported management and relevant government body, depending on severity.
 - Any malicious damage to infrastructure must be reported to Maritime Police and Port Authority within 24 hours.
- Communications:
- All operational boats must maintain VHF radio contact with shore base or other farm vessels at all times during offshore work.

Eden-1-Environmental-Management-Plan-2026-v2.3

NSW Case ID: SSD-41680467

Date: 18 June 2026

Total Page Extent: 32

Classification: For regulatory approval

Copyright © Auskelp 2026

Email: info@auskelp.net

Website: www.auskelp.net

