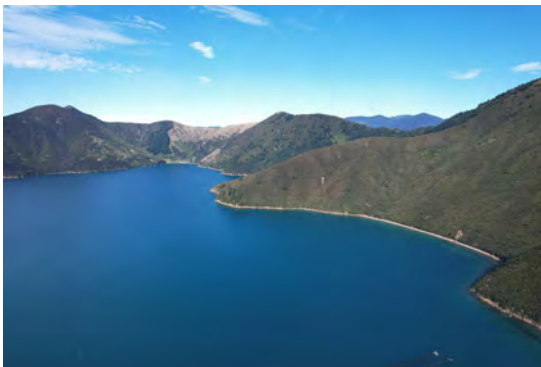




robertson
environmental

ECOLOGICAL ASSESSMENT & REPORTING SERVICES



Proposed Richmond Bay Marine Farms Coastal Ecological Impact Assessment

For Aquaculture Direct Limited

November 2025

REPORT INFORMATION & QUALITY CONTROL

Prepared for:	Aquaculture Direct Limited (ADL) C/- Quentin Davies and Emma Deason, Gascoigne Wicks Lawyers
Authors:	Dr Ben Robertson  Principal Consultant, Director Robertson Environmental Limited 
Reviewer / Approver:	Dr Barry Robertson  Technical Director Robertson Environmental Limited
Version History:	Version 0.1 — First Draft — 24 October 2025 Version 1.0 — Final — 24 November 2025
Document Control:	This document constitutes the Final Coastal EclA for submission as part of the Project resource consent application
Report ID:	Robertson Environmental Report No. 251021
Bibliographic Reference:	<i>Robertson, B.P. 2025. Coastal Ecological Impact Assessment for Proposed Richmond Bay Marine Farms. Report Prepared by Robertson Environmental for Aquaculture Direct Limited. Robertson Environmental Report No. 251021</i>

Contents

Executive Summary	1
1 Introduction	2
1.1 Ecological Assessment Scope	2
1.2 Description of Proposed Activity	2
2 Assessment Methodology	3
2.1 Relevant Standards and Guidelines	3
2.2 Summary of EclA approach	3
2.3 Project Area and Zone of Influence	4
2.4 Desktop Analysis	4
2.5 Field Survey	5
3 Ecological Description	8
3.1 Marine Environment (Historical Background)	8
3.2 Existing Benthic Habitat	9
3.3 Fish	10
3.4 Marine Mammals	11
3.5 Seabirds	11
4 Assessment of Effects on Ecological Values	12
4.1 Positive Effects	12
4.2 Assessment of Operational Effects	12
5 Impact Management Recommendations	16
5.1 Recommendations for avoiding or minimising potential adverse affects	16
5.2 Recommendations for addressing adverse residual effects that cannot be avoided	16
6 Cumulative Effects	17
7 Summary and Conclusions	18
8 References	19

Cover image: Looking eastward toward the proposed marine farm sites, Richmond Bay, Pelorus Sound / Te Hoiere, Marlborough Sounds, REL 2025.

List of Appendices

Appendix A: Report Limitations	21
Appendix B: Supporting Figures	23
Appendix C: Summary of Marine EclA Assessment Methodology	30
Appendix D: Potential Biogenic Habitat and Macroinvertebrates	34
Appendix E: Potential Fish Species	38
Appendix F: Potential Marine Mammal Species	40
Appendix G: Potential Seabird Species	44
Appendix H: Detailed Field Data	46
Appendix I: Benthic (AUV still photograph) Imagery	69

List of Tables

Table 4.1. Assignment of ecological values and magnitude of effects	14
---	----

List of Figures (Appendix B)

Figure B-1. Overview of the Site and surveyed extent	24
Figure B-2. Site description and habitat types	25
Figure B-3. MEP ESMS values associated with the proposal	26
Figure B-4. Broad scale benthic habitat map of the proposed site (Area A)	27
Figure B-5. Broad scale benthic habitat map of the proposed site (Area B)	28
Figure B-6. Broad scale benthic habitat map of the proposed site (Area C)	29

Executive Summary

ADL is facilitating an application on behalf of a group of marine farmers to establish three new marine farms in Richmond Bay, Pelorus Sound / Te Hoiere, Marlborough Sounds. The proposed activity is for long-line mussel farming with the potential to farm other shellfish and seaweeds. To understand and evaluate the ecological values present within the receiving environment, Robertson Environmental Limited was engaged to undertake an ecological assessment of the values and potential effects associated with the proposal. This assessment has been undertaken in accordance with the EIANZ Guidelines (2018).

Desktop, database, and field survey identified two subtidal habitat types associated to the proposed area. The deep subtidal habitat (Coastal Marine (Area) Zone; Marlborough Environment Plan (Operative in Part)) to be covered by shellfish farming structures is dominated by soft mud and of low or limited ecological value. The area immediately shoreward of the proposed site identified with higher values includes nearshore subtidal reef habitat, but is not directly affected by the proposal. Key conclusions of the assessment were as follows:

- The deep subtidal habitat directly affected is soft sediment-dominated, common among the wider Richmond Bay and adjacent coastal area, and of relatively low value ecologically.
- No habitats or communities of scientific, conservation or ecological importance were observed within or directly adjacent to the site or wider surveyed area.
- Regarding native fauna, the proposal presents a low probability risk to higher trophic levels such as fish, marine mammals and seabirds.
- There is negligible risk of biosecurity (marine pests and disease) issues, and no risk of impacts from chemical additives (antibiotics, parasiticides, antifoulants and other therapeutics).
- The magnitude of the potential effects on the coastal receiving environment, both direct and indirect, are low or negligible and the resultant significance of the potential adverse effect is generally **Low** to **Very Low**.

The proposed Richmond Bay farms are located over soft sediment with minimal ecological value. Therefore, specific mitigation measures such as Structures Exclusion Area are not required.

Overall, the proposed activity presents negligible impacts on the ecological values associated with the Richmond Bay site(s), and no permanent loss of indigenous biodiversity values is expected to occur. In the long-term, the establishment of the farm's physical structure, functioning as an artificial reef system via mid-water habitat creation and benthic habitat creation via deposited materials, may generate positive ecological outcomes, including increased local species diversity and improved water clarity.

1 Introduction

1.1 Purpose

This Ecological Impact Assessment (EclA) Report¹ provides a detailed evaluation of the potential ecological effects arising from the establishment of three new marine farms located in Richmond Bay, Pelorus Sound / Te Hoiere, Marlborough Sounds. It was commissioned by Aquaculture Direct Limited.

1.1 Ecological Assessment Scope

With detailed methodology outlined in Section 2, the purpose of this report is to:

- Identify and describe the significance and value of aquatic and terrestrial habitat and features within the Site (Section 3);
- Describe the potential effects on local ecology arising from the Project (Section 4);
- Recommend measures as appropriate to avoid, remedy or mitigate potential effects (including any proposed conditions/management plan required) (Section 5);
- Discuss the potential for cumulative effects (Section 6); and,
- Discuss and present an overall conclusion of the level of potential effects of the Project on local ecology (Section 7).

This report does not include an assessment of effects on māori cultural values, māori cultural concerns may encompass a wider range of values than those covered in the report. This assessment does not denote the habitat or ecological features of cultural value to manawhenua, and such assessments should only be made by manawhenua.

1.2 Project Description

The location of the proposed Richmond Bay marine farms (Areas A-C) within the surveyed area is shown in **Figure 1-1, Appendix B**.

The proposed activity is for long-line mussel farming with the potential to farm other shellfish and seaweeds. Proposed surface structures, to be used as shellfish production crops, consist of²:

- Four (4) blocks of backbones (c. 101-288 m in length) at Area A;
- Two (2) blocks of backbones (c. 106-226 m in length) at Area B; and,
- Two (2) blocks of backbones (c. 115 m in length) at Area C.

It is understood the results presented in this EclA will inform the resource consent application for the proposed activity.

We note the surveyed area as shown in **Figure 1-1** covers the three proposed farm areas only³ (hereafter 'the Site'). The ecological assessment of the Site has been undertaken using a combined desktop, database and field survey approach outlined in Section 2 below.

¹ This report is subject to the Report Limitations provided in **Appendix A**.

² Based on the DPL Project design plans (dated 2 May 2025).

³ and provides for an area of 20 m distance around the proposed consent boundary in line with Resource Management (National Environmental Standards for Aquaculture) Regulations 2020 (NES-MA) requirements.

2 Assessment Methodology

2.1 Relevant Standards and Guidelines

The location of the farm falls within the jurisdictional boundary of MDC and its Marlborough Sounds Resource Management Plan (MSRMP) and the MEP. The site lies within the boundary of the Coastal Marine Zone 2 (CMZ2) of the MSRMP, and Coastal Marine (Area) Zone under the MEP. It is within Coastal Management Unit 'Waitata Reach'. All statutory planning documents relevant to the consenting and ecological assessment of the proposed marine farming activity, and the New Zealand Coastal Policy Statement 2010 (NZCPS) and the NES-MA, were considered in the assessment.

This assessment of ecological effects follows the Environment Institute of Australia and NZ Inc. (EIANZ) Ecological Impact Assessment (EcIA) guidelines (Roper-Lindsay et al. 2018)⁴, and in accordance with appropriate methods outlined in *Recommended Protocols for Conducting Benthic Ecological Surveys for Shellfish Farming in Marlborough, New Zealand* (Davidson et al. 2024). The assessment is based on a relative scale that indicates the level of intactness or modification/damage to a feature or system. The objective of this assessment is to characterise the benthic habitats and features present within the Site and to identify any ecological values or sensitivities that may be affected by the proposed activity.

2.2 EcIA Assessment

The EcIA approach is represented as follows and summarised in **Appendix B**:

1. Ecological Value

- Desktop assessment and literature review;
- Site investigation;
- Data processing;
- Ecological Value assessment (a) Representativeness, (b) Rarity, (c) Diversity and pattern, (d) Ecological context.

2. Level of Effect

- Description of Project features and activities;
- Identification and description of Project effects;
- Magnitude of Effects assessment based on (1) Type, (2) Extent, (3) Duration, (4) Frequency, (5) Probability and (6) Reversibility;
- Level of Effect assessment; systematic approach based on the outcome of Ecological Value and Magnitude of Effects assessments.

3. Mitigation

- In line with No Net Loss principles and mitigation hierarchy;
- Specific focus on Moderate or higher level of effects that can be avoided, minimised, rem-

⁴ With reference to the *EIANZ EcIA Module 1 (2024). Ecological Impact Assessment (EcIA): Module 1 - Assigning Ecological Value to Marine Benthic Habitats. Published by Environment Institute of Australia and New Zealand*. It is noted that this addendum to the guidelines introduces marine ecosystems to the EcIA, a notable omission from the guidelines published earlier, which dealt only with terrestrial and freshwater ecosystems. This module largely follows the form of values assessment for terrestrial and freshwater ecosystems by providing a hierarchy of ecosystem characteristics set against a hierarchy of ecological values ranging from Negligible to Very High values.

edied⁵.

4. Residual Effects

- Assessment of residual effects after measures to avoid, minimise and remedy have been applied;
- Address residual effects through offset or compensation measures to achieve No Net Loss or Net Gain.

2.3 Project Area and Zone of Influence

The Project's Zone of Influence (ZOI) pertains to the habitats and species within and beyond the Project Area that may be affected by the biophysical changes resulting from the proposed Project and its associated activities, as defined in the EIANZ Guidelines. Throughout this report, ZOI is used to describe the effects of Project operation on marine habitats and their associated native species, which may include indirect impacts on sensitive receiving environments and the potential presence of protected fauna and flora within or near the Project Area.

However, the ZOI of the Project can vary for different species and habitat types, depending on how they use their environment. For instance, mobile species such as dolphins typically have a wider home range and more diverse habitat needs than threatened benthic species, which may be confined to specific habitat types or small areas. These factors were accounted for during our review of relevant literature and site investigations to assess how the Project could impact different species. To reflect the likelihood of a species occurring or dispersing within the Project Area, different search distances may be used depending on the species context. In the relevant sections of this report, the size of the search area is indicated alongside any species or habitat records identified.

2.4 Desktop Analysis

Existing biological databases and all published information on habitat types and biological values within the study area were researched. This phase also included preparation of site maps and plans to direct the field survey, including plotting of relevant Project Area overlays. Both the consent corners and extent of potential differences in habitat type within the site were delineated on geographic information systems (GIS) using topographical maps and high resolution aerial photography⁶ prior to site visit. Information was derived from known datasets on landforms, marine farms and seabed features (MDC's Smart Maps database), climate, and topography of the Site. Preliminary biological communities and habitat types were identified and described through a combination of past reports (MDC database), the use of aerial photographs, and to a lesser extent the New Zealand Land Cover Database version six (LCDB6).

The threat classification of important marine species was derived from the appropriate threat classification list for each taxa (Freeman et al. 2013; Nelson et al. 2019; Baker et al. 2019; Robertson et al. 2021; International Union for Conservation of Nature, IUCN) and their regional status was derived from Marlborough District Council reports (Davidson et al. 2011) and the Conservation Management Strategy for the Nelson/Marlborough Conservancy (Department of Conservation, 1996-2006).

⁵ The Wildlife Act 1953 must be complied with, as such management measures must always be implemented to ensure that Project activities do not injure or kill native wildlife.

⁶ LINZ Marlborough 0.25 m Rural Aerial Photos (2023/24).

2.4.1 Biogenic Habitats and Macroinvertebrates

Local biogenic habitat and epibenthic macroinvertebrate lists (**Appendix C**) obtained from various sources (Morton and Miller 1973; Davidson et al. 2010, 2011, 2018; and Anderson et al. 2019) were examined to identify any rare or uncommon biogenic habitat in which to focus field surveys. This list also included potential macroalgae and seagrass habitat.

2.4.2 Fish

A list of fish species in the area, as noted in Davidson et al. (2011), was collated (**Appendix D**).

2.4.3 Marine Mammals

A list of mammal species in the area, as noted in Davidson et al. (2011) and MacKenzie & Clement (2014), was collated in **Appendix E**.

2.4.4 Seabirds

A list of bird species in the area, as noted in eBird⁷, iNaturalist (5 km radius), Davidson et al. (2011) and Schuckard et al. (2018), was collated (**Appendix F**). The species list obtained from the eBird atlas data served as a baseline of species previously recorded in the wider area and therefore potentially present at or near the Site. More recent survey data on NZ King shag populations in the Marlborough Sounds, as presented in McClellan et al. (2020) and Bell et al. (2022), was also considered.

2.5 Field Survey

Habitat within and immediately adjacent to the Site, was assessed by field survey in accordance with appropriate methods outlined in *Recommended Protocols for Conducting Benthic Ecological Surveys for Shellfish Farming in Marlborough, New Zealand*. The survey targeted an approximately 54.00 hectare subtidal area based on the proposal (**Figure B-1**). The survey was undertaken by boat during relatively calm (<10 knot winds) sea conditions on the 15th October 2025. On this day, the tide was low at 1014 (0.86 m) and high at 1646 (1.90 m), and during the survey currents were variable, with weather conditions mostly fine. The Mean Low Water Mark (MLWM) was approximated using the tidal position depicted in LINZ aerial photographs for the area (**Appendix H**)⁸.

2.5.1 Benthic Habitat Classification

Broad ecological or habitat zones in the benthic survey area were identified, and with the aid of a Simrad NSS evo2 chart plotter unit (accuracy approx. ± 0.1 m via Advanced Navigation GNSS geopositioning system) linked to Lowrance HDI Mid/High/DownScan (83/200/455/800 kHz) and Simrad Structure Scan HD Skimmer transducers, broadly delineated. Each habitat was subjectively classified into one of several different qualitative habitat type descriptors according to unique features identified.

⁷ Grid BV60 (July 2019 - May 2024).

⁸ Using this approach, as opposed to on-site qualification, is deemed suitable in this instance because the distance from the littoral shore to the closest proposed inshore farm boundary clearly exceeds the 50 meter minimum specified under the MEP provisions.

A stratified inspection of habitats was then undertaken by Autonomous Underwater Vehicle (AUV) fitted with a USBL and GNSS geopositioning system (accuracy approximately ± 0.5 m at 10–30 m depth). The AUV was deployed along a series of predefined transects and collected continuous video footage (FHD@30fps) and still photographs at 20–25 m intervals. Transect locations were selected to obtain a representative range of habitats and depths within the Site. Additional photographs were taken when features of interest, such as potential reef structures, were observed on the remote monitor aboard the survey vessel or identified during the desktop phase. Detailed field data, including precise locations and depths is presented in **Appendix G** and benthic photographs in **Appendix F**. Reef and biogenic habitats were classified in accordance with NES-MA definitions⁹.

Upon completion of field work, the broad benthic habitat zones, along with AUV video footage and still photograph positions, were imported into a georeferenced aerial photo of the area using QGIS software. Using a combination of sidescan sonar and MDC's multibeam imagery (if available), AUV benthic imagery and colour aerial photographs, the delineated habitat zones were refined to more accurately reflect the tonal gradations in sonar images of respective habitats, producing an indicative map of the different benthic habitats observed.

2.5.2 Biogenic Habitat and Macroinvertebrates

The presence of biogenic habitats and epibenthic macroinvertebrates was assessed along fourteen (14) individual transects (each c. 200–300 m in length) within the Site. The AUV captured continuous video footage, along with a total of 161 still photographs (**Appendix G, F**). At each still photograph station, the cover of natural shell¹⁰ and marine farm-derived shell material was estimated and ranked based on still photographs using the following categories: None (no shell), Low (1–30%), Moderate (31–50%), Moderate to High (51–75%), and High (76–100%).

2.5.3 Fish

Beyond those documented via drop camera, field surveys for fish were not conducted. Rather, we rely on the vegetation community and habitat type descriptions obtained from the field investigations to identify areas of potential habitat for species likely to occur within the area, as well as published accounts of fish present within nearby habitats.

2.5.4 Marine Mammals

Field surveys for marine mammals were not conducted. Rather, we rely on the habitat type descriptions obtained from the field investigations to identify areas of potential habitat for species likely to occur within the area, as well as published accounts of marine mammals present within nearby habitats. All incidental mammal observations were recorded while on-site and observations of mammals within or adjacent to the site.

⁹ **Reef** — (a) means the exposed hard substrata in the coastal marine area formed by geological processes; and (b) includes cobbles equal to, or greater than, 64 mm across, boulders, and bedrock; and (c) includes marine species associated with the reef; but (d) does not include sand or gravel.

Biogenic habitat — (a) means the natural habitat created by the physical structure of living or dead organisms or by the interaction of those organisms with the substrate, including either a hard (reef) or soft (sediment) substrate; but (b) does not include—(i) non-indigenous living organisms; or (ii) organisms attached to a marine farm or other man-made structure; or (iii) holes, mounds, and similar seabed irregularities created by burrowing organisms in soft sediments.

¹⁰ Per NES-MA definition of '**dead shell**' — (a) includes dead shell, broken or whole, equal to or greater than 2 mm across; but (b) excludes shell from a marine farm.

2.5.5 Seabirds

Again, field surveys for sea birds were not conducted. Rather, we rely on the habitat type descriptions obtained from the field investigations to identify areas of potential habitat for species likely to occur within the area, as well as published accounts of birds present within nearby habitats. All incidental seabird observations were recorded while on site and observations of birds within or adjacent to the Site.

3 Ecological Description

3.1 Existing Environment (Ecological Baseline)

This section presents the findings of the desktop analysis and site investigations for all of the habitats and species ('ecological features') present within the Site. Based on this information, an ecological value has been calculated for each ecological feature using the assessment method outlined in Section 2.2.

3.1.1 Site Description and Historic Ecological Context

The Site is located offshore of the southern (Area A and B) and northeastern (Area C) shoreline of Richmond Bay, Pelorus Sound / Te Hoiere (see **Figures B-1, B-2**). Richmond Bay is a large, north-west facing indentation situated on the south-east coastline of Waitata Reach, encompassing a marine area of roughly 509 hectares. The bay's coastline measures approximately 9.4 km, while its mouth is approximately 2.6 km wide and its full length is roughly 2.9 km. By sea, the bay is located about 45 km from Havelock.

The Site is exposed to winds from the westerly-northwesterly quarter. It is expected that the bay would have relatively short water residence times compared to those calculated for bays within inner Pelorus Sound. The seafloor slopes west to southwest (away from shore) and the prominent current direction is from the West-East sector. Depths at the Site typically vary between 15-30 meters. The adjacent landscape features coastal hillslopes which rise from a relatively narrow band of rocky cobbled intertidal to ridges approximately 100-200 m in height. Predominantly landuse cover is Native Scrub vegetation, with smaller areas of Exotic Grassland (LDCB6) and isolated wilding pine trees.

Surrounding values include the Ecologically Significant Marine Site (ESMS) Richmond Bay Reef (3.36), the outer boundaries of which are located > 700 m from the closest part of the proposed marine farm (**Figure B-3**). There are no other mapped ESMS within or near Richmond Bay under the MEP. Generally speaking, given its distance from the Site, this significant site is not likely to be impacted by the proposed activity.

The Site is located with the 'Important Bird Area - Marlborough Sounds'. It should be noted that this classification spans most of the Marlborough Sounds and does not indicate an area of significance but rather indicates an area for which data on birds exists¹¹.

The Site does not feature within the 'Marine Mammal Distribution - Dolphins or Whales' MEP overlays.

3.1.1.1 Seabed (Benthic) Environment

The wider Richmond Bay marine area is characterised by a relatively shallow subtidal environment, influenced physically by the combination of tidal flows in Waitata Reach and local currents. The adjacent coastal area provides refuge for a variety of seabirds and marine mammals, which may include Threatened/At Risk (TAR) species, further discussed below.

No known historical reports have studied the ecological values (seabed or otherwise) directly associated with the Site. Relevant assessments made on adjacent areas are described below.

Marine Farm 8205 (Richmond Bay)

- Davidson (2015a) documented a seabed dominated by combinations of silt, clay natural shell and mussel shell. Cobble and boulder substrata was observed inshore of the 8205 consent, but

¹¹ Species listed as part of the 'Important Bird Area - Marlborough Sounds' overlay: king shag, fairy prion, fluttering shearwater, Australasian gannet, black-billed gull, black-fronted tern.

it appeared visually comparable to boulder/cobble banks in the central Sounds with no obvious impact apparent from the farm. No other species or communities of scientific, conservation or ecological importance were observed.

Marine Farm 8633 (Kōpaua salmon farm)

- Morrissey et al. (2015)¹² described the seabed below adjacent 8633 as dominated by featureless mud or sandy mud (silt/clay), contiguous to the eastern inshore area with high proportions of sand, gravel and cobble¹³. Both areas supported varying levels of shell material. Biologically, the dominant offshore mud component supported several notable taxa including blue cod, opal fish, scallops, solitary ascidians, sea cucumbers, brittle stars (*Ophiopsammus maculata*), turret shells (*Maoricolpus roseus*) and hydroid trees. Burrow openings were often present in offshore sediments.

8204 (Richmond Bay)

- Davidson (2015b) described the benthos beneath this area as predominantly silt, interspersed with natural shell substratum whose presence varied throughout the area. The author noted an increase in shell concentration near the inshore boundary of the consent. No hard or coarse substrata were identified within the consented area; however, a cobble bank was found along the inshore sloping sides of the bay. These findings align with observations made by McKnight and Grange (1991) at a central location in Richmond Bay, offshore from the 8204 consent area.

8325, 8326 and 8327 (outer Richmond Bay)

- Robertson (2024) reported low diversity, species richness, and low faunal abundance on the dominant soft sediment habitat in this area. Drop camera observations below or adjacent to the Site recorded only a few scallops, localised worm tubes, and low densities of other macrofauna (e.g., cushion star, sea cucumber, starfish, and sponges). No biogenic or reef habitats were found within the boundaries of the Site itself, although such habitat was observed inshore.

3.2 Benthic Ecology

3.2.1 Site investigations

Key ecological features within the Site are listed below and described in the following sections. **Figures B-4 to B-6** provide a GIS-based benthic habitat map for each of the proposed farms. Analysis of the MDC MBES rugosity, side-scan sonar and benthic (continuous video transects and still photographs) imagery identified soft sediment as the dominant substratum across all three of the proposed farms. Observed habitat types are detailed in the mapping and further described below.

3.2.1.1 Soft Sediment Habitat (Deeper offshore subtidal area - within and surrounding the Site)

The benthic habitat below the Site is dominated by soft sediment habitat (**Figures B-4 to B-6; Appendix H and I**). Coverage of natural shell material is generally very low, with predominantly less than 5% cover. No mussel shell debris was observed.

¹² <https://www.marlborough.govt.nz/client-api/marlborough/property-files?url=https%3A%2F%2Fmdc-datascape.au-s1.cloudhub.io%2Fapi%2Fdatascape%2Fengagement%2Fv1%2Fproperty-files%2Ffile%2F1539052&name=Conditions%2056b%2C%2057%2C%2060b%2C%2064-%20Baseline%20report%20-%20NZKS%20advice.pdf>

¹³ Refer habitat map in Morrissey et al. (2015); Appendix C, p145.

No reef habitats (as defined in the NES-MA) were present within 20 m of the Site boundaries, with the exception of a small outcrop located approximately 10 m inshore of Area A (**Figure B-4**).

3.2.2 Biogenic Habitat and Epibenthic (Surface-Dwelling) Biota

3.2.2.1 Within Soft Sediment Habitat

The abundance of biogenic habitat within the Site is expected to be very low, which aligns with the typically low diversity found in sheltered, soft-bottom habitats in the Marlborough Sounds (Davidson et al., 2011) and adjacent parts of Richmond Bay (e.g., Davidson 2015a,b; Robertson 2024). Indeed, no biogenic habitat was observed in video footage or still imagery collected from the seabed within the Site (**Appendix H and I**).

Epibenthic macrofaunal species observed at relatively low densities in this part of the surveyed area included sea cucumber, finger sponge, cushion star, eleven-arm sea star. Individual scallops, horse mussels and calcareous worm tubes (non-mounding) were occasionally observed. Additionally, small holes—presumably created by infaunal organisms and fish—were visible at the sediment surface throughout much of the surveyed area.

No biogenic habitats, as defined in the NES-MA, were identified within 20 m of the Site.

3.2.3 Ecological Value

The marine (benthic) habitats within the Site are known for their moderate physical dynamics. The ecological condition of the seabed area that was mapped was assessed and values assigned based on four “Matters”: representativeness, rarity/distinctiveness, diversity and pattern, and ecological context.

The soft sediment habitat within and around the Site is considered to have Low ecological value due to its **Low** diversity, richness, and abundance, and the predominant absence of TAR or regionally significant species.

As noted above, the Site itself is not designated as regionally or nationally significant, and there are no mapped ESMS in close proximity to the Site according to the MEP.

3.3 Fish

Based on the habitat preference and recorded distributions of fish species (**Appendix E**), there are several species of fish with the potential to inhabit the wider area of the Site (Davidson et al. 2011) including:

- rāwaru / blue Cod (*Parapercis colias*) — Threatened - Least Concern (Decreasing);
- reperepe / elephant fish (*Callorhinchus milii*) — Threatened - Least Concern (Stable);
- pākaurua / rough skate (*Zearaja natuta*) — Threatened - Least Concern (Stable);
- tāmure / snapper (*Pagrus auratus*) — Threatened - Least Concern (Decreasing); and,
- pakirikiri / spotty (*Notolabrus celidotus*) — Threatened - Least Concern.

The ecological value of fish populations in the coastal receiving environment of the Site is **Moderate** given the likelihood for species to utilise the wider area, which may include TAR species; however, these species are not restricted to these habitats within the Site and likely utilise available habitat within Richmond Bay and adjacent coastal marine area. Apart from several spotty and triplefin occupying the inshore reef, no species of bony fish were recorded during the present survey.

3.4 Marine Mammals

Based on the habitat preference and recorded distributions of marine mammal species (**Appendix F**), there are several species of mammal with the potential to inhabit the wider area of the Site (Davidson et al. 2011) including:

- bottlenose dolphin (*Tursiops truncatus*) — Nationally Endangered;
- dusky dolphin (*Lagenorhynchus obscurus*) — Not Threatened;
- Hector's dolphin (*Cephalorhynchus hectori hectori*) — Nationally Vulnerable;
- paikea / humpback whale (*Megaptera novaeangliae*) — Non-Resident Native (Migrant);
- kera wēra / orca (*Orcinus orca*) — Nationally Critical;
- short-beaked common dolphin (*Delphinus delphis*) — Not Threatened; and,
- tohorā / Southern right whale (*Eubalaena australis*) — At Risk - Recovering.

The ecological value of marine mammal populations in the coastal receiving environment of the Site is **Very High** given the likelihood for mammal species to utilise the wider area and which may include TAR species; however, these species are not restricted to these habitats within the Site and likely utilise available habitat within Richmond Bay and adjacent bays and other coastal habitat throughout the Marlborough Sounds.

3.5 Seabirds

All native birds are protected under the Wildlife Act except those listed in Schedule 5 of the Act. The presence of TAR species would be considered significant if identified within the Site. A roaming inventory of birds sighted or heard was taken during the field survey at the site. Of those recorded (a single tākapu), none were classified as TAR species.

Recent indigenous bird sightings (**Appendix G**) in the adjacent coastal area included (eBird - Grid BV60, July 2019 - May 2024, iNaturalist (5 km radius), and Davidson et al. (2011) and Schuckard et al. (2018)):

- matuku moana / reef heron (*Egretta sacra sacra*) — Nationally Endangered;
- karoro / southern black-backed gull (*Larus dominicanus dominicanus*) — Not Threatened;
- kawau tikitiki / spotted shag (*Stictocarbo punctatus*) — Nationally Vulnerable;
- pakahā / fluttering shearwater (*Puffinus gavia*) — At Risk (Relict);
- kawau pāteketeke / king shag (*Leucocarbo carunculatus*) — Nationally Endangered (Stable);
- tara / white-fronted tern (*Sterna striata striata*) — At Risk (Declining);
- taranui / caspian tern (*Hydroprogne caspia*) — Nationally Vulnerable;
- tītī / sooty shearwater (*Puffinus griseus*) — At Risk (Declining);
- tākapu / Australasian gannet (*Morus serrator*) — Not Threatened; and,
- kawau tikitiki / spotted shag (*Stictocarbo punctatus*) — Nationally Vulnerable.

Again, the ecological value of shorebird and seabird populations in the coastal receiving environment of the consent is **Low to Very High** given the recent sightings in the vicinity of Richmond Bay and known inhabitants of the open coast which include TAR bird species; however, these species are not restricted to these habitats within the Site and likely utilise available habitat within Richmond Bay and adjacent bays and other coastal habitat throughout the Marlborough Sounds.

4 Assessment of Effects on Ecological Values

4.1 Positive Effects

Key potential positive effects from the further development of long-line mussel farms within the Site include:

- The creation of additional and stable habitat that can lead to increased biodiversity and species richness beneath the farms.
- Water quality regulation through the reduction of phytoplankton biomass (grazing) and the cycling of nutrients, with the potential for regulating concentrations of nitrogen from nearshore waters via biodeposition and denitrification (conversion of bioavailable nitrogen to non-bioavailable gases) or sequestration in the sediment.
- The mitigation of ocean acidification in the immediate vicinity of the farm, as mussels naturally increase the alkalinity of the surrounding water during shell formation (carbonate precipitation).
- The provision of ecosystem services that are not reliant on wild fish stocks, contributing to food security and reducing fishing pressure on wild populations.

In this context, responsible development of the Site will be important to ensure that these ecological benefits are not eroded by suboptimal site selection (location of structures) or farming practices that diminish the same or other ecosystem services (Barrett et al. 2022).

4.2 Assessment of Operational Effects

In the absence of efforts to avoid, remedy or mitigate adverse ecological effects, the potential effects on coastal ecological values come primarily from localised effects at approximately the farm scale within the Site.

In the aquaculture of shellfish, local effects can occur in both water column and benthic environments:

- Water column effects typically include phytoplankton depletion and changes in planktonic community composition, dissolved nutrient and particulate release, and impacts of farming structures on water movement and from biofouling communities.
- Benthic effects generally manifest as localised organic enrichment, smothering of organisms by biodeposits, biofouling drop-off and debris altering the composition of the benthos, and shading of benthos by structures thereby affecting localised productivity. The magnitude of effects ultimately depends on the magnitude and frequency of biodeposit and organic loading, and the assimilative capacity of the receiving environment (including the response, or sensitivity, of inhabitant biota).

Such effects are usually highly localised, impacting areas directly beneath the marine farms. Any effect (either positive or negative) is only observed within 20 m of the farm lines, except in exceptional circumstances¹⁴. Furthermore, the magnitude of effects ultimately depends on the magnitude and frequency of biodeposit and organic loading, and the assimilative capacity of the receiving environment (including the response, or sensitivity, of inhabitant biota).

The risk of adverse benthic impacts from shellfish farming on adjacent soft-sediment (sandy mud / muddy sand) habitat is generally low, due to the large absence of benthic communities and the reasonable flushing potential at the Site. Effects from shading of seabed by structures is considered unlikely. Effects from drop-off of biofouling organisms from the structures can be managed or mitigated through good on-farm husbandry practices.

Adverse benthic effects of aquaculture activities on reef and biogenic habitats are required to be

¹⁴ As per comments made by Mr Wade and Mr Davidson in their MEP Variation 2 Ecologically Significant Marine Site (ESMS) Section 42A report at [47], in this regard.

managed under the MEP and NES-MA. No habitat within the Site meets the NES-MA definition of 'reef habitat' or 'biogenic habitat.' Therefore, the constraints on complying activities do not apply to the dominant soft sediment habitat and the surrounding area.

Biosecurity (marine pests and disease) impacts are not anticipated given the nature of the proposal (shellfish aquaculture) and that A+ members are required to recognise the Biosecurity Act 1993, as well as the Hazardous Substances and New Organisms Act 1996. The Applicant is not seeking to discharge or use chemical additives such as antibiotics, parasiticides and other therapeutants, and so they pose no risk to local ecology.

As outlined above, no impacts on mapped ESMS within or near Richmond Bay are expected to occur, and the Site does not feature within the 'Marine Mammal Distribution - Dolphins or Whales' MEP overlays. The Site is located with the 'Important Bird Area - Marlborough Sounds', again noting that this overlay covers most of the Marlborough Sounds and does not indicate an area of significance but rather indicates an area for which data on birds exists.

The likelihood (or risk) and magnitude of these effects occurring and the potential level of effects on coastal environments relevant to the proposal are discussed as follows.

4.2.1 Coastal Ecology

Table 4.1 integrates specific ecological values described in Section 3 above, and lists the potential effects (direct and indirect) on the marine habitats and fauna within the Site and their magnitude of effect. This is then used to calculate an overall level of effect to each ecological attribute, prior to impact management.

Requirements for the proposed activity to preclude adverse effects on reef and biogenic habitats under the MEP, including evaluation against appropriate NES-MA thresholds, are considered separately in this assessment. If necessary, these requirements are addressed as part of impact management in Section 5.

Table 4.1. Magnitude of effects and subsequent level of effect (without mitigation) of the proposed activity on the coastal ecology features present within the Site during the marine farm operation phase.

Coastal Habitat/ Species	Ecological Value	Effects Description	Magnitude of Effect	Justification of Magnitude	Level of Effect, Without Mitigation
Soft (Sandy Mud - Adjacent to the Site) Sediment Habitat	Low	Long-line farming over ecologically depauperate mud-dominant benthos can lead to habitat fragmentation and edge effects, but it may also create new structured habitats, enhancing local biodiversity and providing refuge for various marine organisms.	Negligible	Given the habitat's low value with respect to in-habitant epibenthic macrofauna, any impacts from the proposed activity on this soft-sediment dominated habitat are expected to fall within the low-impact range that is characteristic of shellfish farms in the Marlborough Sounds. It is unlikely that the biogeochemical conditions of the benthic environment — such as biotic community structure, surface sediment grain size distribution, and oxygenation/redox conditions — would be significantly adversely affected by the proposed activity. The overall extent of any disturbance is likely to be limited at the scale of the bay and is almost certainly reversible.	Very Low
Epibenthic Macro- fauna	Low	Loss or degradation of habitat primarily through depositional effects. Fragmentation of habitat.	Negligible	Given the relatively depauperate epibenthic macrofauna dominated by mobile species occupying soft sediments beyond any reef / biogenic habitat potentially present outside of the Site, any impacts on them are expected to be negligible. The overall extent of any disturbance is limited at both a site and bay scale and almost certainly reversible.	Very Low
Fish	Moderate	Degradation of feeding habitat values or diminished food resources. Fragmentation of habitat.	Negligible	Because shellfish farms can enhance wild fish abundances by creating a habitat for fish to aggregate (providing food resources and refuge), effects on fish would potentially arise due to fish populations becoming displaced from other habitats or more vulnerable to recreational fishing pressure. However, in general, any effects of the proposed activity on wild fish populations are likely to be very minor, or perhaps ecologically neutral.	Very Low

Table 4.1 (Cont.). Magnitude of effects and subsequent level of effect (without mitigation) of the proposed activity on the coastal ecology features present within the Site during the marine farm operation phase.

Coastal Habitat/ Species	Ecological Value	Effects Description	Magnitude of Effect	Justification of Magnitude	Level of Effect, Without Mitigation
Marine Mammals	Very High	Disturbance or loss of foraging and breeding habitat. Fragmentation of habitat.	Negligible	Effects on mammals may arise through direct (e.g. vessel strike, increased underwater sound and light production and possibly the risk of entanglement) and indirect (e.g. degradation of feeding habitat values or diminished food resources and associated trophic flow-on) impacts. While the former has the greatest potential consequences (i.e. injury or death of a marine mammal), any such effects are expected to be either short-term, or avoidable through species utilising available feeding habitat throughout the wider Richmond Bay and adjacent coastal region.	Low
Seabirds	Very High	Disturbance or loss of foraging and breeding habitat. Fragmentation of habitat.	Negligible	Effects on seabirds would potentially arise due to degradation of feeding habitat values, diminished food resources, or through direct entanglement. However, farming structures may in fact provide alternative roost sites closer to foraging areas as well as promote aggregation of prey fish, and mobile bird species could avoid the latter effects by utilising available feeding habitat throughout the wider Richmond Bay and adjacent coastal region. Therefore, the magnitude of effect on birds would be negligible, or perhaps ecologically neutral.	Low

5 Impact Management Recommendations

5.1 Recommendations for avoiding or minimising potential adverse effects

In accordance with the EIANZ guidelines measures to avoid, remedy or mitigate effects is focused on ecological features where the level of effect was assessed to be with **Moderate, High, or Very High**.

This assessment reveals no ecological features within the Site encompassing the proposed Richmond Bay marine farms with a Moderate or higher level of effect. Consequently, specific mitigation efforts for such impacts (e.g. Structures Exclusion Area) are not deemed necessary. Analysis of habitat maps as shown in **Figures B-4 to B-6 (Appendix B)**, indicates that the Site overlays soft substratum lacking any notable ecological values. Notably, no hard substratum, characterised by reef or biogenic habitats, is found within 20 m of the Site, with the exception of a small outcrop located approximately 10 m inshore of Area A (**Figure B-4**). Given that the outcrop is inshore of the proposed farm, is of limited extent, and is situated outside of the proposed farm footprint area, the proposal is unlikely to have any appreciable effect on this feature.

It is recommended to minimise discharges (fine sediment and organic matter) to water in the receiving environment during marine farm operations. Although, the discharge effects of harvesting mussels are seen as transitory and, in most cases, quickly become indistinguishable from background sedimentation.

5.2 Recommendations for addressing adverse residual effects that cannot be avoided or minimised

Monitoring of the coastal receiving environment is not warranted (on ecological grounds) given that the proposed activity is expected to have no more than minor effects on associated ecological values.

6 Cumulative Effects

As per EIANZ guidelines, the assessment of ecological effects considers cumulative impacts. For this proposal, while the broader context is the coastal receiving environment of Richmond Bay and the adjacent Waitata Reach, the assessment focuses on effects manifesting at the site-specific level, including interactions with existing aquaculture and vessel traffic.

Long-line mussel farming is a globally recognised ecosystem service provider, capable of mitigating cumulative impacts rather than exacerbating them. Through efficient grazing (filtration), the farms actively remove phytoplankton biomass, leading to improved water clarity which benefits benthic habitats and visual amenity. Furthermore, the farm's contribution to nitrogen removal via biodeposition and denitrification helps regulate local nutrient concentrations by assimilating a portion of the nutrient load present in the passing water column.

While this filtration functions as a service, the effects of phytoplankton depletion through shellfish consumption are generally only detectable at approximately the farm scale, and are of short duration (Morrisey et al. 2006). The significance of associated effects depends on a variety of factors, including the carrying capacity of the environment, prevailing water currents, weather patterns, and catchment-derived nutrient inputs, with effects more pronounced if farms are located in physically constrained shallow areas with slow currents, compared to deep sites with strong flow and good flushing (Zeldis et al. 2008, 2013; Plew 2011; Broekhuizen et al. 2015). The Site is situated within a relatively deep (predominantly >20 m deep) area of Richmond Bay with reasonable proximity to the stronger currents of Waitata Reach, so water residence times are expected to be relatively short, when compared to sheltered bays in inner Pelorus Sound / Te Hoiere. On this basis, it is considered unlikely that significant phytoplankton depletion would occur outside the boundaries of any future shellfish farms located within the Site.

Given the existing receiving environment consists primarily of soft sediment habitat with limited ecological value, and the proposal's capacity to be ecologically generative, functioning as an artificial reef system via mid-water habitat creation and benthic habitat creation via deposited materials, the overall cumulative effect is considered beneficial or Negligible. The proposal is also unlikely to contribute meaningfully to potential displacement or reduced habitat values for higher trophic levels (e.g., fish, seabirds, or marine mammals).

On balance, the proposal is unlikely to contribute meaningfully to the loss of ecological connectivity or decline in habitat quality at the bay-wide or regional scale, and may instead offer an enduring net positive contribution to the ecological health and functioning of the receiving environment.

7 Summary & Conclusions

An estimate of habitat change resulting from the proposed activity can be undertaken by importing the proposed site design into a GIS environment. This allows a semi-quantitative estimate to be made of the habitat likely to be impacted. The areal footprint of the proposed Richmond Bay farms and survey area overlaid on a map of habitat types is shown in **Figures B-4 to B-6 (Appendix B)**.

The main effect on local ecology is enhanced rates of sedimentation of organic-rich, fine-grained particles (biodeposits of faeces and pseudofaeces), and the deposition and accumulation of live shellfish, shell litter onto the seabed beneath the farms (Keeley et al. 2009; Stenton-Dozey and Broekhuizen 2019).

The proposed activity would not likely alter the soft sediment-dominated habitat. It is unlikely that those remaining habitats adjacent to the Site (e.g. inshore reef) would be appreciably altered by the proposal. Given that the size of the survey area was selected based on the spatial extent of the proposed activity, these calculations suggest that the predominantly featureless soft sediment habitat in the survey area will be situated within the Site.

As the proposed farms would be situated above the soft-sediment habitat in the surveyed area, the relatively depauperate biological nature of the habitat, in this case dominated by a limited number of mostly highly mobile fauna, means that it is unlikely that significant changes to ecology will occur. Indirectly, ecology in more distant habitats from the Site (e.g. inshore subtidal / intertidal habitats) are also unlikely to be affected by the proposed activity given their distance from the Site, relatively large extent, and reasonable flushing potential driven by tides and periodic wind and wave action.

The proposed activity presents negligible impacts on the ecological values associated with the Site, and no permanent loss of indigenous biodiversity values is expected to occur. In the long-term, the establishment of the long-line mussel farm's physical structure, functioning as an artificial reef system via mid-water habitat creation and benthic habitat creation via deposited materials, may generate positive ecological outcomes, including increased local species diversity and improved water clarity.

Overall, assuming integration of impact mitigation and management measures as outlined above in Section 5, it is considered that any effects resulting from the proposed activity will be relatively localised and therefore minor with regard to the wider marine receiving environment.

8 References

- Anderson, T.J., Morrison, M., MacDiarmid, A., Clark, M., D'Archino, R., Nelson, W., Tracey, D., Gordon, D., Read, G., Kettles, H., Morrissey, D., Wood, A., Anderson, O., Smith, A.M., Page, M., Paul-Burke, K., Schnabel, K., and Wadhwa, S. 2019. Review of New Zealand's Key Biogenic Habitats. Prepared for the Ministry for the Environment. NIWA CLIENT REPORT No: 2018139WN.
- Baker, C.S., Boren, L., Childerhouse, S., Constantine, R., van Helden, A., Lundquist, D., Rayment, W., and Rolfe, J.R. 2019. New Zealand threat classification series 29. Conservation status of New Zealand marine mammals.
- Bell, M. (Ed.). 2022. Kawau pāteketekete/King Shag (*Leucocarbo carunculatus*) Research 2018- 2022. Final report on the Marine Farming Association and Seafood innovations Limited King Shag research project. Unpublished Tora Consulting Technical Report to the Marine Farming Association and Seafood Innovations Limited.
- Broekhuizen, N., Hadfield, M., and Plew, D. 2015. A biophysical model for the Marlborough Sounds, Part 2: Pelorus Sound. NIWA Client Report CHC2014-130. 175p.
- Davidson, R., Anderson, T., Robertson, B. 2024. Recommended protocols for conducting benthic ecological surveys for shellfish farming in Marlborough, New Zealand. Prepared for Marlborough District Council, Marine Farming Association Inc. and Aquaculture New Zealand. 32p.
- Davidson, R.J., Baxter, A.S., Duffy, C.A.J., Handley, S., Gaze, P., du Fresne, S., Courtney, S. 2018. Expert panel review of selected significant marine sites surveyed in 2017-2018. Prepared by Davidson Environmental Limited for Marlborough District Council and Department of Conservation. Survey and monitoring report no. 897.
- Davidson, R.J. 2015a. Ecological report for the proposed renewal of a marine farm (8205) located in Richmond Bay, Pelorus Sound. Prepared by Davidson Environmental Ltd. for BJS Marine Ltd. Survey and monitoring report no. 817.
- Davidson, R.J. 2015b. Ecological report for the proposed renewal of a marine farm (8204) located in Richmond Bay, Pelorus Sound . Prepared by Davidson Environmental Ltd. for Andrew King. Survey and monitoring report no. 814.
- Davidson R.J., Duffy C.A.J., Gaze P., Baxter, A., DuFresne S., Courtney S., Hamill P. 2011. Ecologically significant marine sites in Marlborough, New Zealand. Co-ordinated by Davidson Environmental Limited for Marlborough District Council and Department of Conservation. 172p.
- Davidson, R.J., Richards, L.A., Duffy, C.A.J., Kerr, V., Freeman, D., D'Archino, R., Read, G.B., Abel, W. 2010. Location and biological attributes of biogenic habitats located on soft substrata in the Marlborough Sounds. Prepared by Davidson Environmental Ltd. for Department of Conservation and Marlborough District Council. Survey and monitoring report no. 575.
- Davidson, R.J., Richards, L.A., Duffy, C.A.J., Kerr, V., Freeman, D., D'Archino, R., Abel, W. 2001. Location and biological attributes of some biogenic habitats located on soft bottom substrata in the Marlborough Sounds. Prepared by Davidson Environmental Limited for Department of Conservation and Marlborough District Council. Survey and Monitoring Report No. 575.
- Roper-Lindsay, J., Fuller S.A., Hooson, S., Sanders, M.D., Ussher, G.T. 2018. Ecological impact assessment. EIANZ guidelines for use in Aotearoa New Zealand: terrestrial, freshwater, and marine ecosystems.
- Forrest, B. 1995. Overview of ecological effects from shellfish farms in the Marlborough Sounds: background information for marine farm applications. Cawthron Report No. 282. Unpublished report prepared for Sanford South Island Ltd.
- Freeman, D.J., Marshall, B.A., Ah Yong, S.T., Wing, S.R., and Hitchmough, R.A. 2010. Conservation status of New Zealand marine invertebrates, 2009, New Zealand Journal of Marine and Freshwater Research, 44:3, 129-148, DOI: 10.1080/00288330.2010.495373.
- Keeley, N., Forrest, B., Hopkins, G., Gillespie, P., Clement, D., Webb, S., Knight, B.R., and Gardner, J. 2009. Sustainable aquaculture in New Zealand: Review of the ecological effects of farming shellfish and other non-fish species. Prepared for Ministry of Fisheries. Cawthron Report 1476. Cawthron Institute, Nelson, New Zealand.

- MacKenzie, D.I., Clement, D.M. 2014. Abundance and distribution of ECSI Hector's dolphin. New Zealand Aquatic Environment and Biodiversity Report No. 123. 79 p.
- McClellan, R., Reid, Alex., Bycroft, C. and Smith, D. 2020. Pilot study on the use of mussel farms in Perloos Sound/Te Hoiere by King shag. Report prepared for the Reader Oyster Holdings Limited and Seafood Innovations Ltd.
- Morrisey, D., Anderson, T., Broekhuizen, N., Stenton-Dozey, J., Brown, S., Plew, D. 2015. Baseline monitoring report for new salmon farms, Marlborough Sounds. NIWA Client Report No: NEL1014- 020. Prepared for New Zealand King Salmon. 252pp. [May 2015, version 6].
- Morrisey, D.J., Stenton-Dozey, J., Hadfield, M., Plew, D., Govier, D., Gibbs, M., and Senior, A. 2006. Fisheries Resource Impact Assessment (Golden Bay, Tasman Bay Interim AMAs). NIWA Client Report: NEL2006-014 prepared for Ministry of Fisheries (Project: IPA2005-07).
- Nelson, W.A., Neill, K., D'Archino, R., and Rolfe, J.R. 2019. Conservation status of New Zealand macroalgae - New Zealand threat classification series 30.
- Page, M. 2017. Effects of Mussel Farming on Reef-building Biogenic Habitats. Serpulid reefs. Prepared for Marlborough District Council March 2017. NIWA Client Report No: 2017037NE.
- Pearson, T. H., and R. Rosenberg. 1978. Macrobenthic succession in relation to organic enrichment and pollution of the marine environment. *Oceanogr. Mar. Biol. an Annu. Rev.* 16: 229–321.
- Plew D.R. 2011. Shellfish farm-induced changes to tidal circulation in an embayment, and implications for seston depletion. *Aquacult Environ Interact*, 1: 201–214.
- Robertson, H.A., Baird, K.A., Elliott, G.P., Hitchmough, R.A., McArthur, N.J., Makan, T.D., Miskelly, C.M., O'Donnell, C.F.J., Sagar, P.M., Scofield, R.P., Taylor, G.A., Michel, P. 2021. Conservation status of birds in Aotearoa New Zealand, 2021 . New Zealand Threat Classification Series 36. Department of Conservation, Wellington. 43 p.
- Schuckard, R. 2006. Distribution of New Zealand king shags (*Leucocarbo carunculatus*) foraging from the Trio Is and Stewart I colonies, Marlborough Sounds, New Zealand. *Notornis* 53: 291-296.
- Stenton-Dozey, J., and Broekhuizen, N. 2019. Provisioning of ecological and ecosystem services by mussel farming in the Marlborough Sounds: A literature review in context of the state of environment pre- and post-mussel farming. NIWA Client Report No: 2019020H. 141p. Report available at: www.marinefarming.co.nz/public/environment/
- Zeldis, J.R., Hadfield, M.G., Booker, D.J. 2013. Influence of climate on Marlborough Sounds mussel aquaculture yields: predictive models and underlying mechanisms. *Aquaculture Environmental Interactions*, Vol. 4: 1-15.
- Zeldis, J.R., Howard-Williams, C., Carter, C.M., and Schiel, D.R. 2008. ENSO and riverine control of nutrient loading, phytoplankton biomass and mussel aquaculture yield in Marlborough Sounds, New Zealand. *Marine Ecology Progress Series*, Vol. 371: 131-142.

Appendix A:

Report Limitations

This Report/Document has been provided by Robertson Environmental Limited (REL) subject to the following limitations:

- i) This Report/Document has been prepared for the particular purpose outlined in REL's proposal and no responsibility is accepted for the use of this Report/Document, in whole or in part, in other contexts or for any other purpose.
- ii) The scope and the period of REL's services are as described in REL's proposal and are subject to restrictions and limitations. REL did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Report/Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by REL in regard to it.
- iii) Conditions may exist which were undetectable given the limited nature of the enquiry REL was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Report/Document. Accordingly, if information in addition to that contained in this report is sought, additional studies and actions may be required.
- iv) The passage of time affects the information and assessment provided in this Report/Document. REL's opinions are based upon information that existed at the time of the production of the Report/Document. The Services provided allowed REL to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.
- v) Any assessments, designs and advice made in this Report/Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Report/Document.
- vi) Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by REL for incomplete or inaccurate data supplied by others.
- vii) The Client acknowledges that REL may have retained sub-consultants affiliated with REL to provide Services for the benefit of REL. REL will be fully responsible to the Client for the Services and work done by all of its sub-consultants and subcontractors. The Client agrees that it will only assert claims against and seek to recover losses, damages or other liabilities from REL and not REL's affiliated companies. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any legal recourse, and waives any expense, loss, claim, demand, or cause of action, against REL's affiliated companies, and their employees, officers and directors.
- viii) This Report/Document is provided for sole use by the Client and is confidential to it. No responsibility whatsoever for the contents of this Report/Document will be accepted to any person other than the Client. Any use which a third party makes of this Report/Document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. REL accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this Report/Document.
- ix) Where lengths or other measurements have not been provided by a surveyor, REL has used basic GIS mapping and measurement systems to estimate these numbers. These should not be taken as surveyor-level accuracy for the purposes of decision making.

Appendix B:

Supporting Figures

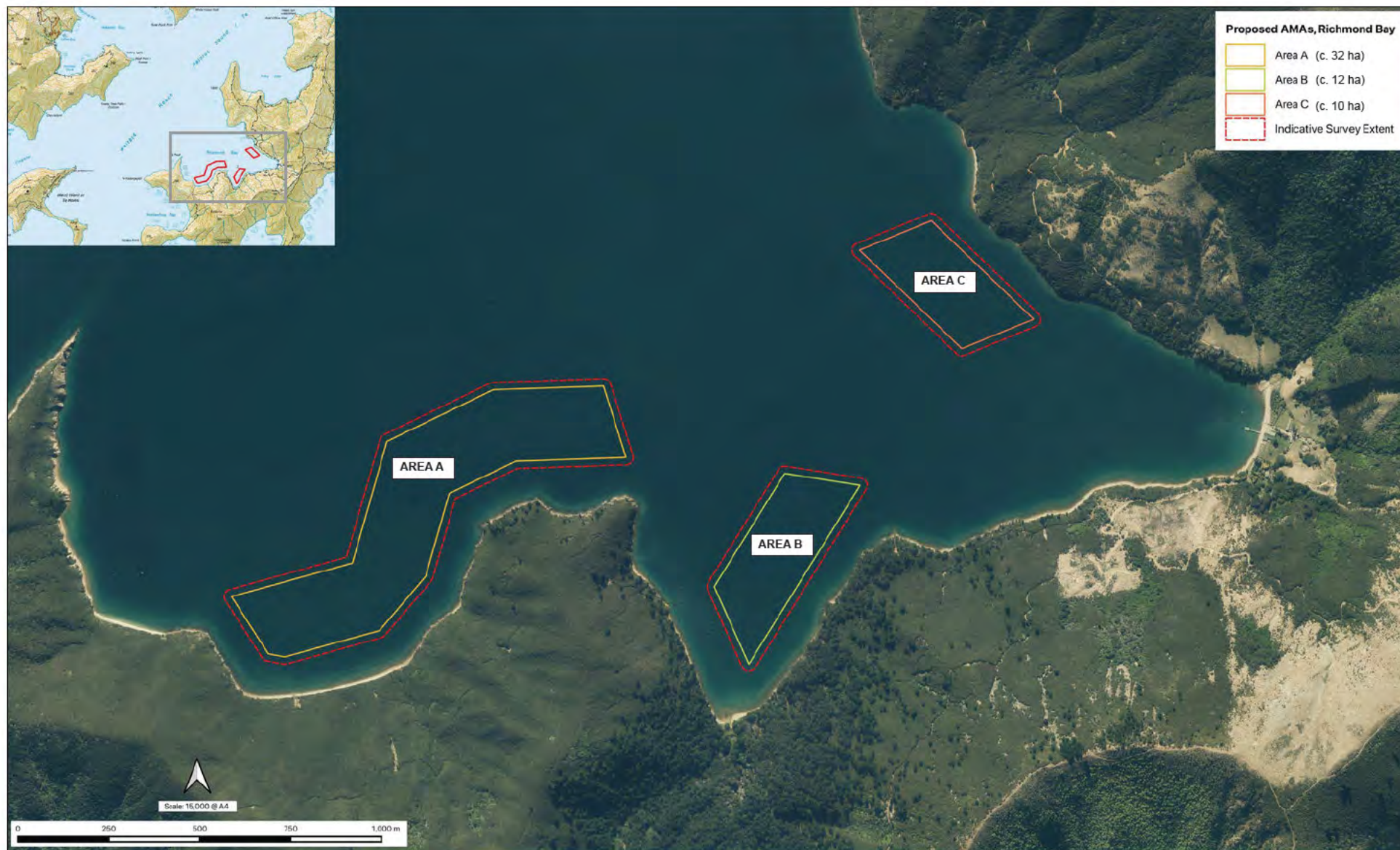


Figure B-1 Overview of the location and extent of proposed Richmond Bay farms and surveyed area assessed in the present study.



Figure B-2 Looking eastward across the Site—Area A (Plate 1), Area B (Plate 2) and Area C (Plate 3)—occupying a subtidal area within Richmond Bay, Pelorus Sound/Te Hoiere.

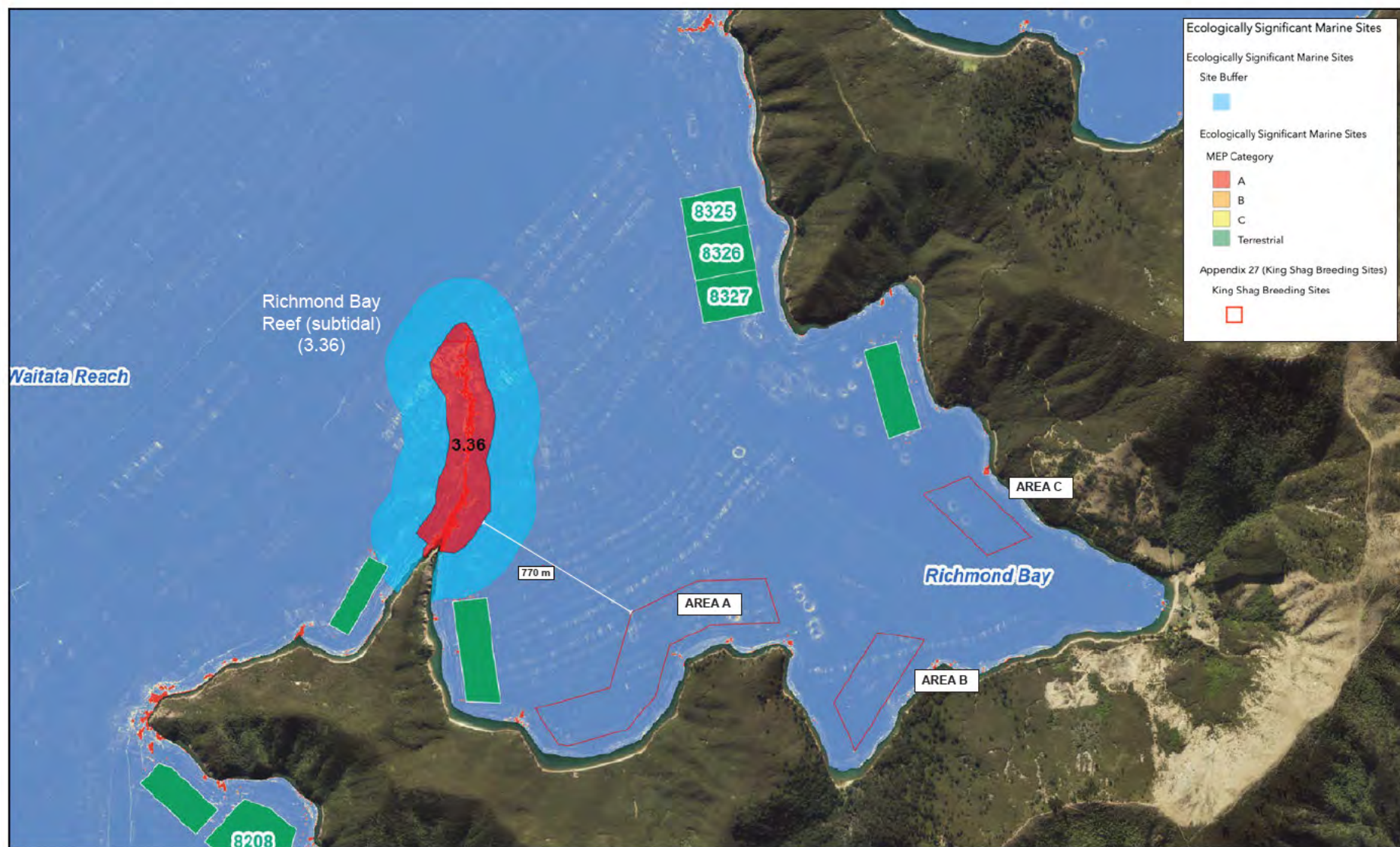


Figure B-3 Ecologically Significant Marine Site (ESMS) values associated with proposed Richmond Bay marine farms. Source: MDC Smart Maps database (accessed October 2025) .



Figure B-4 Surveyed area, mapped habitat types and locations of AUV video transect and still photograph locations assessed in the present study. Corresponding data is presented in Appendix H, with still photographs in Appendix I.

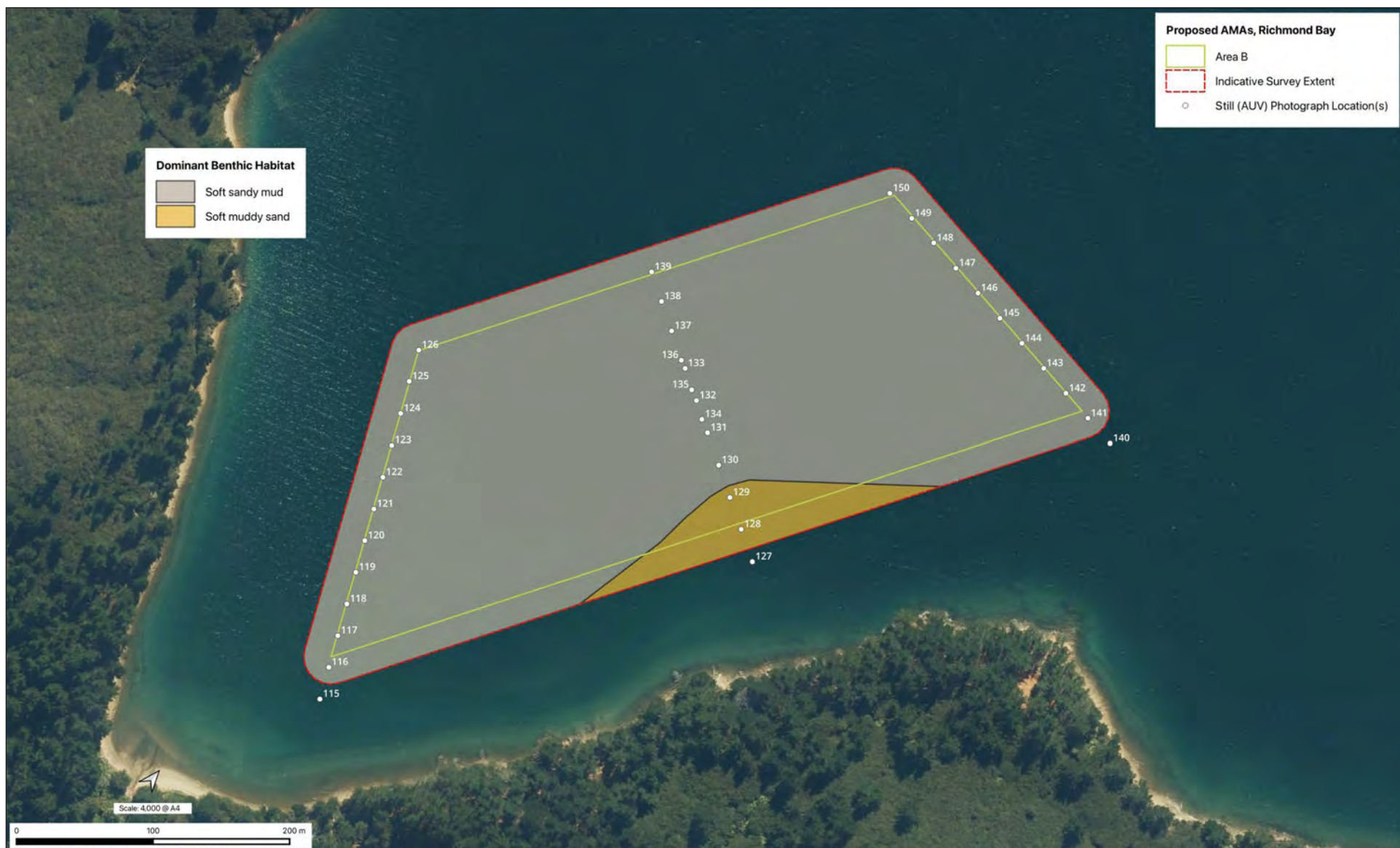


Figure B-5 Surveyed area, mapped habitat types and locations of AUV video transect and still photograph locations assessed in the present study. Corresponding data is presented in Appendix H, with still photographs in Appendix I.

PROJECT: PROPOSED RICHMOND BAY MARINE FARMS

Benthic Habitat Types (Area B)

| Date: 17 Nov 2025 | Revision: A | Aerial: LINZ 0.25m 23/24
Plan map prepared for ADL by Robertson Environmental Limited

Project Manager: [REDACTED]

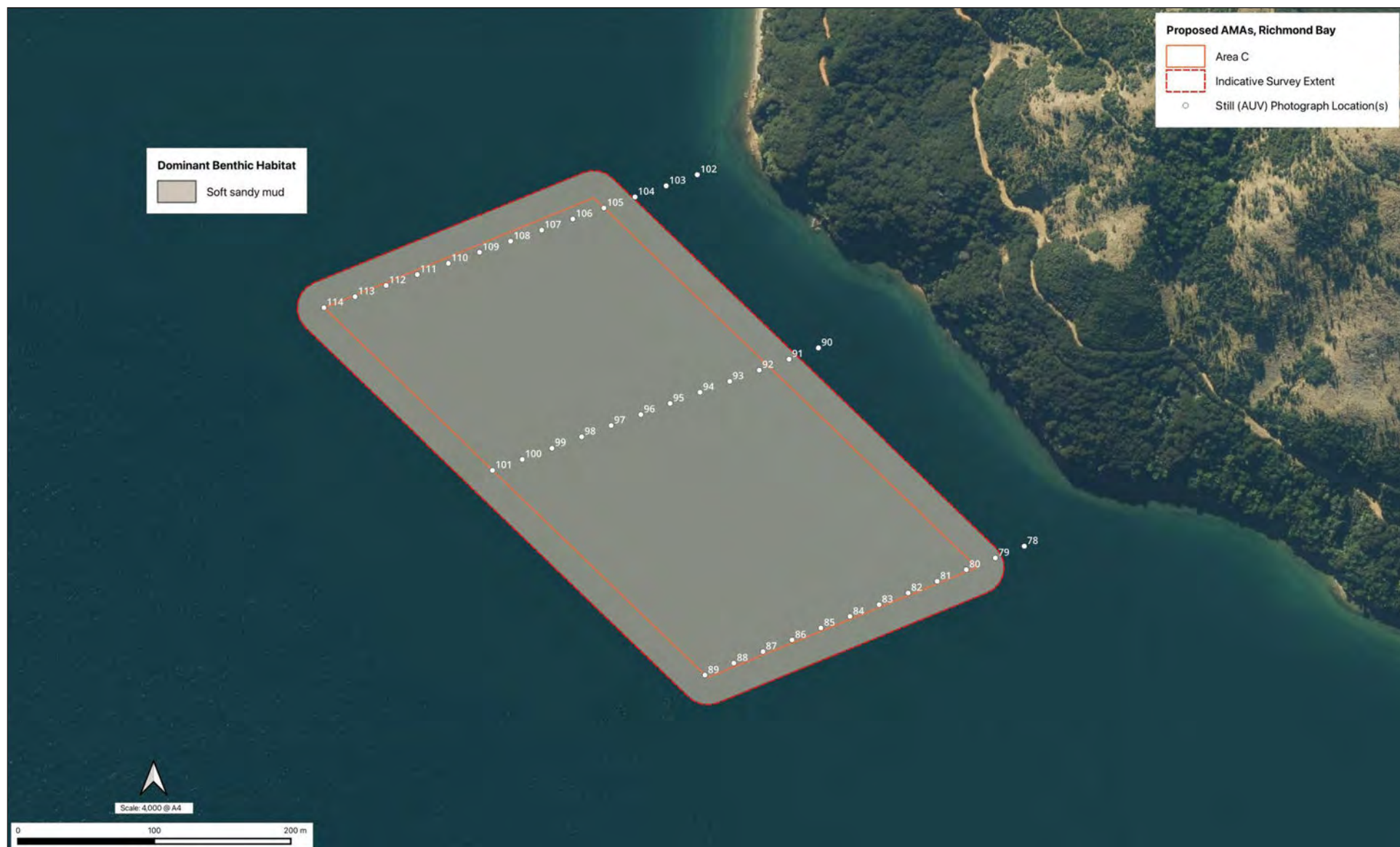


Figure B-6 Surveyed area, mapped habitat types and locations of AUV video transect and still photograph locations assessed in the present study. Corresponding data is presented in Appendix H, with still photographs in Appendix I.

Appendix C:

Summary of EIANZ EcIA Assessment Methodology

The assessment of ecological effects follows the Environment Institute of Australia and NZ Inc. (EIANZ) Ecological Impact Assessment (EcIA) guidelines (Roper-Lindsay et al. 2018)¹. The EcIA approach follows the steps outlined below:

Step 1: Assessment of ecological values

Ecological values are assigned based on the matters to be considered when assigning ecological value outlined in Table A.1, with corresponding criteria specific to marine habitats and species as set out in the EcIA guidelines (Table A.2).

Table A.1. Assignment of values to habitat(s) and fauna within the subject marine area (adapted from Roper-Lindsay et al. 2018).

Matter	Assessment matters considered; marine ecosystems
Representativeness	Criteria for representative fauna and habitats: 1. Extent to which a site is typical or characteristic of a natural example of the habitat type e.g. estuary, open high energy sandy beach, subtidal reef 2. Site/habitat size 3. Indigenous species dominate 4. Expected species and tiers are present
Rarity/distinctiveness	Criteria for rare/distinctive fauna and habitats: 1. Supporting nationally or locally ² Threatened, At Risk or uncommon species 2. National distribution limits 3. Endemism 4. Distinctive ecological features 5. Type of marine environment
Diversity and pattern	1. Degree of natural diversity / habitat modification 2. Diversity metrics/indices 3. Complexity of community 4. Biogeographical considerations - pattern, complexity, size, shape 5. Temporal life history or seasonal habitat usage
Ecological context	1. Local environmental conditions and influences, site history and development 2. Intactness, health and resilience of populations and communities 3. Contribution to ecological networks, linkages, pathways 4. Role in ecosystem functioning 5. Sensitivity to change 6. Project is within New Zealand's Coastal Marine Area (CMA) (under RMA legislation) or Exclusive Economic Zone (EEZ) (under EEZ legislation).

¹ And with reference to the *EIANZ EcIA Module 1 (2024). Ecological Impact Assessment (EcIA): Module 1 - Assigning Ecological Value to Marine Benthic Habitats. Published by Environment Institute of Australia and New Zealand.*

² Locally – defined as Ecological District (ED).

Table A.2. Criteria for assigning ecological value to marine habitats and species (modified from Roper-Lindsay et al. 2018)

Value	Species Value requirements	Habitat Value requirements
Very High	Nationally Threatened species, found in the Project ZOI either permanently or seasonally.	Area rates High for 3 or all of the four assessment matters listed in Table A.1. Likely to be nationally important and recognised as such.
High	Species listed as At Risk – Declining, found in the Project ZOI, either permanently or seasonally.	Area rates High for 2 of the assessment matters, Moderate and Low for the remainder, or Area rates High for 1 of the assessment matters, Moderate for the remainder. Likely to be regionally important and recognised as such.
Moderate	Species listed as any other category of At Risk, found in the Project ZOI either permanently or seasonally. Locally (ED) uncommon or distinctive species.	Area rates High for one matter, Moderate and Low for the remainder, or Area rates Moderate for 2 or more assessment matters Low or Very Low for the remainder. Likely to be important at the level of the Ecological District.
Low	Nationally and locally common indigenous species.	Area rates Low or Very Low for majority of assessment matters and Moderate for one. Limited ecological value other than as local habitat for tolerant native species.
Very Low	Exotic species, including pests, species having recreational value.	Area rates Very Low for 3 matters and Moderate, Low or Very Low for remainder.

Step 2: Magnitude of effect assessments

Step 2 of the EclA guidelines requires an evaluation of the magnitude of effects on ecological values based on the extent of any area which is likely to be affected, intensity and duration of effect. The magnitude of the effect that the Project is expected to have on ecological values is evaluated as being either No effect, Negligible, Low, Moderate, High or Very High, based on the proposed works (footprint size, intensity and duration; see Table A.3).

Table A.3. Summary of the criteria for describing the magnitude of effect as outlined in Roper-Lindsay et al. 2018.

Magnitude of effect	Description
Very High	Total loss or major alteration of the existing baseline conditions; and/or Loss of high proportion of the known population or range
High	Major loss or alteration of existing baseline conditions; and/or Loss of high proportion of the known population or range
Moderate	Loss or alteration to existing baseline conditions; and/or Loss of a moderate proportion of the known population or range

Low	Minor shift away from existing baseline conditions; and/or Minor effect on the known population or range
Negligible	Very slight change from the existing baseline conditions; and/or Negligible effect on the known population or range

Step 3: Level of effects assessment in the absence of mitigation

Step 3 of the EcIA guidelines requires the overall level of effect to be determined using a matrix that is based on the ecological values and the magnitude of effects on these values in the absence of any efforts to avoid, remedy or mitigate for potential effects. Level of effect categories include No Effect, Very Low, Low, Moderate, Moderate/High, High and Very High. Table A.4 shows the EcIA matrix outlining criteria to describe the overall level of ecological effects.

Table A.4. Summary of the criteria for describing the overall level of ecological effects as outlined in Roper-Lindsay et al. 2018.

Effect Level		Ecological Value				
		Very High	High	Moderate	Low	Very Low
Magnitude of Impact	Positive	Net gain	Net gain	Net gain	Net gain	Net gain
	Very High	Very high	Very high	High	Moderate	Low
	High	Very high	Very high	Moderate	Low	Very low
	Moderate	High	High	Moderate	Low	Very low
	Low	Moderate	Low	Low	Very low	Very low
	Negligible	Low	Very low	Very low	Very low	Very low

Assessment also considered the temporal scale at which potential impacts were likely to occur:

- Permanent (>25 years);
- Long-term (15-25 years);
- Medium-term (5-15 years);
- Short-term (0-5 years); or,
- Temporary (during construction).

Step 4: Establish if mitigation is required

Results from the matrix in Table A.4 is used to determine the type of responses that may be required to mitigate potential direct and indirect impacts, considering the following EcIA guidelines:

- A 'Low' or 'Very Low' level of impact is not normally of concern, though design should take measures to minimise potential effects.
- A 'Moderate' to 'High' level of impact indicates a level of impact that qualifies careful assessment on a case-by-case basis. Such activities could be managed through avoidance (revised design) or appropriate mitigation. Where avoidance is not possible, no net loss of biodiversity values would be appropriate.
- A 'Very High' level of impact is are unlikely to be acceptable on ecological grounds alone and should be avoided. Where avoidance is not possible, a net gain in biodiversity values would be appropriate.

As discussed in this report, the Project would largely have only Low to Very Low ecology effects (in terms of Step 3 of the EcIA guidelines), even without taking into account mitigation measures. However, mitigation measures are proposed for specific attributes below to ensure a no-net-loss ecological outcome.

Appendix D:

Potential Biogenic Habitat & Macroinvertebrates

Species	Common name	Threat classification (DOC) (2016) ¹	Significant Species (MDC) ²	Distribution ^{2,3}	Habitat ²
<i>Haliotis iris</i>	Black Foot Paua	N/A	Significant Species - Iconic species in Marlborough as they highly regarded as a recreational and commercial catch.	Black-foot paua are endemic to New Zealand. In Marlborough they have been recorded throughout much of the Marlborough Sounds apart from inner Marlborough Sounds. They are most common from exposed outer Sounds locations and areas with macroalgal forest.	Lives in shallow coastal waters, usually in large groups on rocky reefs.
<i>Galeopsis porcellanicus</i>	Bryozoan Coral	N/A	Significant Species - In Marlborough as they provide biogenic habitat for a variety of species.	Endemic, throughout NZ from Three Kings Islands to Foveaux Strait and the Antipodes Islands.	Found on rock or shelly gravel in sublittoral fringe to 235 m. In Marlborough it is known from areas with relatively strong tidal currents.
<i>Notoplax latalamina</i>	Chiton	N/A	Significant Species - Endemic to the outer Marlborough Sounds being recorded nowhere else. The type locality of the species is 200 m depth off Stephen's island (Takaporewa). It has also been observed by divers from Croisilles Harbour to Sentinel Rock in the outer Marlborough Sounds. This species appears to be naturally rare, and is sparsely distributed in the outer north-west Marlborough Sounds and Cook Strait.	Endemic to the outer Marlborough Sounds being recorded nowhere else. The type locality of the species is 200 m depth off Stephen's island (Takaporewa). It has also been observed by divers from Croisilles Harbour to Sentinel Rock in the outer Marlborough Sounds. This species appears to be naturally rare, and is sparsely distributed in the outer north-west Marlborough Sounds and Cook Strait.	Found on rocky reefs between 6 to 200 m depth, associated with large sponges growing in areas of moderate to high current flow.
<i>Neothyris lenticularis</i>	Giant Lamp-shell	N/A	Significant Species - Scientific and conservation values.	This species and genus is endemic to New Zealand and sub Antarctic waters. They are known from 200 m depth at Stephens island and form large beds in Cook and Foveaux Straits. In Marlborough it is widespread in deep waters of Cook Strait, but has also been recorded from a variety of shallow locations in East Bay, Arapawa island and several locations in inner Queen Charlotte Sound.	Found on a variety of substrates from solid rock platforms and walls to coarse sandy rubble.
<i>Atrina zelandica</i>	Horse Mussel	N/A	Significant Species - Can form a biogenic habitat in high densities.	They are found in muddy to sandy soft-sediment habitats around the coast of New Zealand from extreme low water to 70 m depth. In the Marlborough Sounds they are often found in the soft sediments. Dense beds of greater than 10 per square metre have been recorded from particular areas such as Grove Arm, Wet inlet and Port Gore.	Inhabit soft sediments with most of the shell embedded in the sea floor and anchored to sediment by byssus threads. The exposed shells provide attachment for an array of algae and invertebrates such as sponges and sea squirts.

1. Freeman et al. (2013). 2. Nelson et al. (2019). 3. Davidson et al. (2011). 4. Page (2017).

Species	Common name	Threat classification (DOC) (2016) ¹	Significant Species (MDC) ²	Distribution ^{2,3}	Habitat ²
<i>Jasus edwardsii</i>	Rock Lobster	N/A	Significant Species - Highly regarded as a recreational and commercial catch. Dominant or key-stone predator.	They are found from Three Kings, north, South, Stewart and Chatham islands, south to Auckland islands. In Marlborough they have been recorded throughout the Sounds where suitable rock habitat exists, except central and inner Marlborough Sounds. Port underwood where large numbers of juveniles can be observed in the shallows.	Most common from outer Sounds locations and areas swept by moderate to strong tidal currents in rocky reef and on occasion, soft sediment habitats.
<i>Pecten novaezelandiae</i>	Scallop	N/A	Significant Species - Iconic species in Marlborough as they highly regarded as a recreational and commercial catch.	They are found throughout the Marlborough Sounds except inner Marlborough Sounds (including inner Kenepuru Sound) and Port underwood. They are particularly abundant in Croisilles Harbour entrance, the many bays in Queen Charlotte Sound and some outer Sound locations.	Found on a variety of soft substrata from mud to fine gravels, however adults appear to prefer coarse sediments (e.g. shell gravel and grit). They are usually most abundant in areas with some tidal flow.
<i>Celleporaria agglutinans</i>	Separation point coral	Not Threatened	Significant Species - Form dense beds that provide habitat for a variety of other species.	In New Zealand it is commonly known as Separation Point coral, Tasman Bay coral or 'hard coral' and occurs from the Three Kings islands to Foveaux Strait at about 3 to 220 m depth. In Marlborough particularly large concentrations of colonies are known from Current Basin, Chetwode and Titi islands.	Grows on rocky and soft sediment substrata, but only tends to form large, conspicuous colonies on soft sediments in high current areas.
<i>Galeolaria hystrix</i>	Tubeworm	N/A	Significant Species - Tubeworm mounds represent a significant biogenic habitat in Marlborough as they are utilised by a variety of species enhancing local biodiversity and potentially providing habitat for a variety of juvenile fishes.	Found on the rocky shores throughout Marlborough, however mounds are restricted only known to occur in the sheltered waters of the Marlborough Sounds and Port underwood. Particularly dense growths of these mounds are restricted to locations such as The Knobbies and Perano Shoal. There are three major reefs in the region. One is in Queen Charlotte Sound and two are in Port Underwood at the Knobbies and Whataroa Bay.	Most abundant on rocky sheltered shores devoid of macroalgae but swept by tidal currents. Mounds are absent from areas exposed to ocean storms.

1. Freeman et al. (2013). 2. Nelson et al. (2019). 3. Davidson et al. (2011). 4. Page (2017).

Species	Common name	Threat classification (DOC) (2016) ¹	Significant Species Marlborough (MDC) ²	Distribution ^{2,3}	Habitat ²
<i>Macrocystis pyrifera</i>	Giant Kelp	At Risk (Declining)	Significant species - In Marlborough because in areas where it is dominant it can alter abiotic and biotic conditions by dampening water motion, altering sedimentation, shading the sea floor, scrubbing nutrients from the water column, stabilising substrata, and they can provide physical habitat for organisms both above and below the benthic boundary.	The giant kelp is found throughout New Zealand's marine environment. The range and extent of beds in the Marlborough Sounds has declined, with beds now absent from the eastern coast of D'urville island. Beds in the Marlborough Sounds are largely confined to sheltered eastern outer sound locations. Giant kelp beds are also located north and south of Cape Campbell.	Generally attaches to rock substrata, occasionally horse mussels, from low water to at least 18 m depth. The lower depth limit is determined by light and habitat availability. Note this species may also be a useful indicator of global warming as its distributional limit has been moving southward.
<i>Adamsiella chauliophylla</i>	Red Alga	Not Threatened	Significant species - In Marlborough because where it forms dense beds it appears to provide habitat for a variety of species including bivalves, holothurians and fishes.	Endemic to New Zealand. In Marlborough it often forms dense beds in particular areas of Port Underwood, East Bay, and inner Queen Charlotte Sound (Houhou Point, Hauatehoro Point, Wedge Point, Ngakutu Point).	Found growing on a variety of substrata from rock to sand and mud.
<i>Rhodomyenia</i> sp.	Red Algae	Data Deficient	Significant Species - In Marlborough because they provide an important food source for a variety of species, including urchins and some herbivorous fishes	New Zealand waters.	Occur on a variety of substrata including rock, tube worm colonies and horse mussel shells. They may also be intertidal but most beds are subtidal in harbours and inlets.
<i>Lithothamnion</i> sp.	Rhodoliths	Data Deficient	Significant Species - Play an important role in the global calcium carbonate budget.	In the Marlborough Sounds rhodoliths are known from a small number of distinct locations including Picnic Bay in Marlborough Sounds, and Pongau Bay and Catherine Cove, D'urville island.	Many species that form rhodoliths may also be found encrusting reefs and other hard substrata. Rhodoliths may form around small particles of rock, shell or coral, or may develop from fragments of coralline algae eroded from reefs.

1. Freeman et al. (2013), 2. Nelson et al. (2019), 3. Davidson et al. (2011), 4. Page (2017).

Appendix E:

Potential Fish Species

Species	Common name	Threat classification (IUNC) ¹	Date last assessed (IUCN)	Significant Species Marlborough (MDC) ²	Distribution ²	Habitat ²
<i>Paraper-cis colias</i>	Blue Cod	Threatened - Least Concern (Decreasing)	2009	Significant Species - Iconic species, dominant or key-stone predator.	Blue cod are endemic to New Zealand and are found from the Three Kings islands in the north to the Snares islands in the south. They are a common reef fish in Marlborough, Kaitiaki, Fiordland, Stewart island and the Chatham Islands.	Found throughout Marlborough on rocky habitats and offshore biogenic soft bottom habitats. Small juveniles appear at about 5 cm length on sandy or shelly bottoms that provide some cover (e.g. dead whole shells or cobbles).
<i>Cal-lorhinchus milii</i>	Elephant Fish	Threatened - Least Concern (Stable)	2015	Significant Species - Accessibility of the spawning areas makes them of importance to scientists	This chimaera resides on continental shelves of cool temperate areas to depths to at least 656 feet (200 m). It has also been reported to migrate into estuaries and inshore bays during the spring months to mate. They occur throughout New Zealand coastal waters but are most common around the South Island. Spawning grounds have been identified at several locations in the Marlborough Sounds. Observations suggest that highest densities of egg cases occur in Garne Bay, Marlborough Sounds, but other important areas include Saville Bay, Kumutoto Bay and Grove Arm.	Adults are most often found on soft bottom habitats, from the surf zone to 227 m depth. Adults migrate into inshore waters, including harbours and estuaries to breed.
<i>Zearaja natuta</i>	Rough Skate	Threatened - Least Concern (Stable)	2017	"Significant Species - breeds in the sheltered bays of the Marlborough Sounds and its	Endemic to the outer Marlborough Sounds being recorded nowhere else. The type locality of the species is 200 m depth off Stephen's island (Takaporewa). It has also been observed by divers from Croisilles Harbour to Sentinel Rock in the outer Marlborough Sounds. This species appears to be naturally rare, and is sparsely distributed in the outer north-west Marlborough Sounds and Cook Strait.	Found on rocky reefs between 6 to 200 m depth, associated with large sponges growing in areas of moderate to high current flow.
<i>Pagrus auratus</i>	Snapper	Threatened - Least Concern (Decreasing)	2009	Significant Species - Significant Species - Iconic species, dominant or keystone predator.	In New Zealand they are found mainly in warmer coastal waters from Three Kings islands south to Cook Strait on the east coast; and to Tasman Bay and Westport on the west. Occasional individuals have been recorded from Foveaux Strait and Chatham Islands. Snapper are present throughout Marlborough but are more common in the west.	Young fish school in shallow water and sheltered areas and move out to deeper water in winter.
<i>Noto-labrus celidotus</i>	Spotty	Threatened - Least Concern	2008	N/A	Endemic to the waters around New Zealand, including Stewart Island.	Found on reefs at depths from 22 to 145 m, though most common in shallower parts of that range.

1. International Union for Conservation of Nature (IUCN) - <https://www.iucnredlist.org/species>.

2. Davidson et al. (2011).

Appendix F:

Potential Marine Mammal Species

Summary the threat classification, habitat preferences and distribution of mammal species known to occur within the Marlborough Sounds area.						
Species	Common name	Threat classification (DOC) (2019) ¹	Threat classification (IUCN) ²	Date last assessed (IUCN)	Significant Species Marlborough (MDC) ³	Distribution ³
<i>Tursiops truncatus</i>	Bottlenose Dolphin	Threatened - Nationally endangered	Threatened - Least Concern	2018	Significant Species - Conservation grounds	New Zealand is at the southern most point of their range. Limits to the range of this species appear to be temperature related. Around 450 individuals live in the North Island area, ranging from Doubtless Bay in Northland to Tauranga. There are currently 31 individual dolphins visiting the Bay of Islands area (from 2017-2019 data). Around 63 live in Doubtful Sound, Fiordland (as at 1998). Another group range from the Marlborough Sounds to Westport. The only known population estimate for the Marlborough Sounds is 211 semi-resident animals.
<i>Lagenorhynchus obscurus</i>	Dusky Dolphin	Not Threatened	Threatened - Least Concern	2018	Significant Species	They are widely distributed around the South Island and southern North Island but are rarely seen north of Hawke's Bay. They have been observed throughout much of the Marlborough Sounds, including Admiralty Bay, Queen Charlotte Sound and Tory Channel, Marlborough Sounds and Croisilles Harbour. Admiralty Bay is now recognised as an important feeding area for some over-wintering dolphins that are found off Kaikoura during the summer. Feeding in Admiralty Bay occurs during daylight hours, with primary targets being small schooling fishes e.g. pilchards. The Admiralty Bay winter population represents a significant portion of the New Zealand dusky dolphin population. This population has been the focus of continued scientific interest regarding the relationship between aquaculture activities and dolphins.
<i>Cephalorhynchus hectori hectori</i>	Hector's Dolphin	Threatened - Nationally Vulnerable	Threatened - Endangered (Decreasing)	2008	Significant Species - Conservation grounds	Two sub-species of Hector's dolphins exist: Maui's dolphin is only found off the west coast of the north island; Hector's dolphin is found around the South Island of New Zealand except Fiordland. In Marlborough the Hector's Dolphin is known to inhabit an area in the central Queen Charlotte Sound and a second area in Cloudy and Clifford Bays.

Species	Common name	Threat classification (DOC) (2019) ¹	Threat classification (IUCN) ²	Date last assessed (IUCN)	Significant Species Marlborough (MDC) ³	Distribution ³
<i>Megaptera novaeangliae</i>	Humpback Whale	Non-Resident Native - Migrant	Threatened - Least Concern (Increasing)	2018	Significant Species - Scientific and conservation and grounds	In Marlborough humpback whales migrate northward from late May to early August, travelling up the east coast of the South Island before dividing into two groups: one moving through Cook Strait and up the west coast of the north island; the other continuing up the east coast of the north island. South bound humpbacks mostly pass along the west coasts of both islands, between mid November and early December.
<i>Orcinus orca</i>	Killer Whale, Orca	Threatened - Nationally Critical	Threatened - Data Deficient	2017	Significant Species - Conservation grounds	They are the most cosmopolitan of all marine mammals, being found in all waters from tropics to polar regions. Within new Zealand there appear to be three main populations: (1) north island, (2) South island and (3) a population that appears to move between the both islands. Killer whales have been recorded from throughout much of Marlborough and may be encountered at any time of the year.
<i>Delphinus delphis</i>	Short-beaked Common Dolphin	Not Threatened	Threatened - Least Concern	2008	Significant Species	The New Zealand distribution is not well documented, however common dolphins are known from as far south as Fiordland, through to Kaikoura, the eastern coast of the north island and the Hauraki Gulf. Common dolphin are also present off the west coast of the North Island, from Northland through to the South Taranaki Bight and Cook Strait. In Marlborough common dolphin are known from Queen Charlotte Sound and Cook Strait; French Pass and Admiralty Bay area and also Cloudy and Clifford Bays.
<i>Eubalaena australis</i>	Southern Right Whale	At Risk - Recovering	Threatened - Least Concern	2017	Significant Species - Conservation grounds	They have a circumpolar distribution between 20 and 55 degrees south. Southern right whales are occasionally seen in the Marlborough region during winter and spring. Sightings are primarily in Cloudy and Clifford Bay, Tory Channel and Queen Charlotte Sound, however sightings have occurred in other areas and seasons. Historically, New Zealand was considered to have two of the seven recognised southern right whale breeding grounds in the South Pacific to Indian Ocean Basin: (1) mainland New Zealand; and (2) Auckland Islands.

1. Baker et al. (2019).

2. Listed as 'Threatened' by the International Union for Conservation of Nature (IUCN). <https://www.iucnredlist.org/species>.

3. Davidson et al. (2011).

Species	Common name	Threat classification (DOC) (2019) ¹	Threat classification (IUCN) ²	Date last assessed (IUCN)	Significant Species Marlborough (MDC) ³	Distribution ³
<i>Arctocephalus forsteri</i>	New Zealand Fur Seal	Not Threatened	Threatened - Least Concern (Increasing)	2014	Significant Species - Scientific and conservation and grounds	They are widely distributed around mainland New Zealand as well as offshore islands and sub-Antarctic islands and can be found as far north as Three Kings islands. They are widely distributed in the Marlborough Sounds and east coast region. In Marlborough breeding colonies exist at Stephens Island and Trio islands. There are numerous haul outs throughout the Marlborough Sounds region. In at least some parts of the region (e.g. Admiralty Bay, French Pass, Current Basin), the haulout sites can vary through-out the year. Fur seals are regularly seen near salmon farms. Fur seals frequently feed on pelagic schooling fishes such as hoki, jack mackerel, and barracouta, as well as arrow squid. They also occasionally feed on penguins and shearwaters. Adult females tend to forage at night, in depths ranging from 15 m to 163 m.

1. Baker et al. (2019).

2. Listed as 'Threatened' by the International Union for Conservation of Nature (IUCN). <https://www.iucnredlist.org/species>.

3. Davidson et al. (2011).

Appendix G:

Potential Seabird Species

Summary the threat classification of bird species recently sighted within New Zealand Bird Atlas (BV60) and iNaturalist (5 km radius).

Species	Common Name	Māori Name	Threat Classification ^a	New Zealand Status
<i>Haematopus unicolor</i>	Variable oystercatcher	Tōrea pango	At Risk – Recovering	Endemic
<i>Larus dominicanus</i>	Kelp gull / Southern black-backed gull	Karoro	Not Threatened	Native
<i>Chroicocephalus novaehollandiae</i>	Red-billed gull	Tarāpunga	At Risk – Declining	Native
<i>Sterna striata striata</i>	White-fronted tern	Tara	At Risk – Declining	Native
<i>Hydroprogne caspia</i>	Caspian tern	Taranui	Threatened – Nationally Vulnerable	Native
<i>Egretta sacra</i>	Pacific reef-heron	Matuku moana	Nationally Endangered	Native
<i>Egretta novaehollandiae</i>	White-faced heron	Matuku	Not Threatened	Native
<i>Phalacrocorax punctatus</i>	Spotted shag	Kawau tikitiki / parekareka	Threatened – Nationally Vulnerable	Endemic
<i>Phalacrocorax varius</i>	Pied shag	Kāruhiruhi	At Risk – Recovering	Native
<i>Microcarbo melanoleucos</i>	Little shag	Kawaupaka	At Risk – Relict	Native
<i>Leucocarbo carunculatus</i>	New Zealand king shag	Kawau pāteketeke	Nationally Endangered	Endemic
<i>Anous minutus</i>	Black noddy	—	Threatened – Nationally Vulnerable	Native
<i>Procellaria westlandica</i>	Westland petrel	Tāiko	At Risk – Naturally Uncommon	Endemic
<i>Pelecanoides urinatrix</i>	Common diving-petrel	Kuaka	At Risk – Relict	Native
<i>Puffinus gavia</i>	Fluttering shearwater	Pakahā	At Risk – Relict	Endemic
<i>Ardenna carneipes</i>	Flesh-footed shearwater	Toanui	At Risk – Relict	Native
<i>Ardenna grisea</i>	Sooty shearwater	Tītī / mutton-bird	At Risk – Declining	Native
<i>Stercorarius parasiticus</i>	Parasitic jaeger / Arctic skua			Non-resident native
<i>Morus serrator</i>	Australasian gannet	Tākapu	Not Threatened	Native
<i>Eudyptula minor minor</i>	Little penguin	Kororā	At Risk – Declining	Native

^a Conservation status of birds in Aotearoa New Zealand (Robertson et al. 2021).

Appendix H:

Detailed Field Data



Figure H-1A Overview of Area A, surveyed area, and boundary corner locations for the proposed farm. Distances between Mean Low Water and the inshore farm boundary also shown.

PROJECT: PROPOSED RICHMOND BAY MARINE FARMS

Survey Area (Area A)

| Date: 17 Nov 2025 | Revision: A | Aerial: LINZ 0.25m 23/24
Plan map prepared for ADL by Robertson Environmental Limited

Project Manager: [REDACTED]



Figure H-2A Area A - Side-scan sonar image overlaid with AUV video transect and still photograph locations used to ground-truth benthic habitat features identified in the sonar data.

PROJECT: PROPOSED RICHMOND BAY MARINE FARMS

Benthic Imagery & Side-Scan Sonar Extent

| Date: 17 Nov 2025 | Revision: A | Aerial: LINZ 0.25m 23/24
Plan map prepared for ADL by Robertson Environmental Limited

Project Manager: [REDACTED]

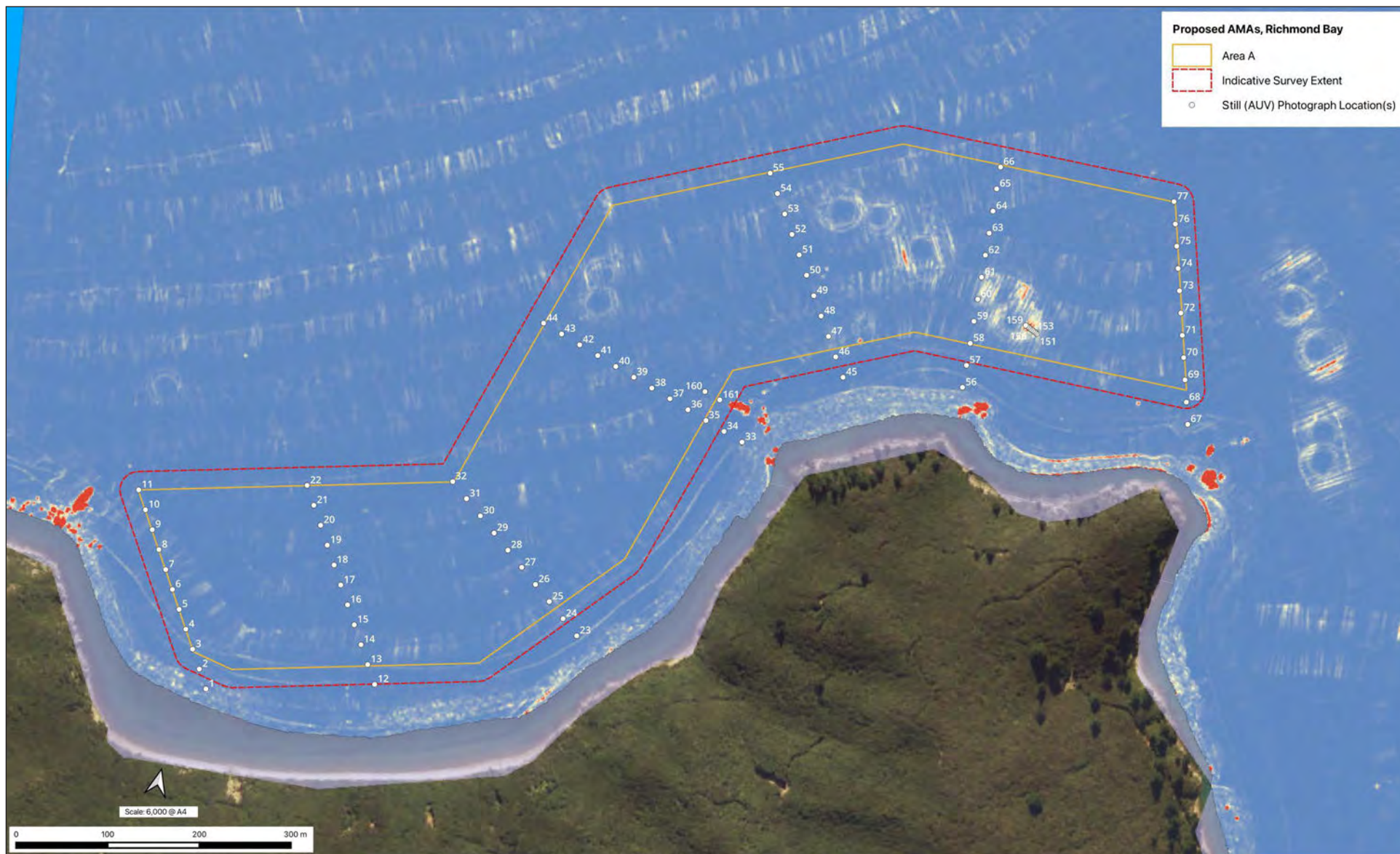


Figure H-3A Area A - MDC MBES Rugosity image overlaid with AUV video transect and still photograph locations used to ground-truth benthic habitat features identified in the sonar data.



Figure H-1B Overview of Area B, surveyed area, and boundary corner locations for the proposed farm. Distances between Mean Low Water and the inshore farm boundary also shown.



Figure H-2B Area B - MDC MBES Rugosity image overlaid with AUV video transect and still photograph locations used to ground-truth benthic habitat features identified in the sonar data.



Figure H-1C Overview of Area C, surveyed area, and boundary corner locations for the proposed farm. Distances between Mean Low Water and the inshore farm boundary also shown.

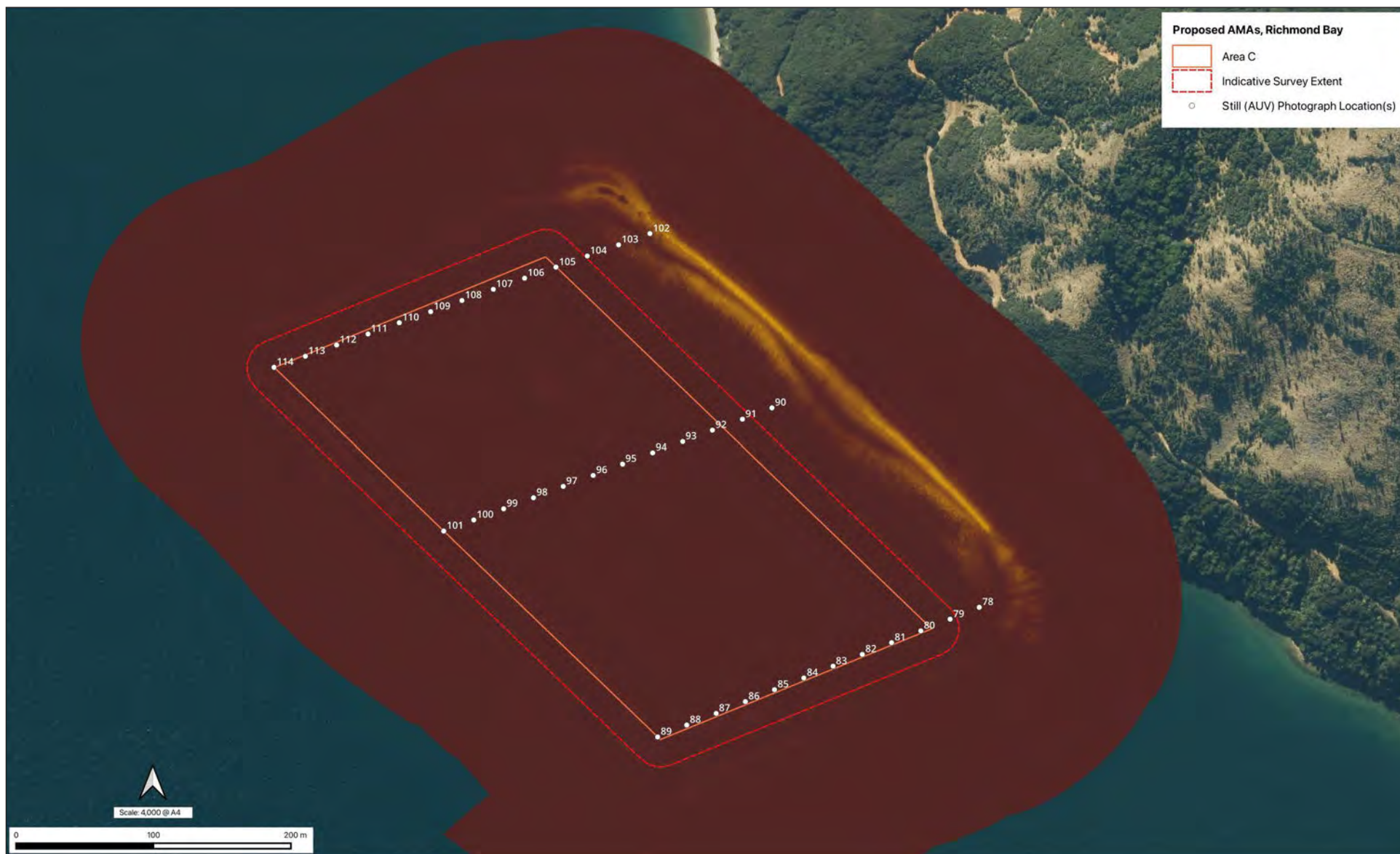


Figure H-2C Area C - Side-scan sonar image overlaid with AUV video transect and still photograph locations used to ground-truth benthic habitat features identified in the sonar data.

PROJECT: PROPOSED RICHMOND BAY MARINE FARMS

Benthic Imagery & Side-Scan Sonar Extent

| Date: 17 Nov 2025 | Revision: A | Aerial: LINZ 0.25m 23/24
Plan map prepared for ADL by Robertson Environmental Limited

Project Manager: [REDACTED]



Figure H-3C Area C - MDC MBES Rugosity image overlaid with AUV video transect and still photograph locations used to ground-truth benthic habitat features identified in the sonar data.

PROJECT: PROPOSED RICHMOND BAY MARINE FARMS

Benthic Imagery & MDC Rugosity Extent

| Date: 17 Nov 2025 | Revision: A | Aerial: LINZ 0.25m 23/24
Plan map prepared for ADL by Robertson Environmental Limited

Project Manager: [REDACTED]

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area A), Richmond Bay, October 2025.								
AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
A-1	1	5458489.625	1680431.906	Silt, fine sand, broken natural shell	Soft muddy sand	<5	MPB film, ulva sp.	Suitable
A-1	2	5458508.874	1680419.688	Silt, fine sand, broken natural shell	Soft muddy sand	<5	MPB film	Suitable
A-1	3	5458528.207	1680407.327	Silt, clay, sand	Soft sandy mud	15	calcareous tube worms (individual, non-mounding), finger sponge (<i>Callyspongia</i> sp.), ulva sp., MPB film	Suitable
A-1	4	5458547.529	1680394.923	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), sea cucumber, ulva sp., MPB film	Suitable
A-1	5	5458566.854	1680382.538	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), finger sponge (<i>Callyspongia</i> sp.), ulva sp., MPB film	Suitable
A-1	6	5458586.169	1680370.122	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), horse mussel (<i>A. zealandica</i>) (individual, <1 per m2 based on video), ulva sp., MPB film	Suitable
A-1	7	5458605.462	1680357.776	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-1	8	5458624.8	1680345.3	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-1	9	5458644.188	1680332.997	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), horse mussel (<i>A. zealandica</i>) (individual, <1 per m2 based on video), MPB film	Suitable
A-1	10	5458663.473	1680320.55	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-1	11	5458682.819	1680308.184	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area A), Richmond Bay, October 2025.								
AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
A-2	12	5458538.956	1680609.378	Silt, fine sand, broken natural shell	Soft muddy sand	20	MPB film, ulva sp.	Suitable
A-2	13	5458558.104	1680596.854	Silt, fine sand, broken natural shell	Soft muddy sand	85		Suitable ^b
A-2	14	5458577.432	1680584.471	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-2	15	5458596.747	1680572.068	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-2	16	5458616.081	1680559.69	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-2	17	5458635.367	1680547.263	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-2	18	5458654.725	1680534.909	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-2	19	5458674.02	1680522.461	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-2	20	5458693.334	1680510.153	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-2	21	5458712.694	1680497.695	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-2	22	5458732.012	1680485.301	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

^b Appears to represent a highly localised patch of natural shell material of limited ecological value.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area A), Richmond Bay, October 2025.								
AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
A-3	23	5458643.769	1680810.577	Silt, fine sand, gravel, broken natural shell	Soft muddy sand	30	ulva sp.	Suitable
A-3	24	5458658.288	1680791.624	Silt, fine sand, broken natural shell	Soft muddy sand	20	calcareous tube worms (individual, non-mounding), sea cucumber, spotty (<i>Notolabrus celidotus</i>)	Suitable
A-3	25	5458672.805	1680772.51	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-3	26	5458687.359	1680753.372	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-3	27	5458701.867	1680734.233	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-3	28	5458716.409	1680715.094	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
A-3	29	5458730.939	1680695.964	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-3	30	5458745.469	1680676.834	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film, triple fin	Suitable
A-3	31	5458760.001	1680657.678	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-3	32	5458774.522	1680638.539	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area A), Richmond Bay, October 2025.								
AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
A-4	33	5458892.271	1680934.628	Silt, fine sand, gravel, broken natural shell	Soft muddy sand	20	ulva sp.	Suitable
A-4	34	5458898.801	1680912.678	Silt, fine sand, gravel, cobble, broken natural shell	Soft muddy sand	20	eleven-arm sea star, ulva sp.	Suitable
A-4	35	5458905.606	1680890.725	Silt, clay, sand	Soft sandy mud	15	sea cucumber, calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-4	36	5458912.266	1680868.753	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-4	37	5458919.108	1680846.77	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-4	38	5458925.645	1680824.801	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-4	39	5458932.431	1680802.862	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-4	40	5458939.078	1680780.906	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-4	41	5458945.858	1680758.92	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-4	42	5458952.533	1680736.957	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-4	43	5458959.239	1680714.973	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-4	44	5458966.003	1680693.026	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area A), Richmond Bay, October 2025.								
AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
A-5	45	5458987.623	1681024.402	Silt, fine sand, gravel, cobble, broken natural shell	Soft muddy sand	20	eleven-arm sea star, ulva sp.	Suitable
A-5	46	5459007.355	1681011.289	Silt, fine sand, broken natural shell	Soft muddy sand	55	MPB film	Suitable ^b
A-5	47	5459027.064	1680998.189	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-5	48	5459046.741	1680985.05	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
A-5	49	5459066.336	1680971.918	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-5	50	5459086.193	1680958.9	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-5	51	5459105.83	1680945.717	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film, ind. scallop	Suitable
A-5	52	5459125.594	1680932.655	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film, ind. scallop	Suitable
A-5	53	5459145.316	1680919.595	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-5	54	5459165.026	1680906.434	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable
A-5	55	5459184.738	1680893.376	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

^b Appears to represent a highly localised patch of natural shell material of limited ecological value.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area A), Richmond Bay, October 2025.								
AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
A-6	56	5459008.564	1681153.653	Silt, fine sand, gravel, cobble, broken natural shell	Soft muddy sand	5	cushion star	Suitable
A-6	57	5459032.85	1681152.041	Silt, fine sand, gravel, broken natural shell	Soft muddy sand	70	sea star, finger sponge (<i>Callyspongia</i> sp.), ulva sp., MPB film, calcareous tube worms (individual, non-mounding)	Suitable ^b
A-6	58	5459057.179	1681150.173	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), horse mussel (<i>A. zealandica</i>) (individual, <1 per m2 based on video), MPB film	Suitable
A-6	59	5459081.564	1681148.291	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), horse mussel (<i>A. zealandica</i>) (individual, <1 per m2 based on video), MPB film	Suitable
A-6	60	5459105.913	1681146.549	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
A-6	61	5459130.282	1681144.742	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
A-6	62	5459154.64	1681142.99	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film, ind. scallop	Suitable
A-6	63	5459179.006	1681141.171	Silt, clay, sand	Soft sandy mud	<5	MPB film, finger sponge (<i>Callyspongia</i> sp.)	Suitable
A-6	64	5459203.368	1681139.373	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
A-6	65	5459227.887	1681137.374	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film, scallop (individual, <1 per m2 based on video)	Suitable
A-6	66	5459252.099	1681135.761	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), MPB film, scallop (individual, <1 per m2 based on video)	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

^b Appears to represent a highly localised patch of natural shell material of limited ecological value.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area A), Richmond Bay, October 2025.								
AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
A-7	67	5459028.787	1681401.98	Silt, fine sand, broken natural shell	Soft muddy sand	80		Suitable ^b
A-7	68	5459051.912	1681394.673	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
A-7	69	5459075.16	1681387.362	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
A-7	70	5459098.44	1681380.045	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
A-7	71	5459121.68	1681372.676	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
A-7	72	5459144.941	1681365.325	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
A-7	73	5459168.18	1681357.993	Silt, clay, sand	Soft sandy mud	<5	MPB film, calcareous tube worms (individual, non-mounding)	Suitable
A-7	74	5459191.435	1681350.638	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
A-7	75	5459214.666	1681343.273	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
A-7	76	5459237.818	1681335.966	Silt, clay, sand	Soft sandy mud	<5	calcareous tube worms (individual, non-mounding), scallop (individual, <1 per m2 based on video), MPB film	Suitable
A-7	77	5459261.188	1681328.574	Silt, clay, sand	Soft sandy mud	<5	MPB film, calcareous tube worms (individual, non-mounding)	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

^b Appears to represent a highly localised patch of natural shell material of limited ecological value.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area A), Richmond Bay, October 2025.

AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
A-Local Depression	151	5459085.014	1681218.08	Silt, clay, sand	Soft sandy mud	<5	MPB film, calcareous tube worms (individual, non-mounding)	Suitable
	152	5459085.813	1681216.344	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
	153	5459086.587	1681214.694	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
	154	5459087.266	1681213.006	Silt, clay, sand	Soft sandy mud	<5	MPB film, scallop (individual, <1 per m2 based on video)	Suitable
	155	5459087.952	1681211.194	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
	156	5459088.716	1681209.352	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
	157	5459089.636	1681207.839	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
	158	5459090.211	1681206.096	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
	159	5459090.875	1681204.302	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
Reef out-crop ^b	160	5458935.512	1680882.869	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
	161	5458929.684	1680900.863	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

^b Ground-truth to determine outer extent of outcrop as shown in MDC MBES (Rugosity) overlay in Figure H-3A.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area C), Richmond Bay, October 2025.

AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
C-1	78	5459460.218	1682546.449	Silt, fine sand, gravel, broken natural shell	Soft muddy sand	30	sea star, sea cucumber, MPB film, calcareous tube worms (individual, non-mounding)	Suitable
C-1	79	5459451.578	1682525.222	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-1	80	5459443.024	1682503.931	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-1	81	5459434.471	1682482.654	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-1	82	5459425.923	1682461.353	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-1	83	5459417.355	1682440.064	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-1	84	5459408.764	1682418.777	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-1	85	5459400.239	1682397.442	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-1	86	5459391.529	1682376.252	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-1	87	5459382.938	1682355.024	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-1	88	5459374.491	1682333.596	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-1	89	5459365.784	1682312.411	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area C), Richmond Bay, October 2025.

AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
C-2	90	5459605.133	1682395.599	Silt, clay, gravel, sand	Soft sandy mud	15	MPB film, scallop (individual, <1 per m2 based on video)	Suitable
C-2	91	5459596.886	1682374.103	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-2	92	5459588.891	1682352.282	Silt, clay, sand	Soft sandy mud	<5	MPB film, scallop (individual, <1 per m2 based on video)	Suitable
C-2	93	5459580.659	1682330.651	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-2	94	5459572.638	1682308.813	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-2	95	5459564.480	1682286.923	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-2	96	5459556.273	1682265.486	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-2	97	5459548.255	1682243.699	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-2	98	5459540.007	1682222.052	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-2	99	5459531.948	1682200.323	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-2	100	5459523.809	1682178.593	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-2	101	5459515.763	1682156.738	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area C), Richmond Bay, October 2025.								
AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
C-3	102	5459732.045	1682306.816	Bedrock, cobble, gravel, silt, fine sand, broken natural shell	Reef	<5	blue cod (<i>Parapercis colias</i>), ulva sp., calcareous tube worms (individual, non-mounding), cushion star, ralsia sp., sea cucumber	N/A (Reef outer extent >20 m inshore of the Site boundary)
C-3	103	5459723.856	1682284.008	Silt, fine sand, cobble, gravel, broken natural shell	Soft muddy sand	10	ulva sp.	Suitable
C-3	104	5459715.732	1682261.218	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-3	105	5459707.617	1682238.428	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-3	106	5459699.565	1682215.605	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-3	107	5459691.468	1682192.807	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-3	108	5459683.325	1682170.034	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-3	109	5459675.176	1682147.244	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-3	110	5459667.102	1682124.412	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-3	111	5459658.921	1682101.673	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-3	112	5459650.911	1682078.817	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-3	113	5459642.709	1682056.068	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
C-3	114	5459634.640	1682033.237	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area B), Richmond Bay, October 2025.

AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
B-1	115	5458468.198	1681742.855	Silt, clay, sand	Soft sandy mud	<5	MPB film, calcareous tube worms (individual, non-mounding), cushion star, ulva sp.	Suitable
B-1	116	5458490.239	1681732.945	Silt, clay, sand	Soft sandy mud	<5	MPB film, calcareous tube worms (individual, non-mounding), cushion star	Suitable
B-1	117	5458512.23	1681723.081	Silt, clay, sand	Soft sandy mud	<5	MPB film, calcareous tube worms (individual, non-mounding), cushion star	Suitable
B-1	118	5458534.252	1681713.21	Silt, clay, sand	Soft sandy mud	<5	MPB film, calcareous tube worms (individual, non-mounding), cushion star, sea cucumber	Suitable
B-1	119	5458556.244	1681703.299	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-1	120	5458578.232	1681693.464	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-1	121	5458600.272	1681683.624	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-1	122	5458622.294	1681673.767	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-1	123	5458644.283	1681663.778	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-1	124	5458666.302	1681653.902	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-1	125	5458688.243	1681643.607	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-1	126	5458710.305	1681634.268	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-1	114	5459634.640	1682033.237	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-truthing in adjacent area.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area B), Richmond Bay, October 2025.								
AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
B-2	127	5458748.757	1681920.739	Silt, fine sand, gravel, broken natural shell	Soft muddy sand	20	sea cucumber	Suitable
B-2	128	5458761.688	1681899.211	Silt, fine sand, gravel, broken natural shell	Soft muddy sand	20		Suitable
B-2	129	5458774.249	1681877.934	Silt, fine sand, gravel, broken natural shell	Soft muddy sand	75		Suitable ^b
B-2	130	5458787.119	1681856.415	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-2	131	5458799.788	1681835.08	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-2	132	5458812.631	1681813.691	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-2	133	5458825.345	1681792.24	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-2	134	5458804.668	1681825.592	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-2	135	5458816.397	1681805.97	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-2	136	5458828.169	1681786.255	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-2	137	5458840.038	1681766.963	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-2	138	5458851.837	1681747.459	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-2	139	5458863.708	1681727.972	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

^b Appears to represent a highly localised patch of natural shell material of limited ecological value.

Summary of benthic imagery locations, substratum type, natural shell cover and species present, in relation to MEP and NES-MA standards, proposed farm (Area B), Richmond Bay, October 2025.

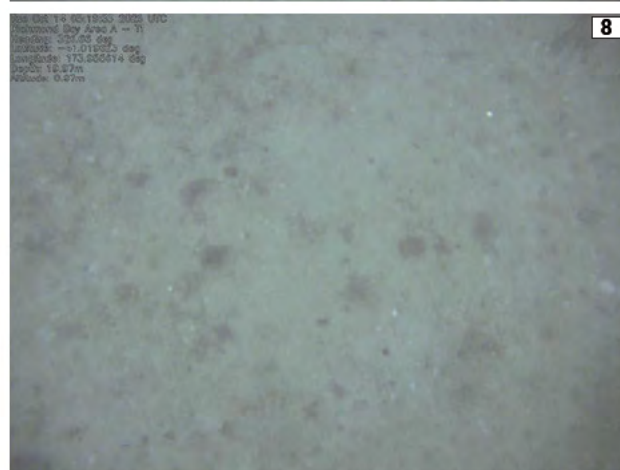
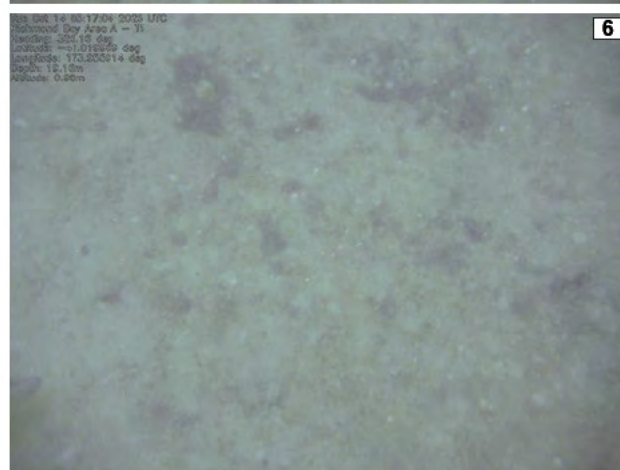
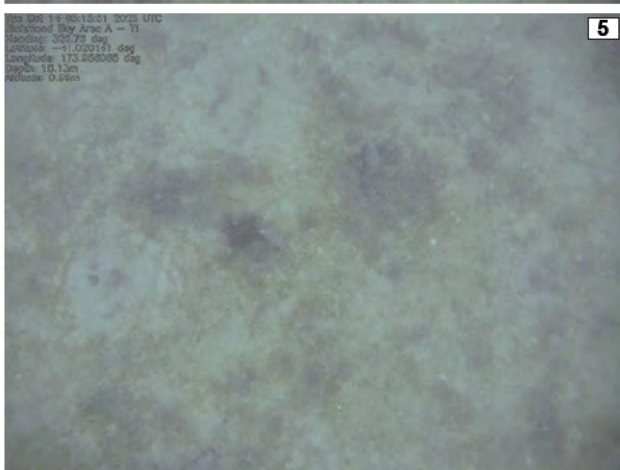
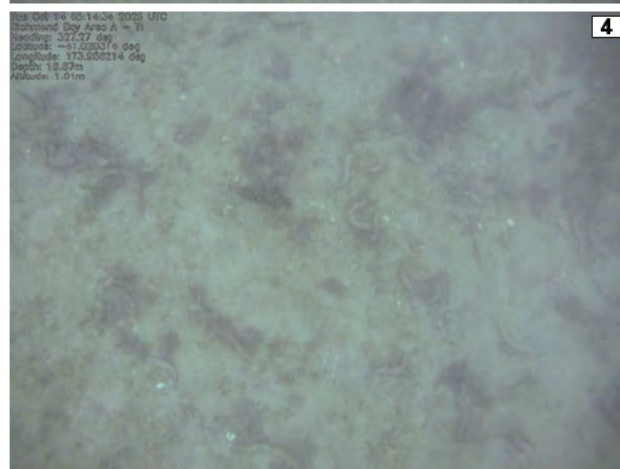
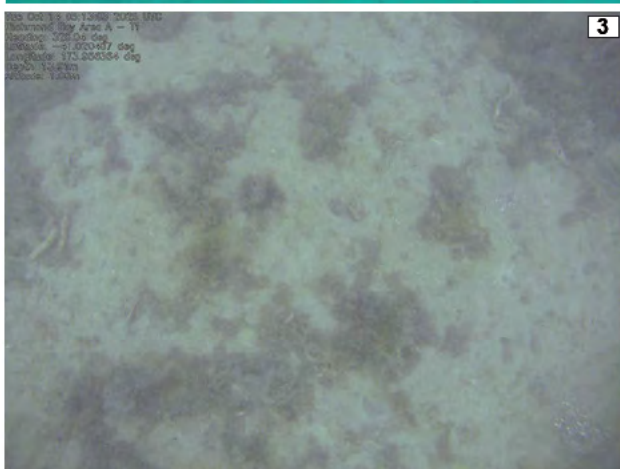
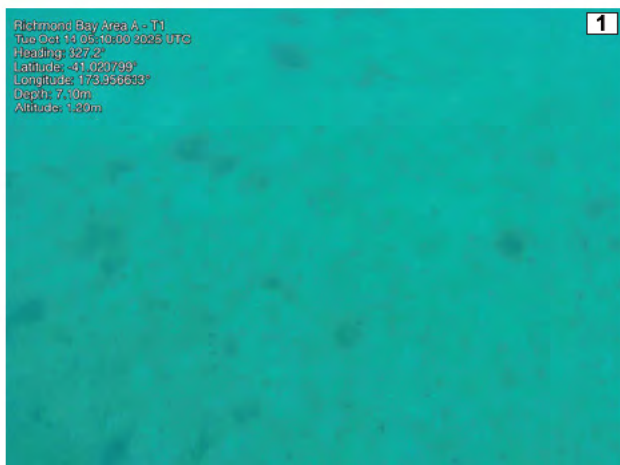
AUV Benthic Imagery		NZTM E	NZTM N	Substratum	Dominant Habitat Type ^a	% Natural Shell	Biota Observed	Suitability in terms of MEP (Policy 13.21.3) and NES-MA (S4, 7-9)
Video Transect ID	Still Photograph ID ^a							
B-3	140	5458983.345	1682065.694	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-3	141	5458986.906	1682041.523	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-3	142	5458990.605	1682017.43	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-3	143	5458994.134	1681993.301	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-3	144	5458997.919	1681969.225	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-3	145	5459001.62	1681945.131	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-3	146	5459005.387	1681920.988	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-3	147	5459008.984	1681896.91	Silt, clay, sand	Soft sandy mud	<5	MPB film, horse mussel (<i>A. zealandica</i>) (individual, <1 per m2 based on video)	Suitable
B-3	148	5459012.75	1681872.532	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-3	149	5459016.205	1681848.679	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-3	150	5459019.931	1681824.603	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-3	138	5458851.837	1681747.459	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable
B-3	139	5458863.708	1681727.972	Silt, clay, sand	Soft sandy mud	<5	MPB film	Suitable

^a As shown in Figures B-4, B-5, B-6, based on MBES rugosity and side-scan sonar imagery and AUV-led ground-thruthing in adjacent area.

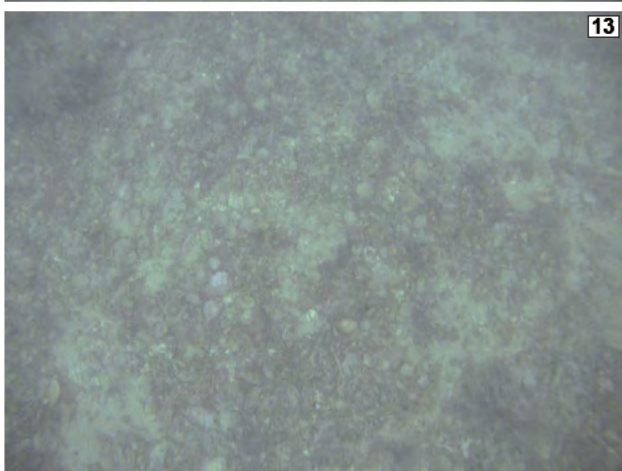
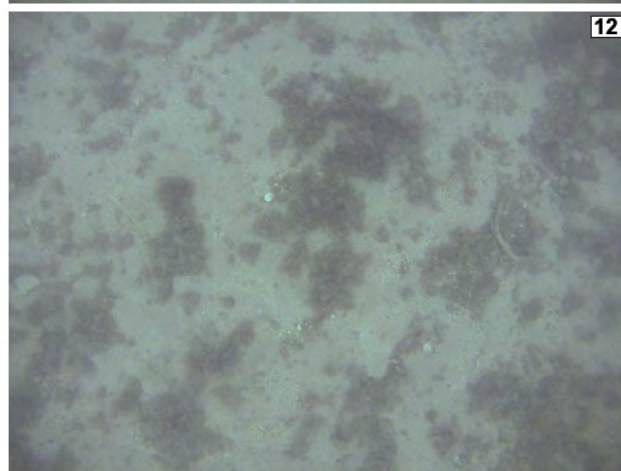
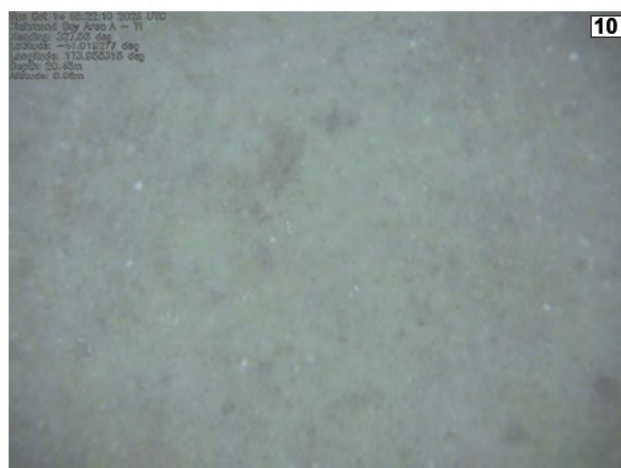
Appendix I:

Benthic (AUV Still Photograph) Imagery

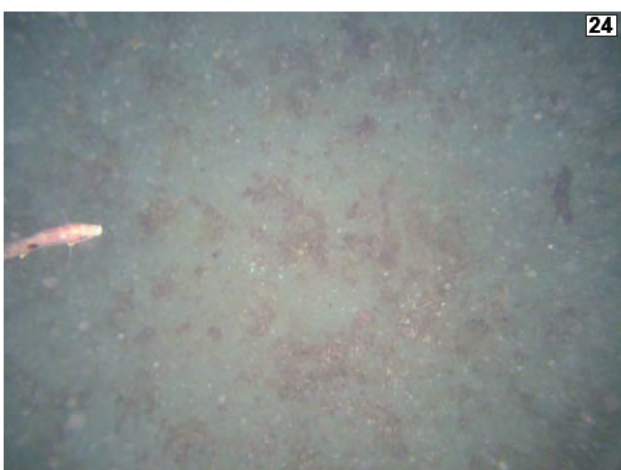
Proposed Long-line Marine Farms - Richmond Bay



Proposed Long-line Marine Farms - Richmond Bay



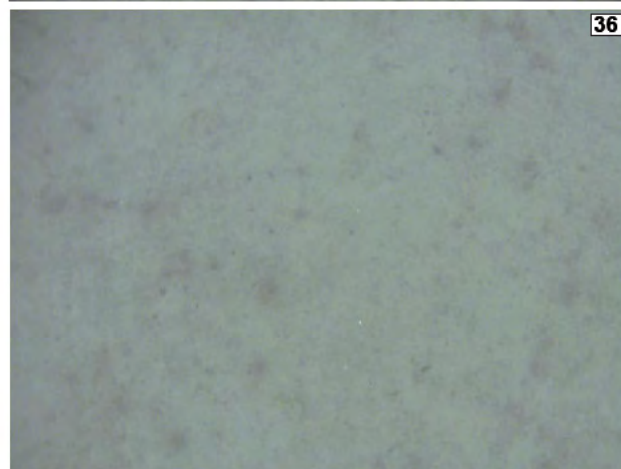
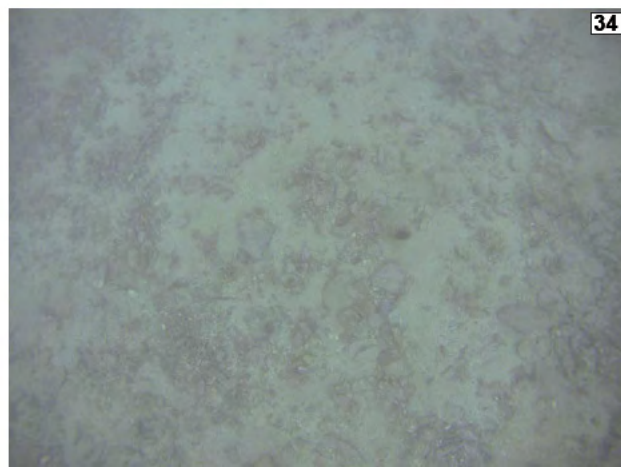
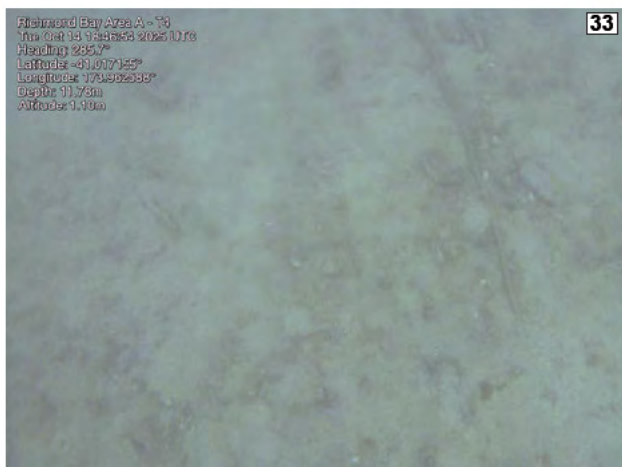
Proposed Long-line Marine Farms - Richmond Bay



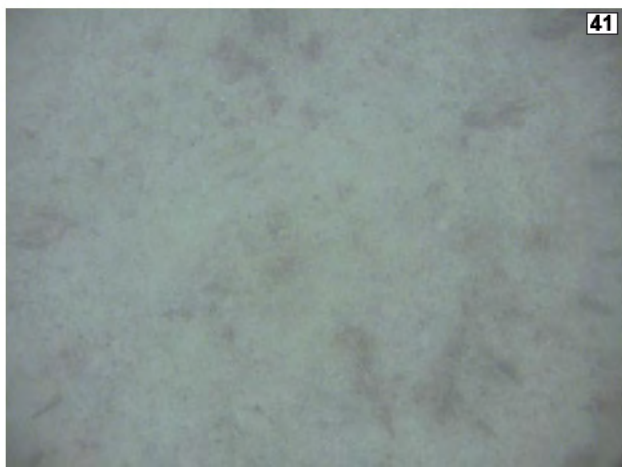
Proposed Long-line Marine Farms - Richmond Bay



Proposed Long-line Marine Farms - Richmond Bay



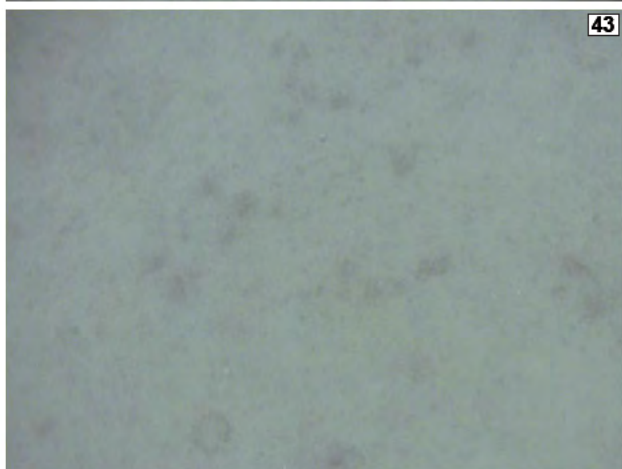
Proposed Long-line Marine Farms - Richmond Bay



41



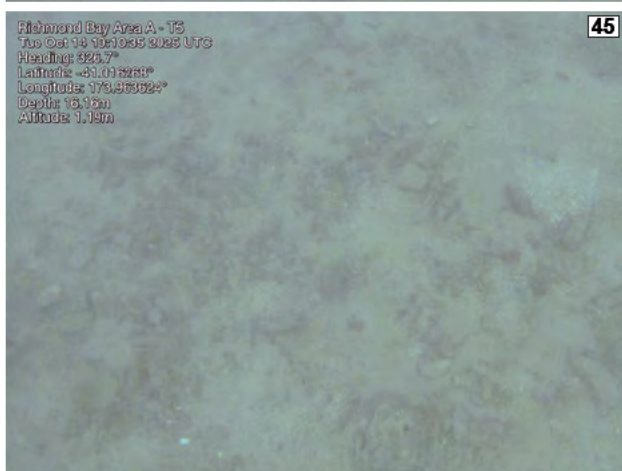
42



43

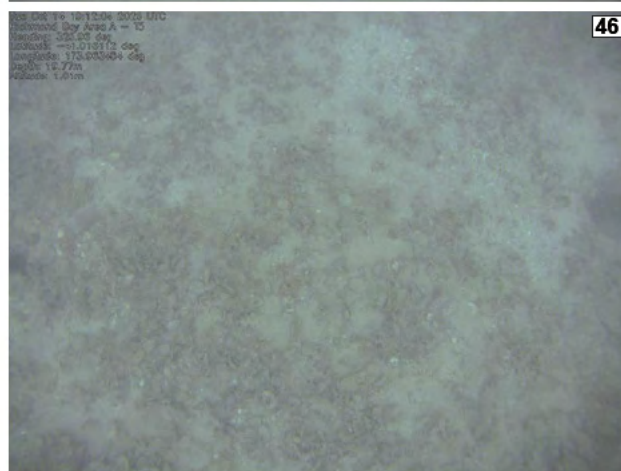


44



45

Richmond Bay Area A - T5
Tue Oct 14 10:10:45 2023 UTC
Heading: 326.7°
Latitude: -31.015254°
Longitude: 173.853024°
Depth: 15.17m
Altitude: 1.19m



46

Tue Oct 14 10:12:04 2023 UTC
Richmond Bay Area A - T5
Heading: 325.60 deg
Latitude: -31.015111 deg
Longitude: 173.853404 deg
Depth: 12.77m
Altitude: 1.61m



47

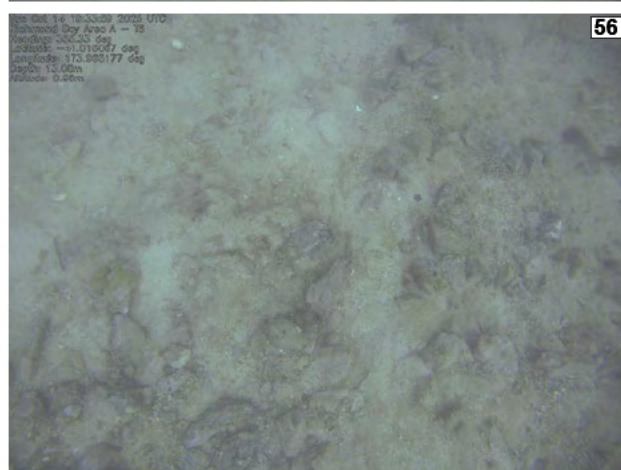
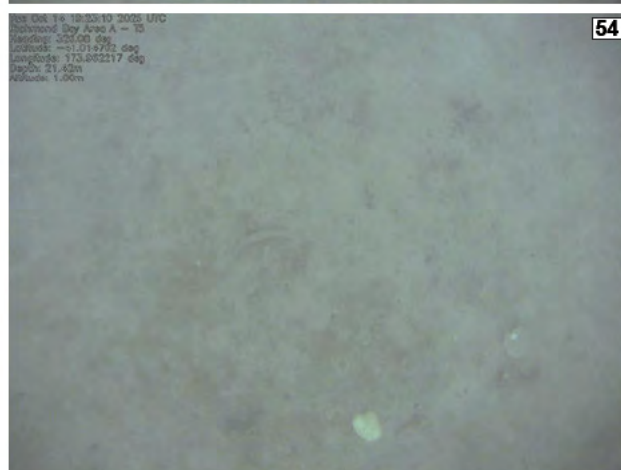
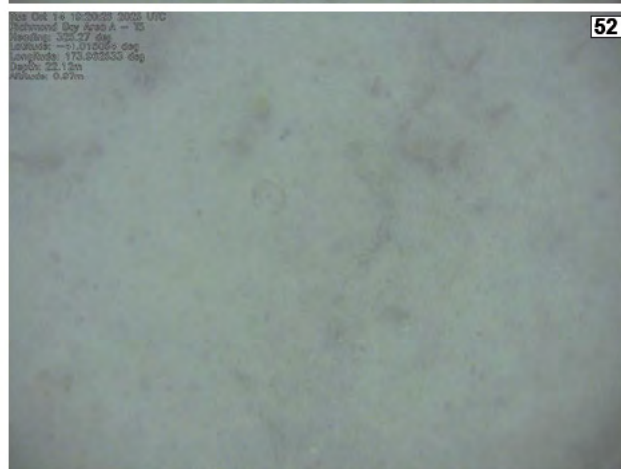
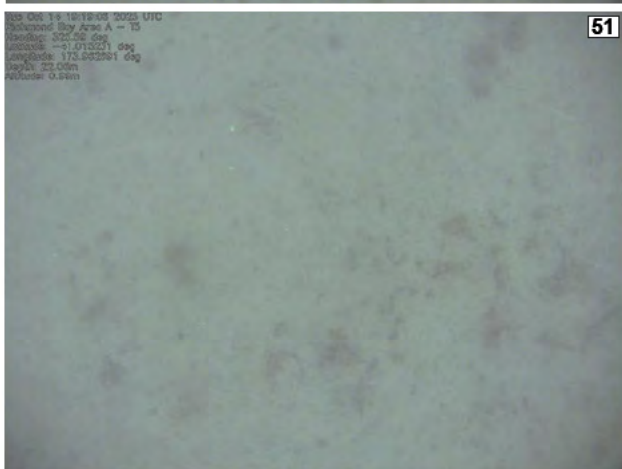
Tue Oct 14 10:12:37 2023 UTC
Richmond Bay Area A - T5
Heading: 325.55 deg
Latitude: -31.015025 deg
Longitude: 173.853328 deg
Depth: 21.00m
Altitude: 0.83m



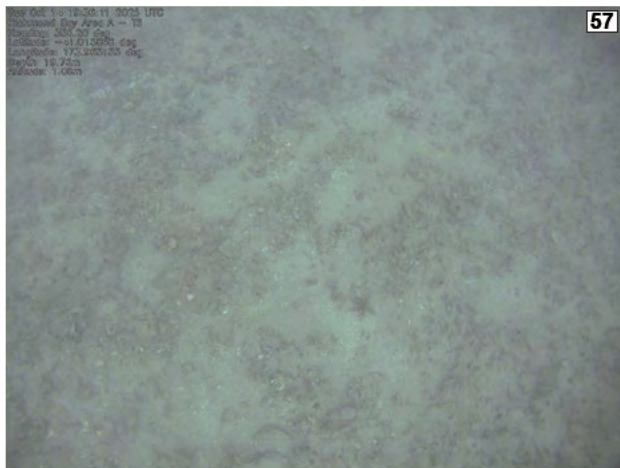
48

Tue Oct 14 10:14:40 2023 UTC
Richmond Bay Area A - T5
Heading: 325.75 deg
Latitude: -31.015076 deg
Longitude: 173.853187 deg
Depth: 21.27m
Altitude: 0.85m

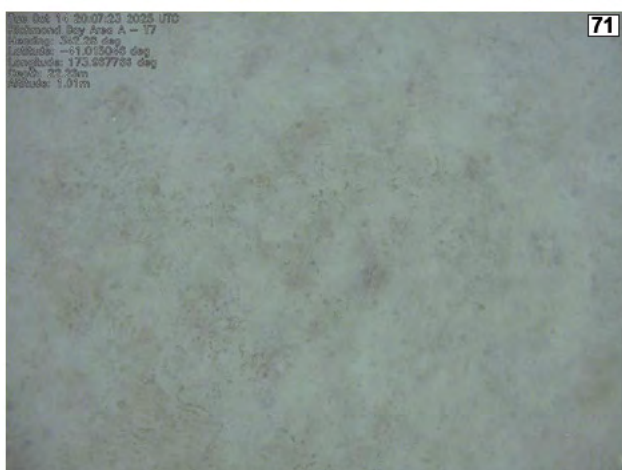
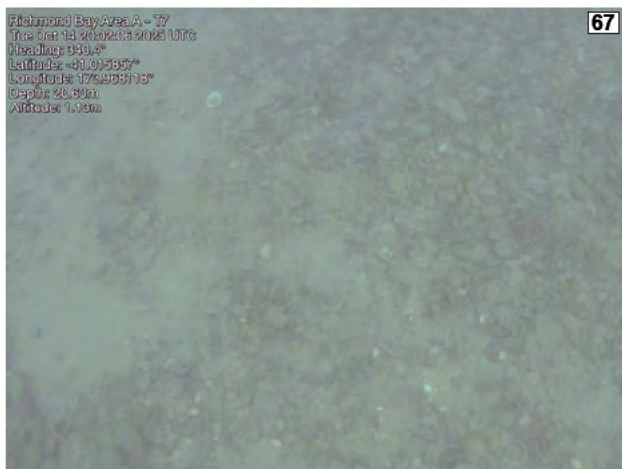
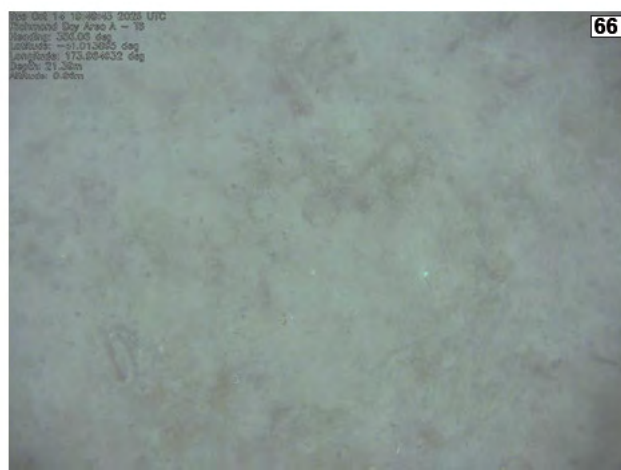
Proposed Long-line Marine Farms - Richmond Bay



Proposed Long-line Marine Farms - Richmond Bay



Proposed Long-line Marine Farms - Richmond Bay



Proposed Long-line Marine Farms - Richmond Bay



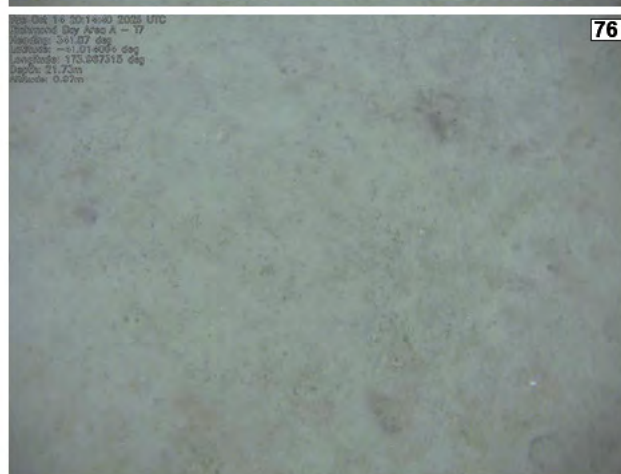
73



74



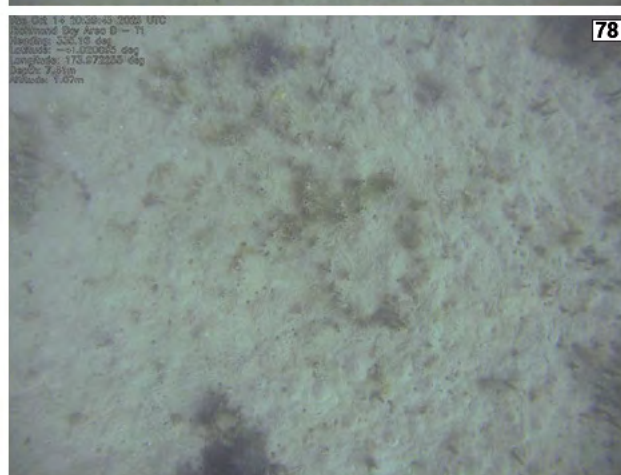
75



76



77



78

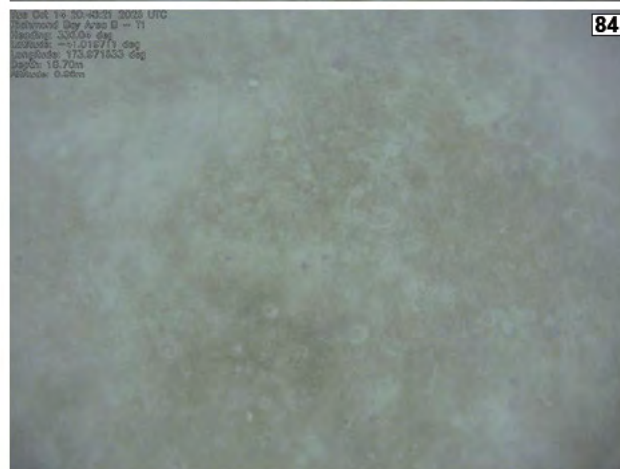
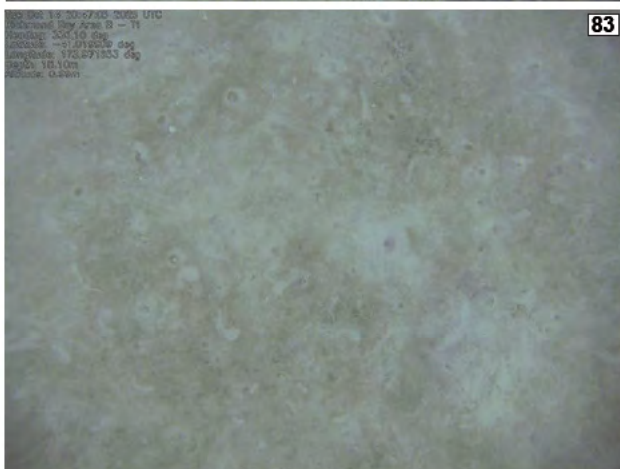
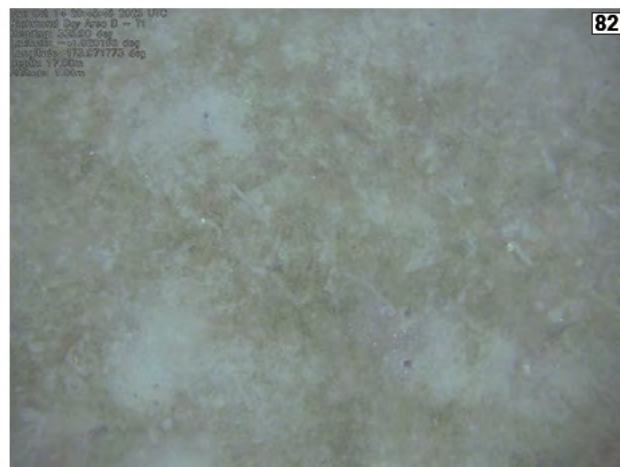


79

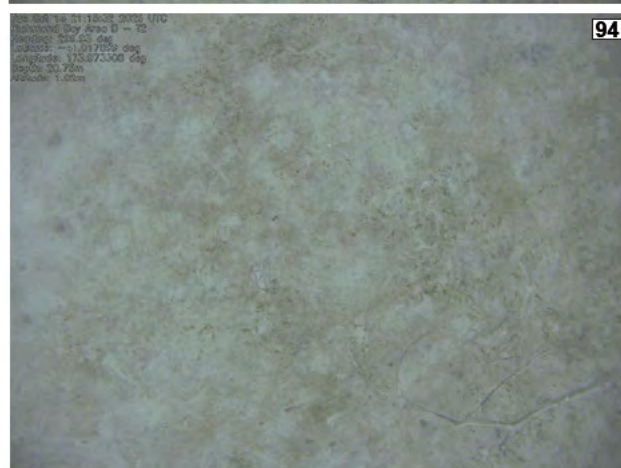
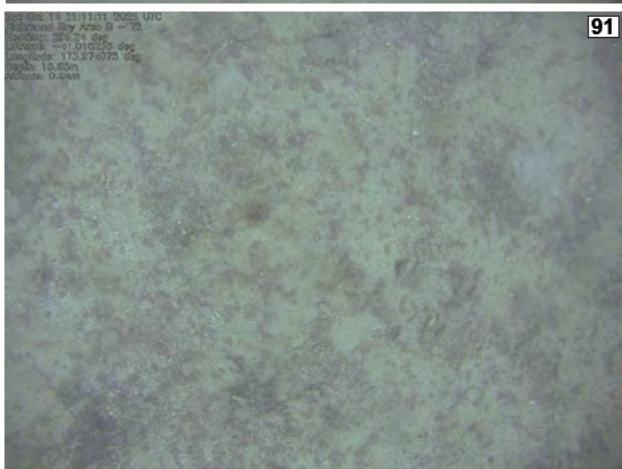
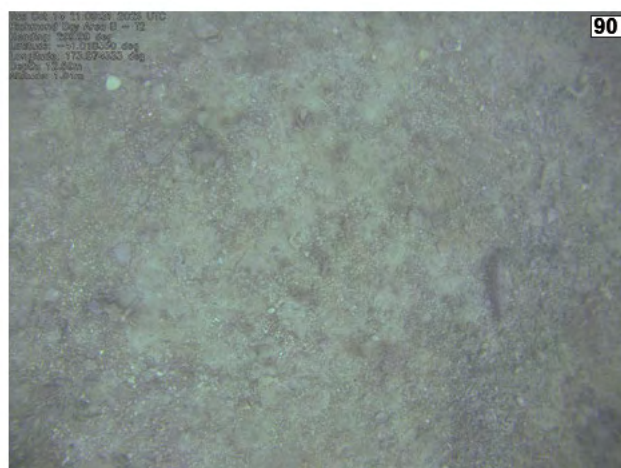


80

Proposed Long-line Marine Farms - Richmond Bay



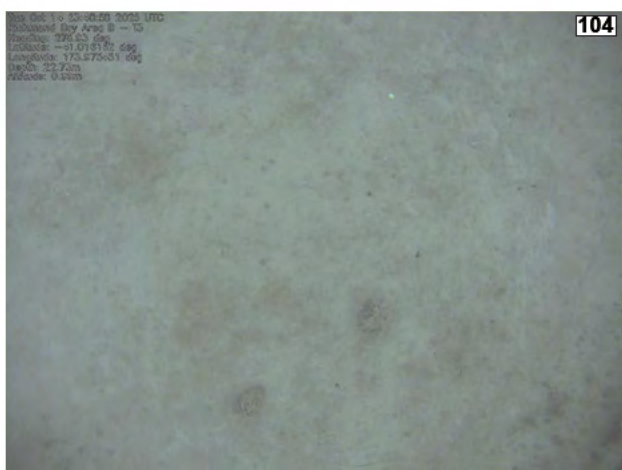
Proposed Long-line Marine Farms - Richmond Bay



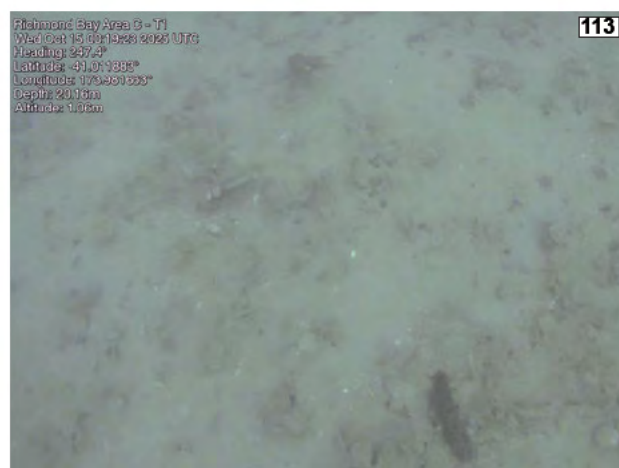
Proposed Long-line Marine Farms - Richmond Bay



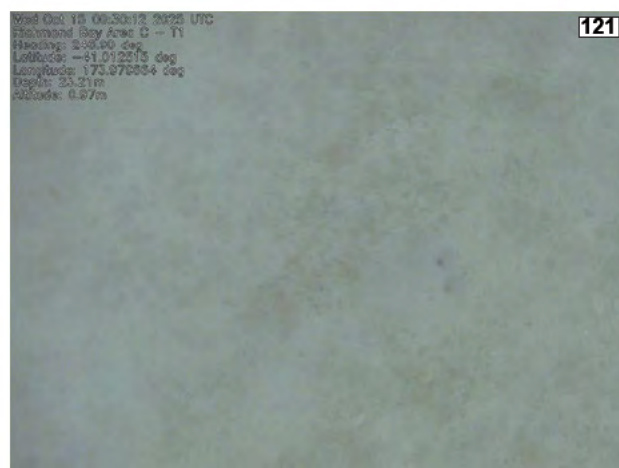
Proposed Long-line Marine Farms - Richmond Bay



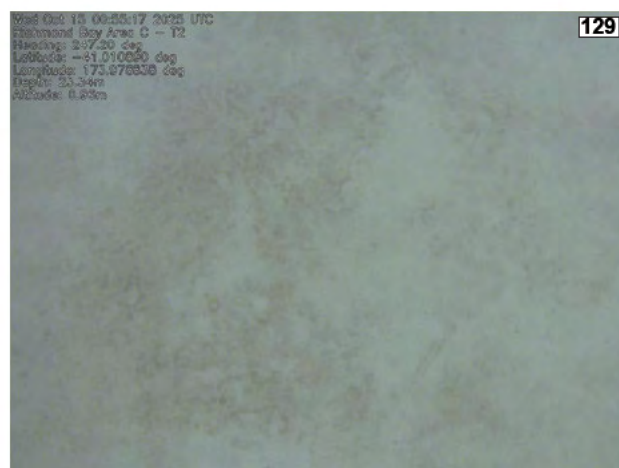
Proposed Long-line Marine Farms - Richmond Bay



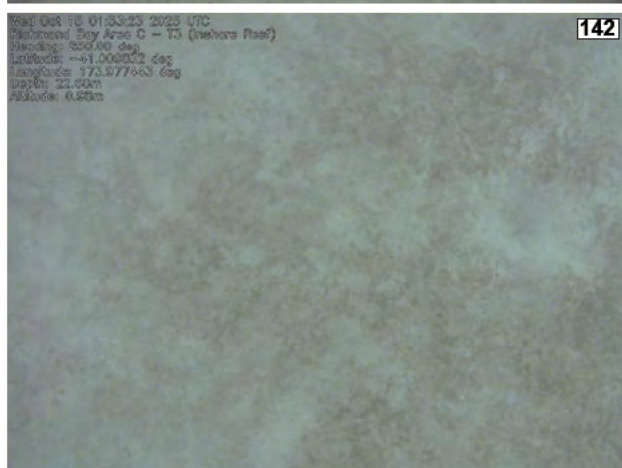
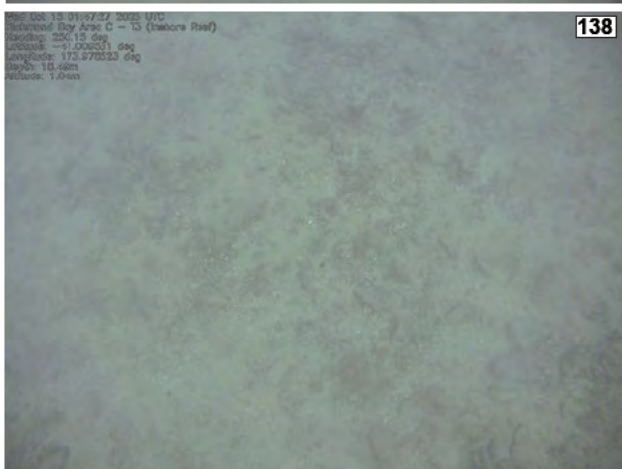
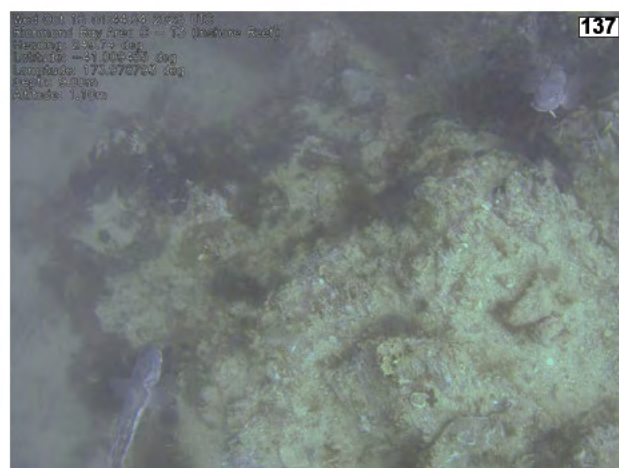
Proposed Long-line Marine Farms - Richmond Bay



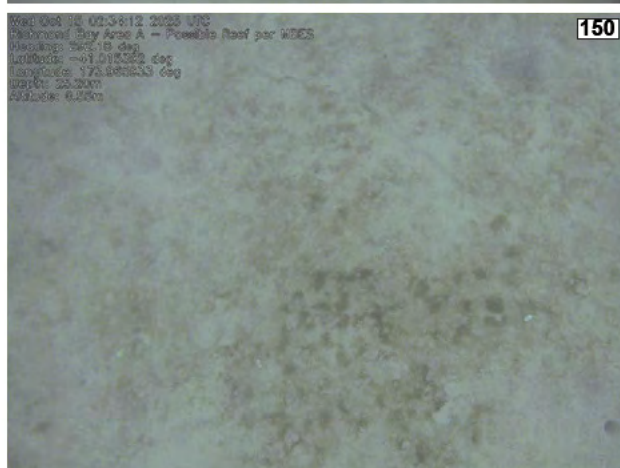
Proposed Long-line Marine Farms - Richmond Bay



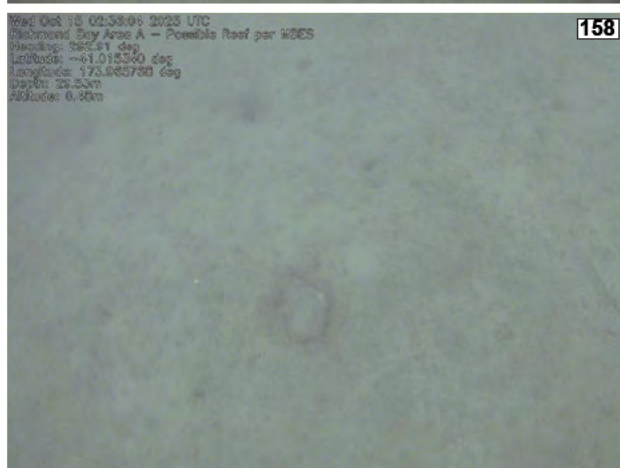
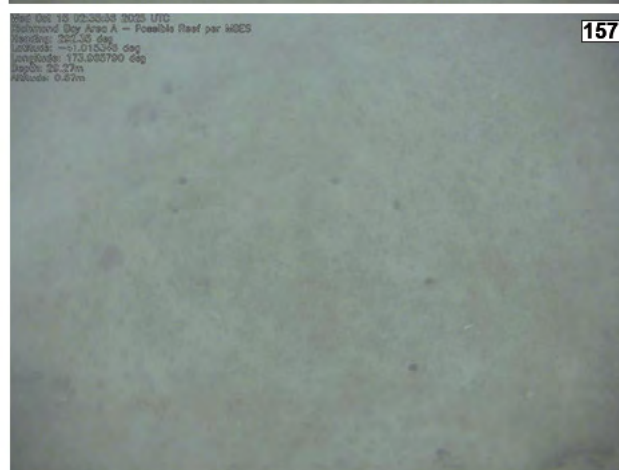
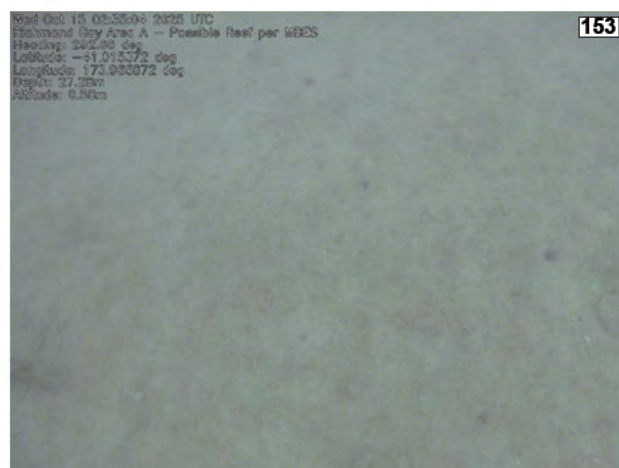
Proposed Long-line Marine Farms - Richmond Bay



Proposed Long-line Marine Farms - Richmond Bay



Proposed Long-line Marine Farms - Richmond Bay



Proposed Long-line Marine Farms - Richmond Bay



www.robertsonenvironmental.co.nz

