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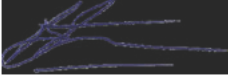


Marlborough Sounds Aquaculture Project **Coastal Ecological Impact Assessment**

For Aquaculture Direct Limited

September 2026

REPORT INFORMATION & QUALITY CONTROL

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Cover image: Looking northward across Richmond Bay Reef ESMS, outer Richmond Bay and Waitata Reach, Pelorus Sound / Te Hoiere, Marlborough Sounds, REL 2025.

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Glossary of abbreviations and defined terms

Acronym / term	Definition
AEE	Assessment of Environmental Effects
ADL	Aquaculture Direct Limited
AMA	Aquaculture Management Area
Applicant	The applicant or applicants for the Marlborough Sounds Aquaculture Project
AUV	Autonomous underwater vehicle
CMU	Coastal Marine Unit
CTD	Conductivity, temperature and depth
EcIA	Ecological Impact Assessment
EIANZ	Environment Institute of Australia and New Zealand
ESMS	Ecologically Significant Marine Site
FTAA	Fast track Approvals Act 2024
King shag	Kawau pāteketeke (<i>Leucocarbo carunculatus</i>)
MEP	Marlborough Environment Plan
MMMP	Marine Mammal Management Plan
NES-MA	National Environmental Standards for Marine Aquaculture
NZTCS	New Zealand Threat Classification System
Project	Marlborough Sounds Aquaculture Project, comprising proposed new or expanded longline shellfish marine farms at Papatua, Guards Bay, Hāpūkū Rock, Okuri Bay, Richmond Bay and Onapua Bay
Project Area	The six proposed marine farm sites and associated areas considered in this assessment
Project ZOI	The wider area relevant to indirect, cumulative, regional or population level ecological effects associated with all six proposed farms
Site	An individual proposed marine farm location within the Project Area
Site ZOI	The near-field area relevant to direct and local ecological effects associated with an individual farm, including its structures, associated activity and immediately affected receiving environment
TAR	Threatened or At Risk (taxa)
ZOI	Zone of Influence: the area and ecological resources that may be affected by the Project's biophysical changes, including receiving environments beyond the immediate farm footprint

Executive Summary

This Ecological Impact Assessment (EclA) assesses the potential effects on coastal ecology arising from the proposed establishment of six new or expanded long-line shellfish marine farms at Papatua, Guards Bay, Hapūkū Rock, Okuri Bay, Richmond Bay and Onapua Bay, Marlborough Sounds.

The assessment considers five ecological domains relevant to the coastal receiving environment and proposed activity, namely seabed (benthic) habitat, pelagic (water column) habitat, wild fish, seabirds and marine mammals. Available site-specific field survey data were supplemented by existing ecological information for the Project area and wider Marlborough Sounds where species or habitats were not subject to site-specific surveys.

The assessment has been undertaken in accordance with the EIANZ framework (Roper-Lindsay et al., 2018), including scoping, characterisation of the existing environment, assignment of ecological value, assessment of potential effects, identification of impact management measures and consideration of monitoring requirements where appropriate.

The Project represents an incremental addition of approximately 280 ha of dispersed mussel farming within a wider Marlborough Sounds aquaculture footprint of approximately 3,325 ha. Ecological values across the Sites range from Low value soft sediment seabed and pelagic habitats to Very High value seabird and marine mammal receptors.

Potential construction effects comprise temporary and localised seabed disturbance associated with anchor installation and farm establishment, short duration vessel-related disturbance to seabirds and marine mammals, and temporary sediment mobilisation. Potential operational effects include localised biodeposition beneath farm structures, minor changes in water column productivity, potential localised changes in seabird access to foraging habitat, and marine mammal avoidance, habitat use and entanglement risk.

Construction effects are assessed as Very Low across all ecological domains. Operational effects are assessed as Very Low for benthic habitat, pelagic habitat, wild fish and seabirds, and for marine mammals at five of the six sites. Operational effects on marine mammals at Hapūkū Rock are assessed as Very Low to Low at a local scale, reflecting potential changes in movement and habitat use. Project scale cumulative ecological effects are also assessed as Very Low.

The assessment relies principally on avoidance measures embedded in Site selection, farm layout and operational practice. These include:

- Retaining the reef exclusion area at Onapua Bay.
- Maintaining the proposed Site locations and separation from king shag breeding colonies.
- Prohibiting vessel operations, navigation, mooring and anchoring within 200 m of scheduled king shag breeding sites, exceeding the MEP's 100 m exclusion buffer.
- Retaining the non-continuous Hapūkū Rock farm layout to provide movement space for marine mammals.

Further management commitments include implementation of the Marine Mammal Management Plan, including vessel operating protocols, marine mammal response procedures and staff training. Routine aquaculture practices will manage stocking density, maintain farm structures, and minimise unnecessary shell fall and debris. A+ Biosecurity Standards and vessel and equipment hygiene procedures will continue to apply. Biosecurity and disease management requirements for the proposed New Zealand flat oyster component at Onapua Bay will be addressed through a sep-

arate biosecurity assessment and management plan. With these measures in place, biosecurity-related effects associated with the proposed farms are anticipated to be very low risk.

No biodiversity offset, ecological compensation or further ecological mitigation is proposed. This reflects the conclusion that, provided the embedded design measures and management commitments are implemented, residual adverse effects on all ecological domains are anticipated to be no more than minor.

1 Introduction

REL has been engaged by the Applicant to provide an assessment effects on coastal ecology associated with the establishment of six new or expanded marine farms at Papatua, Guards Bay, Hapūkū Rock, Okuri Bay, Richmond Bay, and Onapua Bay, as proposed under the Marlborough Sounds Aquaculture Project (the Project).

This report¹ comprises an Ecological Impact Assessment (EclA) and is part of a suite of technical assessments prepared to inform the Assessment of Environmental Effects (AEE) and the substantive Fast track Approvals Act (FTAA) 2024 application for the Project.

1.1 Report Purpose & Scope

This report considers the likely ecological effects associated with the establishment and operation of the Project on the existing and likely future environment, and recommends measures that may be implemented to avoid, remedy and/or mitigate these effects.

The key matters addressed in this EclA Report are as follows:

- (a) identifying and describing the ecological values of the Project Area;
- (b) identifying and describing the potential ecological effects of the Project;
- (c) recommending measures as appropriate to avoid, remedy or mitigate actual and potential ecological effects (including any conditions or management plans required); and
- (d) presenting an overall conclusion on the level of residual ecological effects of the Project after recommended measures are implemented.

The AEE covers the National Policy Statements, National Environmental Standards, Regional Policy Statements, and Regional / District Plans. These matters are not repeated in this assessment.

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 this report. This assessment does not denote the ecological features of cultural value to manawhenua, and such assessments should only be made by manawhenua.

Potential biosecurity-related effects of the proposed flat oyster aquaculture at Onapua Bay are subject to a separate approval process and have been addressed by others. As these matters are covered elsewhere, they are not discussed further in this report.

1.2 Project Overview

The Project, described in the referral materials as “Fit For a Changing World - Marlborough Fast track Aquaculture Projects”, comprises applications for six sites (**Table 1-1**; **Figure 1-1²**).

Three of the six applications (Papatua, Guards Bay and Hapūkū Rock) are nursery only sites and seek consent for Greenshell mussel (*Perna canaliculus*) only. The remaining three applications (Okuri Bay, Richmond Bay and Onapua Bay) seek consent to cultivate the full range of “commonly

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

² All supporting figures are presented in **Attachment B**.

consented” shellfish and seaweed species listed in Appendix 11 of the Marlborough Environment Plan (MEP), in addition to the primary species identified above.

This report assesses the potential ecological effects within the Project Area identified in **Figure 1-1**. For the purpose of this assessment, the spatial extent considered at each site includes a 20 m buffer around the proposed structures, consistent with the National Environmental Standards for Marine Aquaculture (NES-MA).

Table 1-1 Summary of the six proposed sites. Source: Referral application form and Marlborough aquaculture Fast track assessment of impacts (2026).

Site	Applicant(s)	Location	Area	Primary species	Farm type ³
Papatua	Marine Farming Association Incorporated (for industry; preferential Iwi/ community trust rights)	Te Anamāhanga / Port Gore	90.2 ha	Greenshell mussel	Nursery only
Guards Bay	PH Redwood & Co Limited	Hikoekoea Bay, outer Te Hoiere / Pelorus Sound	76.8 ha additional (88.8 ha total)	Greenshell mussel	Nursery only
Hapūkū Rock	Clearwater Mussels Limited	Admiralty Bay	28.03 ha (two blocks: 15.0 ha and 13.03 ha)	Greenshell mussel	Nursery only
Okuri Bay	Clearwater Mussels Limited and Talley's Limited	Current Basin	27.9 ha (two blocks)	Greenshell mussel	Production
Richmond Bay	All five applicants on behalf of Iwi	Waitata Reach, outer Te Hoiere / Pelorus Sound	42.2 ha (three blocks)	Greenshell mussel	Production
Onapua Bay	Apex Marine Farm Limited	Kura Te Au / Tory Channel	15.7 ha (three blocks)	NZ flat oyster; also mussel and seaweed	Production, for oysters (2 yr 3 month cycle, single year-class, low stocking density)

1.3 Legislative & Planning Context

The Project is being progressed under the Fast track Approvals Act (FTAA) 2024. The Project Area

³ All structures at all sites will be conventional long-line.

falls within the Enclosed Waters and Near-shore CMUs under the Marlborough Environment Plan (MEP). MEP schedules identifying features such as Ecologically Significant Marine Sites (ESMS), including king shag breeding sites and significant marine mammal habitat, have been considered in this EclA.

1.4 Credentials and Code of Conduct

Dr Ben Robertson (Author)

I am Director of REL, a small Nelson-based consultancy specialising in ecology. I have been employed by REL since 2017.

I hold the qualifications of BSc (First Class Honours) in Marine Science and Statistics and a PhD in Applied Coastal Ecology, and I am a Certified Environmental Practitioner (CEnvP). I have more than 15 years' experience as a professional ecologist in New Zealand, with speciality expertise in coastal and marine ecology, and effects assessment and management.

I have extensive experience in ecological site assessments, significance assessments, impact assessment, and impact management, including extensive experience on the ground designing, constructing, implementing, monitoring and reporting on interventions to restore, enhance, and protect ecology values at terrestrial, freshwater, coastal and marine sites across New Zealand. I have authored or led over 200 ecological assessment reports, including reports supporting marine farming consent applications and monitoring in Marlborough.

I undertook marine surveys and provided expert evidence for the consented Blue Endeavour open ocean salmon farm project, Marlborough. I have since led the development and implementation of the Benthic Monitoring Plan and undertook on-site monitoring and prepared the Baseline Benthic Monitoring report on behalf of the consent holder (New Zealand King Salmon). I remain REL's project lead ecologist for the Blue Endeavour benthic monitoring programme.

I have served as the lead project ecologist for approved projects under the FTAA 2024, including the Maitahi Village residential development. Additionally, I am involved in projects currently going through FTAA consenting.

I confirm that, in my capacity as author of this report, I have read and agree to comply with the by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Dr Barry Robertson (Reviewer)

Dr Barry Robertson is Technical Director of REL. He has more than 45 years' experience as an ecological consultant, including roles as a director of Robertson Ryder, Wriggle Coastal Management and REL, and as manager of the Coastal Group at the Cawthron Institute.

Dr Robertson holds a BSc and Dip Sci in Ecology and a PhD in Applied Coastal Ecology.

In reviewing this report, Dr Robertson has read and agree to comply with the by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

REL declare that in relation to our role in providing expert ecological assessment and advice for this project we are not, to the best of our knowledge, subject to any real or perceived conflicts of interest.

1.5 Key Documents Reviewed

The following documents, relevant to the ecological assessment of the Project, were reviewed and considered in preparing this report. Published guidelines, standards and scientific literature relied upon are set out in Section 2 and listed in the References.

Application and assessment material

- Referral application form (2026). Fast track Approvals Referral Application Form, Marlborough Sounds Aquaculture Project (“Fit For a Changing World - Marlborough Fast track Aquaculture Projects”).
- Marlborough aquaculture Fast track assessment of impacts (2026). Assessment of Impacts Document prepared in support of the Project referral.
- Draft Consent Conditions, Marlborough Sounds Aquaculture Project. Gascoigne Wicks, prepared on behalf of the Applicants, August 2026.

Site-specific ecological and technical reports

- Robertson, B. (2026). Coastal Benthic Habitat Characterisation: Proposed Papatua Marine Farm, Te Anamāhanga / Port Gore.
- Davidson, R.J. et al. (2021a). Biological report for an extension to marine farm 8164 in Hikoekoea Bay, Guards Bay, outer Pelorus Sound.
- Davidson, R.J. et al. (2021b). Ecological report for two proposed marine farm sites located near Hapūkū Rock, Admiralty Bay, Marlborough Sounds.
- McConnell, H. (2025). Hapūkū Rock Marine Mammals Assessment.
- Robertson, B. (2022). Proposed Aquaculture Management Areas (AMAs), Okuri Bay: Coastal Ecological Impact Assessment.
- McClellan, R. (2022). A review of king shag information for an assessment of potential effects of two mussel farms, Okuri Bay, Marlborough Sounds.
- McClellan, R. (2026). Potential effects on seabirds of proposed longline aquaculture projects, Marlborough Sounds.
- Robertson, B.P. 2025. Coastal Ecological Impact Assessment for Proposed Richmond Bay Marine Farms.
- Robertson, B. (2024). Proposed 8164 Extension, Guards Bay: Coastal Ecological Impact Assessment.
- Davidson, R.J. et al. (2016). Biological report for a marine farm application located in Onapua Bay, Tory Channel.
- Davidson, R.J. (2019). Additional data on a reef associated with an application for a new marine farm located in Onapua Bay, Tory Channel.
- Davidson, R.J. (2021c). Statement of Evidence of Robert James Davidson in Support of the Submissions of Apex Marine Farm Ltd, Onapua Bay Ecological Package, Proposed Marlborough Environment Plan Variations 1 and 1A Hearings Panel, 29 October 2021.

Marine mammal management and correspondence

- McConnell, H. (2025). Hapūkū Rock Marine Mammals Assessment. 3 July 2025.
- McConnell, H. (2026). Technical Advice, Marine Mammals - Marlborough Aquaculture, 18 August 2026.

- Marine Mammal Management Plan (MMMP), Revision 03 (Final), 19 August 2026.

1.6 Report Structure

The report is structured as follows:

- Executive Summary
- Section 1 – Introduction
- Section 2 – Assessment Methodology
- Section 3 – Ecological Description
- Section 4 – Project Features and Implementation
 - Sections 3 and 4 include:
 - (a) an overview of the Project in relation to ecology;
 - (b) identification and description of the existing ecological baseline across the six sites; and
 - (c) a description of the proposed farm structures, installation and operation in relation to ecology.
- Section 5 – Assessment of Effects on Ecological Values
 - Section 5 includes:
 - (d) description of the potential positive ecological effects of the Project;
 - (e) description of the potential adverse ecological effects of constructing and operating the farms; and
 - (f) a description of cumulative effects across the Marlborough Sounds; and
- Section 6 – Impact Management
- Section 7 – Conclusion
 - Sections 6 and 7 include:
 - (g) recommended measures to avoid, remedy or mitigate potential adverse ecological effects (including any conditions or management plans required);
 - (h) management of any residual effects after those measures are implemented;
 - (j) an overall conclusion on the level of potential adverse ecological effects of the Project after recommended measures are implemented.

This report should be read in conjunction with the AEE, which provides further detail on the Project's context, the proposed works, likely staging, and typical installation and operational methodologies. These have been reviewed by the author and considered as part of this ecological effects assessment. To avoid duplication, this report does not repeat those details unless a description of an activity is necessary to understand the potential effects, in which case it has been included for clarity.

2 Assessment Methodology

2.1 EcIA Assessment Framework

This EcIA has been prepared in general accordance with the Environment Institute of Australia and New Zealand (EIANZ) Ecological Impact Assessment Guidelines for use in New Zealand terrestrial and freshwater ecosystems (Roper-Lindsay et al., 2018), including the Marine Addendum (EIANZ 2024). The methodology has been adapted to the Project's multi-site marine farming context. A full description of the assessment framework, including the effect matrix and impact management principles applied, is provided in **Appendix C**.

In summary, the assessment follows the EIANZ EcIA process of scoping; describing the existing environment; assigning ecological value; assessing potential effects; identifying impact management measures; and establishing monitoring requirements, where appropriate. Ecological features are assigned a value from Negligible to Very High, based on representativeness, rarity/distinctiveness, diversity and pattern, and ecological context. The magnitude of potential effects is then assessed with regard to spatial extent, duration, frequency and reversibility. Ecological value and effect magnitude are combined using the EIANZ matrix (**Table C-1, Appendix C**) to determine the overall level of effect, supported by professional ecological judgement.

The assessment considers effects at both individual site and Project wide scales, including potential cumulative effects associated with the six farms and, where relevant, other activities in the Marlborough Sounds. Potential effects are also considered according to their temporal scale, including temporary, short-, medium- and long-term, and permanent effects.

The framework has been applied to five ecological domains: seabed (benthic) habitat, wild fish, seabirds, marine mammals, and pelagic habitat. Biosecurity risk is addressed separately in Section 5 as an integrated consideration relevant to farm structures, vessels and cultivated species across all six sites⁴.

As the Project has not yet been constructed or operated, all effects considered in this report are predicted or potential effects. For readability, they are generally referred to as "effects" in the detailed assessment, except where the distinction between predicted and observed effects is material.

2.2 Zone of Influence

The Zone of Influence (ZOI) comprises the areas and ecological resources that may be affected by the Project's biophysical changes, including receiving environments beyond the immediate farm footprint. The ZOI is defined with reference to the relevant effect pathways, the ecology and mobility of affected species, habitat connectivity, and the spatial and temporal scale over which effects may occur. Further detail on the ZOI framework and the domain-specific ZOIs applied in this assessment is provided in **Appendix C**.

Two nested scales of ZOI have been applied:

- **Site ZOI**; the near-field area relevant to direct and local effects associated with an individual farm, including structures, associated activity and the immediately affected receiving environment.
- **Project ZOI**; the wider area relevant to indirect, cumulative, regional or population level effects

⁴ The Sites are also generally located within, or in proximity to, areas of existing aquaculture activity in the Marlborough Sounds.

associated with all six farms.

The Site and Project ZOIs have been defined separately for each ecological domain. In broad terms, the benthic and pelagic ZOIs encompass the relevant depositional and water column effect gradients; wild fish ZOIs encompass fish using the farm area and relevant wider population, migration and spawning areas; seabird ZOIs extend from farm structures and local foraging areas to the Sounds wide context where cumulative prey-related effects may occur; and marine mammal ZOIs extend from the vicinity of individual farms to relevant home ranges, foraging areas, transit routes, resting or haul out areas, and CMU scales for Threatened taxa.⁵

The spatial extent applied to a particular species, habitat or ecological feature may be refined where its sensitivity, mobility, conservation status, or relevant effect pathway warrants assessment at a different scale.

2.3 Information Sources & Limitations

This EclA draws on a combination of site-specific field survey data and an extensive desktop record covering the Marlborough Sounds. **Table 2-1** summarises the principal information base available for each site and domain.

No dedicated fish, seabird or water column field surveys were undertaken at any site; these domains are assessed on the basis of incidental records made during benthic and marine mammal fieldwork, together with the published and unpublished desktop record for the Marlborough Sounds. This is consistent with standard EclA practice for activities of this type and scale, where the primary ecological receptors of concern (reef and biogenic seabed habitat, king shag and cetaceans) are comparatively well studied at the regional scale, allowing robust inferences to be drawn without the need for exhaustive site-specific survey at every location.

The most significant data gap identified during preparation of this EclA relates to Onapua Bay, where the principal dolphin distribution study for the area (Cross, 2019) did not survey within the bay itself. Cross (2019) draws on data from Dolphin Watch and Beachcomber Cruises tour vessels, spanning 1995–2011 from tour logbooks and 2011–2014 from dedicated surveys aboard these opportunistic platforms. The Department of Conservation has noted that Onapua Bay was not within Cross's (2019) survey area; however, the immediately adjacent Kura Te Au / Tory Channel was heavily surveyed over the same period, and as the opportunistic platforms were tourist vessels that would be expected to visit a resident dolphin population if one were present in Onapua Bay, this gap has been addressed conservatively in this assessment by treating Onapua Bay as interacting with marine mammals in a manner comparable to the mussel farm sites assessed elsewhere within Kura Te Au / Tory Channel, rather than assuming an absence of marine mammal use on the basis of an absence of survey effort (McConnell, 2026). This treatment is considered appropriate given that the adjacent and intensively surveyed Kura Te Au / Tory Channel does not show elevated dolphin occurrence that would suggest materially different use of Onapua Bay itself (Cross, 2019).

⁵ Unless otherwise stated the [New Zealand Threat Classification System \(NZTCS\) database](#) informed the current (accessed 4 August 2026) conservation status of taxa.

Table 2-1 Principal ecological information sources by site.

Site	Benthic habitat	Pelagic habitat	Seabirds	Marine mammals	Wild fish
Papatua	Site-specific multi-beam and AUV ground-truthing survey (Robertson, 2026); regional context from Cawthron (2011)	Desktop record; Sounds wide monitoring (Cawthron, 2020)	Desktop record; colony proximity data (Bell, 2022) and potential effects McClellan (2026)	Desktop record (McConnell, 2026)	Desktop record
Guards Bay	Site-specific assessment (Davidson et al., 2021a)	Desktop record; Sounds wide monitoring (Cawthron, 2020)	Desktop record; recorded foraging location (Bell, 2022) and potential effects McClellan (2026)	Desktop record (McConnell, 2026)	Desktop record
Hapūkū Rock	Site-specific assessment (Davidson et al., 2021b)	Desktop record; Sounds wide monitoring (Cawthron, 2020)	Desktop record; potential effects McClellan (2026)	Comprehensive site-specific assessment (McConnell, 2025)	Desktop record
Okuri Bay	Site-specific benthic survey (Robertson, 2022)	Desktop record; Sounds wide monitoring (Cawthron, 2020)	Dedicated King Shag review; colony-proximity data (McClellan, 2022, citing Bell, 2022) and potential effects McClellan (2026)	Desktop record; single fur seal observation (Robertson, 2022; McConnell, 2026)	Desktop record
Richmond Bay	Site-specific assessment (Robertson, 2024, 2025)	Desktop record; Sounds wide monitoring (Cawthron, 2020)	Desktop record; potential effects McClellan (2026)	Desktop record (McConnell, 2026)	Desktop record
Onapua Bay	Substantial site and bay wide survey history (Davidson et al., 2016; Davidson, 2019, 2021c)	Desktop record; limited CTD/fluorimeter data for Tory Channel side bays (Cawthron, 2020);	Desktop record; potential effects McClellan (2026)	Desktop record; bay not directly surveyed by Cross (2019) (McConnell, 2026)	Desktop record

3 Ecological Description

3.1 Overview of Marine Receiving Environment

The Marlborough Sounds support one of New Zealand's longest established marine farming industries. The MEP sets out Aquaculture Management Areas (AMAs) where existing farms are deemed appropriate, generally between 50 to 300 m from shore in water depths of 15-30 m (Stenton-Dozey & Broekhuizen, 2019). Approximately 3,325 ha of authorised aquaculture activity exists across the Marlborough Sounds (Fisheries NZ, 2024). **Table 3-1** summarises the physical setting of each site.

The sections below describe the existing ecological environment of the Sites across five domains, namely seabed (benthic) habitat, wild fish, seabirds, marine mammals and pelagic habitat.

Table 3-1 Physical setting of the six sites. Sources: Papatua benthic habitat characterisation (Robertson, 2026); Richmond Bay ecological assessment (Robertson, 2025); Guards Bay, Hapūkū Rock and Onapua Bay ecological assessments (Davidson et al., 2016, 2021a, 2021b; Davidson, 2019, 2021c).

Site	CMU	Depth range	Dominant seabed type within footprint	Exposure
Papatua	Port Gore	25-45 m	Soft sediment; sandy mud (58%), mud (32%), muddy sand (11%)	Moderately exposed to southeasterly-northeasterly winds, tidal influence, outer Port Gore
Guards Bay	Guards Bay	15-30 m	Soft sediment (silt/mud)	Moderately exposed to westerly-northwesterly winds, tidal influence, outer Sound
Hapūkū Rock	Coastal Section - Outer Pelorus	15-45 m	Soft sediment; with inshore-corner reef and ≥40% natural shell approx. 21 m inshore of the northern block	Exposed to westerly-northerly winds, tidal influence, Outer Admiralty Bay.
Okuri Bay	Coastal Section - South of French Pass	15-25 m	Soft sediment; mapped horse-mussel beds and reef approx. 5 m from farm boundary	Current Basin, tidal influence; exposed to northwesterly winds
Richmond Bay	Waitata Reach	15-30 m	Silt/mud with variable natural and mussel shell cover	Exposed to westerly-northwesterly winds; tidal influence due to proximity to Waitata Reach
Onapua Bay	Tory Channel	10-20 m	Soft sediment, with a small bedrock reef tip on a submerged ridge	Sheltered bay; lower current than the adjacent Kura Te Au / Tory Channel; tidal influence due to proximity to Tory Channel

3.2 Existing Ecological Values

3.2.1 Seabed (Benthic) Habitat

Benthic habitat features have been identified and valued within the applicable Site and Project ZOIs, as summarised in **Table 3-2**. Values are assigned to discrete habitat features rather than to consent areas as a whole, recognising that adjacent reef, biogenic habitat and other sensitive features may differ materially in value from footprint sediments and may be relevant to particular effect pathways.

Across the six sites, the proposed consent areas are predominantly underlain by soft sediment typical of the wider Marlborough Sounds, including mud, sandy mud, muddy sand and firm muddy sand (Davidson et al., 2016, 2021a, 2021b; Davidson, 2019, 2021c; Robertson, 2022, 2024, 2025, 2026). These habitats generally have low structural complexity and support sparse epifaunal and infaunal assemblages. All soft sediment habitat is assigned **Low** ecological value, reflecting its widespread occurrence and relatively low structural complexity, diversity and distinctiveness, while recognising its representativeness of subtidal Sounds sediment habitat.

The principal higher value feature within the proposed consent areas is a small bedrock reef tip within the central Onapua Bay application block, which is assigned **High** ecological value. The reef provides locally uncommon hard substrata within an otherwise predominantly soft sediment bay and supports native (*Galeolaria hystrix*) tubeworm mounds (Davidson, 2019, 2021c). It consequently provides greater structural complexity, habitat diversity and ecological distinctiveness than the surrounding soft sediment habitat.

Several benthic habitat features of elevated ecological value occur within the wider Project ZOI but outside the proposed consent areas. These include Hapūkū Rock's inshore corner reef, cobble habitat and area of at least 40% natural shell; Guards Bay's nearshore reef; Okuri Bay's horse mussel beds and reef; Richmond Bay's inshore reef outcrop; and *Chaetopterus* formed biogenic habitat on the shore slopes at Onapua Bay (Davidson, 2021c; Davidson et al., 2025). These features are assigned **Moderate** to **High** ecological value because they provide comparatively complex, distinctive and/or biogenic habitat, support associated benthic assemblages, and are uncommon within their local setting.

At Onapua Bay, dense *Chaetopterus* beds occur on the adjacent shore slopes outside the consent footprint. These beds are structurally more complex and locally distinctive than the surrounding soft sediment and are therefore assigned **Moderate** ecological value. However, *Chaetopterus* has been observed overgrowing and apparently smothering some *Galeolaria hystrix* mounds at Onapua Bay (Davidson et al., 2025). The *Chaetopterus* beds are consequently not treated as an ecological equivalent of the native *Galeolaria* mound habitat, nor are they relied upon to support a High ecological value rating. The extent of *Galeolaria* displacement within Onapua Bay has not been quantified. This distinction is nevertheless warranted because recent monitoring elsewhere in Tōtaranui / Queen Charlotte Sound records *Chaetopterus* invasion of *Galeolaria* mound habitats, including sites where it has smothered formerly healthy mounds (Davidson et al., 2025). The taxonomic and biosecurity status of the Onapua Bay *Chaetopterus* population remains unresolved; it is currently regarded as cryptogenic.⁶ The value assessment is based on observed habitat condition and function, rather than its unresolved origin.

At the Project ZOI scale, the six consent areas are predominantly associated with widespread

⁶ Expert ecological caucusing on the PMEP (JWS, 30 March 2026) was equivocal as to whether the population is native or introduced/invasive.

Marlborough Sounds soft sediment habitat. The wider receiving environment also includes ESMS 2.33B at Papatua and Richmond Bay Reef ESMS 3.36 (**Figure 3-1**). These ESMS are retained as discrete **Very High** ecological value features because of their formally recognised ecological significance and contribution to wider ecological context; their presence does not elevate the value assigned to intervening soft sediment habitat.

As shown in **Figure 3-1**, ESMS 2.33B is located more than 170 m from the Papatua consent area and more than 70 m from its buffer edge (Robertson, 2026). Richmond Bay Reef ESMS 3.36 is more than 700 m from the nearest proposed farm area (Robertson, 2025). Neither feature would be directly occupied by farm infrastructure; their relevance is therefore principally to the assessment of indirect and cumulative effects.

Table 3-2 Ecological value of benthic habitat features within the Site and Project ZOIs.

Site	ZOI and benthic habitat feature	Indicative extent / location	Ecological value	Ecological basis for value assignment
Papatua	Site ZOI <i>Consent area soft sediment</i>	90.2 ha; entire consent area	Low	Extensive, representative soft sediment habitat of the Marlborough Sounds, with low physical complexity and no identified reef, biogenic habitat, TAR benthic taxa, or ESMS overlap.
	Project ZOI <i>ESMS 2.33B</i>	>170 m from consent area; >70 m from buffer edge	Very High	Formally recognised ecologically significant marine site. Retained as a High value feature in the Project ZOI because of its recognised ecological significance and relevance to wider ecological context and potential indirect or cumulative effects.
Hapūkū Rock	Site ZOI <i>Consent area soft sediment</i>	28.03 ha; entire consent area	Low	Widespread, low complexity soft sediment characteristic of sheltered Marlborough Sounds environments. The habitat lacks reef, biogenic habitat and other identified high value benthic features within the consent footprint.
	Site/Project ZOI <i>Inshore corner reef, cobble and natural shell habitat</i>	Nearest habitat approximately 21 m inshore; excluded from consent area	Moderate	Structurally diverse hard substratum and shell habitat with greater complexity and ecological heterogeneity than the footprint mud. The available evidence does not demonstrate the extent, condition or ecological distinctiveness required for a High value assignment.
Guards Bay	Site ZOI <i>Consent area soft sediment</i>	76.8 ha; entire consent area	Low	Extensive, representative soft sediment with low structural complexity, typical of Marlborough Sounds subtidal habitats. No reef, biogenic habitat or other high value feature occurs within the consent footprint.
	Site/Project ZOI <i>Nearshore reef</i>	Likely present inshore of the Site; no reef habitat recorded within 20 m of the Site boundaries	Moderate	Structurally distinct habitat inshore of the low complexity soft sediment consent area, not yet characterised in detail; expected to provide greater habitat complexity than the footprint sediments.

Site	ZOI and benthic habitat feature	Indicative extent / location	Ecological value	Ecological basis for value assignment
Onapua Bay	Site ZOI <i>Consent area soft sediment</i>	Majority of 15.73 ha consent area	Low	Widespread, low-complexity soft sediment typical of sheltered bay environments. Sparse and patchy tubeworm clumps within the application blocks do not constitute biogenic habitat.
	Site ZOI <i>Bedrock reef with Galeolaria hystrix mounds</i>	Reef tip extending into central application block; approximately 0.068 ha at reef foot	High	Locally uncommon bedrock reef within a predominantly soft sediment bay. The reef and associated native <i>Galeolaria</i> mounds provide hard substrata, comparatively high structural complexity, biogenic habitat and ecological distinctiveness.
	Site/Project ZOI <i>Chaetopterus formed beds on shore slope</i>	Shore slopes, in-shore of application blocks and outside consent footprint	Moderate	Dense, locally distinctive biogenic habitat on shore slopes that provides greater structural complexity and habitat diversity than surrounding soft sediment. Assigned Moderate, rather than High, because <i>Chaetopterus</i> has locally overgrown and apparently smothered native <i>Galeolaria hystrix</i> mounds. The extent of this displacement at the bay scale has not been quantified.
Okuri Bay	Site ZOI <i>Consent area soft sediment</i>	27.89 ha; entire consent area	Low	Widespread, low complexity muddy sand habitat with no reef, horse mussel bed or other high value benthic feature within the consent footprint.
	Site/Project ZOI <i>Biogenic horse mussel beds and rocky reef</i>	Nearest habitat approximately 5 m from proposed western block	High	Horse mussel biogenic habitat and associated reef provide high structural complexity, habitat provision and ecological diversity within the local muddy sand environment. Their close proximity also makes them relevant to the assessment of indirect effects.
Richmond Bay	Site ZOI <i>Consent area soft sediment</i>	Entire proposal area (3 blocks)	Low	Extensive, representative soft sediment with low structural complexity and no identified reef, biogenic habitat or other high value benthic feature within the proposed consent areas.
	Site ZOI <i>Inshore reef outcrop</i>	Approximately 10 m inshore of Area A	Moderate	Local feature that provides greater structural complexity and habitat heterogeneity than adjacent footprint sediment.
	Project ZOI <i>Richmond Bay Reef ESMS 3.36</i>	>700 m from nearest proposed farm area	Very High	Formally recognised ecologically significant marine site. Its value derives from its recognised ecological significance and contribution to the wider ecological context, rather than any direct overlap with proposed farm infrastructure.

3.2.2 Wild Fish

Ecological value of wild fish is assessed at both the Site ZOI and Project ZOI scales (**Table 3-3**). The Site ZOI comprises the farm structures and expected depositional gradient affecting local demersal and benthic fish habitat. The Project ZOI extends to the Sounds/embayment scale, encompassing the wider habitat mosaic, regional fish populations, spawning and migration corridors, and potential cumulative effects across all six proposed farms.

No dedicated fish surveys were undertaken. This assessment draws on fish observations recorded incidentally during benthic video and dive surveys, together with the desktop record for the Marlborough Sounds (Davidson et al., 2011; Robertson, 2022, 2024, 2025, 2026).

Site ZOI

Across the six proposed sites, fish records from within, or immediately adjacent to, the proposed farm areas are sparse and are principally associated with relatively uniform soft sediment habitat. The proposed consent footprints and expected depositional gradients comprise unconsolidated soft sediments and do not include the shell debris, mixed biogenic or reef habitats identified elsewhere within the broader Sounds (Anderson, 2022).

Soft sediments provide habitat for indigenous demersal and benthic fish, including foraging habitat associated with infaunal and epifaunal prey. However, where sediments are relatively uniform and lack shell material, biogenic structure, coarse substrata or reef features, they provide limited physical complexity, refuge and hard substrata compared with more structurally complex seabed habitats.

Benjamin et al. (2024) found that adding mussel shell to degraded mud and sand habitats in Pelorus Sound increased infaunal taxon richness and epifaunal diversity relative to adjacent unmodified soft sediment reference areas. This supports the importance of shell derived structural complexity in soft sediment environments and indicates that areas lacking shell, biogenic material or other habitat forming structure are likely to support comparatively lower benthic biodiversity and associated fish prey and habitat values.

Most other fish records relate to reef associated taxa recorded from inshore reef, coarse substratum or biogenic habitats beyond the proposed farm areas (Cawthron, 2011; Davidson et al., 2021a, 2021b; Davidson, 2021c; Robertson, 2022, 2024, 2025, 2026). These habitats are not represented, or occur only to a very limited extent, within the proposed farm footprints.

The Site ZOI therefore provides habitat for a sparse, low diversity soft sediment fish assemblage, rather than habitat of particular importance for reef associated fish. On the basis of its representativeness, diversity and ecological context, wild fish habitat within the Site ZOIs is assessed as having **Low** ecological value.

Project ZOI

At the Project ZOI scale, the assessment encompasses the wider Sounds/embayment context, including fish populations that may use reef, biogenic, spawning and migration habitats beyond individual farm footprints. The desktop record identifies several species as having potential to occur in the wider Project ZOI, including rāwaru / blue cod, reperepe / elephant fish, pākaurua / rough skate, tāmure / snapper and pakirikiri / spotty (Davidson et al., 2011; Robertson, 2022, 2024, 2025).

Of these species, elephant fish (*Callorhinchus milii*) and rough skate (*Zearaja nasuta*) are classified as Not Threatened (Duffy et al., 2024). No New Zealand marine bony fish species currently holds TAR status; therefore, no fish species recorded or predicted within the Site or Project ZOIs is classified as TAR.

Rough skate is naturally rare and sparsely distributed in the outer Marlborough Sounds and Cook Strait, where it is associated with rocky reef and sponge habitat in moderate to high current environments. Elephant fish have known spawning areas elsewhere in the Sounds, including Garne Bay, Saville Bay, Kumutoto Bay and Grove Arm; these areas are located away from the assessed sites (Davidson et al., 2011). Higher diversity and abundance of reef associated fish are likewise associated with adjacent inshore reef, coarse substratum and biogenic habitats rather than the proposed farm footprints.

Accordingly, although fish use of the individual Site ZOIs is limited, the wider Project ZOI contains locally uncommon or distinctive fish species and habitats, and provides the broader population, connectivity and life history context relevant to the Project. Wild fish within the Project ZOI are therefore assessed as having **Moderate** ecological value.

For the purposes of the effects assessment in Section 5, the Site ZOI value has been applied to direct, near-field effects associated with individual farm footprints and their depositional gradients. The Project ZOI value has been applied where an effect pathway has potential to extend beyond an individual site, including cumulative effects on wider fish populations, habitat connectivity, spawning or migration corridors, or Sounds scale water quality conditions.

Table 3-3 Summary of existing ecological values - wild fish.

Attribute	Site ZOI	Project ZOI
Spatial context	Farm structures and expected depositional gradient affecting local demersal and benthic fish foraging habitat	Sounds/embayment scale context, including regional populations, spawning and migration corridors, and cumulative effects
Species recorded or predicted	Sparse records of fish assemblages principally associated with relatively uniform soft sediments	Blue cod, elephant fish, rough skate, snapper and spotty; reef fish also recorded in the wider area, including triplefin, blue moki, tarakihi and goatfish
Threatened / At Risk (NZTCS) fish species	None recorded or predicted	None recorded or predicted
Habitat use	Sparse, low diversity assemblage associated with typical Sounds soft sediments. Limited physical complexity, refuge and hard substrata relative to shell debris, biogenic, coarse substratum and reef habitats	Higher diversity and abundance associated with reef, coarse substratum, shell debris and biogenic habitats; broader context includes regionally relevant habitat, population and connectivity values
Distinctive species or life history values	No evidence that the proposed consent footprints support distinctive fish habitat or important spawning habitat	Rough skate is naturally rare and sparsely distributed; elephant fish spawning areas occur elsewhere in the Sounds, away from the assessed sites
Overall ecological value	Low	Moderate

3.2.3 Seabirds

Ecological value for seabirds is assessed at both the Site ZOI and Project ZOI scales (**Table 3-4**). The Site ZOI comprises each proposed farm footprint, associated farm structures and immediately surrounding waters, including the area in which attraction to structures, lighting, vessel activity, operational disturbance, or localised changes in prey availability could affect seabirds. For the Nationally Endangered kawau pāteketēke / king shag (Robertson et al., 2021), the Site ZOI also includes the surrounding waters that may function as foraging, transit or roosting habitat for birds associated with nearby colonies.

The Project ZOI encompasses the wider Marlborough Sounds and intra Sounds dispersal area, including the connected network of seabird breeding colonies, roosts, foraging areas and movement pathways relevant to the six proposed farms. At this scale, the assessment considers potential cumulative effects on prey availability, seabird behaviour, use of marine farm structures, and the wider population context of TAR seabirds (Robertson et al., 2021). This distinction recognises that direct and near-field effects are assessed at an individual farm scale, whereas effects on population connectivity, colony networks and cumulative resource use are appropriately addressed at the Project ZOI scale.

No dedicated seabird surveys were undertaken at any of the six sites. This assessment is therefore based on incidental observations, desktop records, previous site-specific assessments, and available research on king shag distribution, foraging ecology and interaction with marine farms in the Marlborough Sounds.

Site ZOI

King shag is the principal driver of Site ZOI value because it is restricted to the Marlborough Sounds, is the most threatened shag breeding there, and has a small global population.

Between 2019 and 2021, the king shag breeding population was estimated at 287–326 nesting pairs across 12 locations in the Marlborough Sounds. Non-breeding surveys undertaken from 2018 to 2022 estimated an average total population of approximately 784 birds after accounting for likely missed roost sites (Bell, 2022). King shags are primarily benthic foragers, with diet dominated by flatfish including witch, crested sole and opalfish (Bell, 2022).

King shag foraging behaviour is variable among individual birds and colonies. GPS tracking found a mean individual foraging area of 5.09 km² (SD 3.91; range 0.19–13.69 km²), with mean foraging distances of 8.4 km for males and 5.7 km for females. Historical studies recorded maximum foraging ranges of 24 km from Duffers Reef and 18 km from Kuru Pongi / North Trio. Individual birds showed relatively high fidelity to particular foraging areas, but there was no overlap in the tracked foraging ranges of birds from different colonies (Bell, 2022).

Research also confirms that king shags may use marine farm areas variably for both foraging and roosting. A paired study of eight mussel farms and adjacent non-farmed habitats recorded 13 king shags at six farms; birds were observed roosting, foraging, or undertaking both activities, including foraging within farms while maintenance or harvesting activity occurred. GPS tracking found that 23 of 26 birds from Pelorus Sound colonies foraged within mussel farms, with birds using farms for an average of 39% of their total foraging time (Bell, 2022).

The MEP schedules king shag breeding sites and applies a 100 m exclusion buffer to boat activity around those sites. Industry practice also seeks to maintain at least 200 m separation from colonies. None of the six proposed consent footprints or associated buffers overlaps, or is within 1 km of, a scheduled king shag breeding site. The closest reported colony separations are approximately 1.6 km for Papatua to KS5 Hunia; 2.6 km for Richmond Bay to KS8 Tawhitinui; 4.4 km for

Hapūkū Rock to KS3 Stewart Island; 5.9 km for Guards Bay to KS5 Hunia; 8.0 km for Onapua Bay to KS9 Blumine Island; and 10.2 km for Okuri Bay to KS1 Rahuinui Island (**Figure 3-2**).

Available information indicates varying levels of direct evidence of king shag use among the six sites. At Hapūkū Rock, previous Admiralty Bay survey data recorded king shags at low density in the proposal area during the non-breeding season and at higher density during the breeding season, particularly in the southern portion of the site (Bramley, 2015). The same assessment concluded that parts of the proposal area were seasonally important to king shags and recommended a precautionary approach to further development in areas overlapping known habitat use.

Guards Bay is a recorded king shag foraging location used by birds associated with the Duffers Reef, Annie Bay and Paparoa colonies in outer Pelorus Sound. GPS tracking confirms that three birds from Duffers Reef used outer Pelorus Sound locations, including Guards Bay, Annie Bay and Paparoa, for foraging (Bell, 2022).

Papatua and Guards Bay also lie within the broader predicted foraging envelope of the Hunia colony (KS5), as shown on **Figure 3-3**. Bell (2022) recorded mean foraging distances of approximately 8.4 km for male king shags and 5.7 km for females, with substantial individual variation in foraging distance and area. When the male mean distance and one standard deviation are considered, the modelled envelope extends to approximately 14 km from the colony. **Figure 3-3** therefore identifies Papatua and Guards Bay as locations that are plausibly accessible to birds from Hunia, consistent with the Site ZOI defined for king shag. This spatial overlap does not, of itself, demonstrate regular use or an adverse effect; however, it supports the conclusion that both sites may contribute foraging, transit or roosting habitat for king shags (Bell, 2022).

At Okuri Bay, the previous king shag review concluded that birds, particularly males, could reach the site from nearby colonies despite its greater separation distance. A single king shag was also recorded roosting on the existing mussel farm in September 2020 (McClellan, 2022). The 2026 seabird review notes that a dedicated king shag assessment was prepared for the Okuri Bay proposals (McClellan, 2026). Richmond Bay and Onapua Bay are likewise within the wider potential movement and foraging context of king shag colonies, although the information reviewed does not identify regular site-specific use equivalent to that documented for Hapūkū Rock or Guards Bay.

The absence of dedicated surveys and consistent site-specific observations should not be interpreted as demonstrating absence of use. King shags exhibit substantial individual and colony-related variation in foraging behaviour, and use of marine farms varies from occasional use to extensive use by particular birds. Accordingly, the available evidence is sufficient to establish a reasonable likelihood that each proposed Site ZOI may provide foraging, transit and/or roosting habitat for king shag, even where regular use of the individual consent footprint has not been demonstrated.

Seabird habitat within all six Site ZOIs is therefore assessed as having **High** ecological value. This rating reflects the potential functional use of the farm areas and adjacent waters by a Nationally Endangered, geographically restricted species with a small population, together with the incomplete site-specific survey record. It does not imply that each farm footprint comprises breeding habitat, a scheduled colony, or a location known to support regular and concentrated king shag use. None of the proposed sites contains a scheduled king shag breeding or roosting site, and none overlaps the associated exclusion buffers.

For the purpose of the effects assessment, the High Site ZOI value is applied to direct and near-field effects associated with individual farms, including attraction to structures, lighting, vessel activity, operational disturbance, potential entanglement risks, localised changes to prey availability, and local effects on seabird foraging or roosting behaviour.

Project ZOI

At the Project ZOI scale, the assessment encompasses the wider Marlborough Sounds seabird assemblage, including king shag breeding colonies and roosts, connected foraging areas, inter-colony movements, and potential cumulative effects associated with the six proposed farms. The wider Project ZOI supports at least 40 seabird species, and the majority of species breeding in New Zealand waters are classified as TAR (McClellan, 2026).

Again king shag is of particular significance at this scale because it breeds only in the Marlborough Sounds and is restricted to a small number of colony locations. The species' small total population, limited breeding range, dependence on benthic fish prey, and use of a spatially connected network of breeding, roosting and foraging sites give it substantial ecological context beyond any individual farm footprint (Bell, 2022).

The Project ZOI includes multiple king shag breeding and roost sites, including Hunia, Tawhitinui, Stewart Island, Rahuinui, Duffers Reef, Kuru Pongi / North Trio and other colonies and roosts within the outer Marlborough Sounds (**Figure 3-1**). King shag colony occupancy and breeding activity can shift over time (Bell, 2022), reinforcing the importance of considering the wider colony network rather than treating individual colonies or individual farm sites as isolated ecological units.

The Project ZOI also captures potential cumulative pathways that cannot be appropriately assessed at a single site scale. These include cumulative changes in prey availability or benthic foraging conditions, increased vessel activity, disturbance to birds using shared roosting or foraging areas, and the aggregate influence of multiple farm structures on seabird movement and habitat use. While research indicates that longline mussel farms can provide roosting and, in some circumstances, foraging opportunities for king shags and other birds, the use of farms varies among individuals and locations (McClellan, 2026).

Seabirds within the Project ZOI are therefore assessed as having **Very High** ecological value. This reflects the presence of king shag as a Nationally Endangered, range restricted species with a small total population, together with the wider assemblage of TAR seabirds and the importance of the Marlborough Sounds colony, roost and foraging network. The Project ZOI value is applied to effects with potential to extend beyond individual farms, including cumulative effects on king shag foraging opportunities, prey resources, inter-colony connectivity, or the wider Sounds scale seabird population.

Table 3-4 Summary of existing ecological values - seabirds.

Attribute	Site ZOI	Project ZOI
Spatial context	Individual farm structures, consent footprint and immediately surrounding waters; local attraction, lighting, vessel activity, disturbance, potential prey-related effects, and potential king shag foraging, transit or roosting use	Wider Marlborough Sounds and intra-Sounds context, including breeding colonies, roosts, connected foraging areas, movement pathways and cumulative effects across the six farms
Survey basis	No dedicated seabird surveys; assessment based on incidental observations, desktop records, previous site assessments and king shag research	Desktop assessment of regional seabird records, king shag population and tracking research, colony and roost network, and cumulative effects context

Key TAR species	Potential use by kawau pāteketekete / king shag (Nationally Endangered), together with other TAR seabirds potentially occurring in the immediate vicinity	King shag, matuku moana / reef heron and tarapirohe / black-fronted tern (Nationally Endangered); kawau tikitiki / spotted shag and taranui / Caspian tern (Nationally Vulnerable); and several At Risk species
King shag evidence	Confirmed or documented relevant use at Hapūkū Rock, Guards Bay and Okuri Bay; reasonable potential for foraging, transit or roosting use at all sites given variable foraging ranges and marine farm use	Small, geographically restricted population; 287–326 breeding pairs recorded in 2019–2021; approximately 784 birds estimated in the non-breeding population; multiple breeding colonies and roost sites
Colony relationship	No proposed consent overlaps a scheduled king shag colony or its 100 m exclusion buffer; all sites are more than 1 km from the nearest scheduled colony	Encompasses the wider breeding colony, roost and foraging network that supports the Marlborough Sounds population
Functional habitat role	Potential foraging, transit and roosting habitat; no evidence that a proposed footprint supports breeding habitat or a discrete colony-equivalent habitat feature	Population, colony network, prey resource, connectivity and cumulative effects context
Overall ecological value	High (all six sites)	Very High

3.2.4 Marine Mammals

Ecological value for marine mammals is assessed at both the Site ZOI and Project ZOI scales (**Table 3-5**). The Site ZOI comprises each proposed farm footprint, associated farm structures and the immediately surrounding waters in which vessel movements, operational noise, farm structures, potential entanglement hazards, disturbance, and local foraging or transit behaviour could affect marine mammals. The relevant Site ZOI extends beyond the consent footprint to encompass the typical near-field movement, foraging and transit area of animals using the particular bay or embayment.

The Project ZOI encompasses the wider Marlborough Sounds and relevant Cook Strait context, including the home ranges and foraging ranges of resident and visiting marine mammals, recognised feeding and transit habitat, habitat connectivity, haul out and resting areas where relevant, and the population or management unit scale of TAR taxa. At this scale, the assessment considers the cumulative ecological implications of the six proposed farms, including aggregate vessel activity, multiple structures, potential interaction risks, and effects that could extend beyond an individual farm or bay. This distinction recognises that direct and near-field interactions are appropriately considered at an individual farm scale, whereas regional populations, mobile species habitat use, connectivity and cumulative effects require assessment at the Project ZOI scale.

Across the wider Marlborough Sounds and Cook Strait, at least 16 marine mammal species are recorded. Regularly occurring taxa include kekeno / New Zealand fur seal (*Arctocephalus forsteri*, Not Threatened), terehu / common bottlenose dolphin (*Tursiops truncatus*, Nationally Vulnerable),

dusky dolphin (*Lagenorhynchus obscurus* unnamed subspecies, Not Threatened), aihe / common dolphin (*Delphinus delphis*, Not Threatened), maki / killer whale (*Orcinus* aff. *orca*, Nationally Critical), tutumairekurai / Hector's dolphin (*Cephalorhynchus hectori hectori*, Nationally Vulnerable), and goosebeaked whale (*Ziphius cavirostris*, At Risk – Uncommon). Tohorā / southern right whale (*Eubalaena australis*, Nationally Increasing) and paieka / humpback whale occur seasonally (Merriam et al., 2009; McConnell, 2025, 2026; Lundquist et al., 2025). The TAR taxa relevant to the Project ZOI are common bottlenose dolphin, killer whale, Hector's dolphin, southern right whale, and goosebeaked whale. The Marlborough Sounds bottlenose dolphin population is estimated at approximately 211 individuals ranging across the 890 km² Marlborough Sounds complex (McConnell, 2025).

Site ZOI

At the Site ZOI scale, the relevant ecological features are the individual farm areas, their associated structures and adjacent waters that may be used by fur seals, dolphins, whales or other marine mammals for local foraging, transit, resting, or interaction with farm and vessel activity.

Available information demonstrates that marine mammals use the wider Sounds extensively, but the strength of direct, site-specific evidence varies among the six proposed sites.

Admiralty Bay and the Current Basin are mapped as significant dusky dolphin habitat in MEP Appendix 28. The recent site-specific assessment for Hapūkū Rock concludes that Admiralty Bay “... *should continue to be considered as important dusky dolphin feeding habitat...*” (McConnell, 2025, citing Clement & Elvines, 2015). Hapūkū Rock is therefore the only proposed Site ZOI that overlaps the mapped Admiralty Bay significant habitat for dusky dolphins.

The other five sites, including Okuri Bay, occur in parts of the Sounds used by the same wide ranging marine mammal assemblage but are not themselves identified as MEP significant habitat (McConnell, 2025, 2026). This does not establish that these Site ZOIs are unused by dolphins or other marine mammals; rather, it distinguishes their available evidence base from that for Hapūkū Rock and Admiralty Bay.

It is relevant context that Admiralty Bay's dusky dolphin population represents a comparatively small component of the wider population that uses the area seasonally, most of which breeds off Kaikōura. Research indicates that Admiralty Bay accommodates approximately 6–9% of the Kaikōura dusky dolphin population, or approximately 2–4% of the wider New Zealand dusky dolphin population of approximately 30,000 individuals (Pearson, 2009; Piwetz et al., 2024). Dolphin presence in Admiralty Bay is strongly seasonal; with animals arriving from mid-April, occurrence increases from mid-autumn (0–29% of surveys) to late autumn (89–100%), remains high through winter, and declines in spring (45–70%) (Clement & Halliday, 2014). The average residency of individual dolphins in Admiralty Bay in any one season was reported as 16 days in 2005/06 (Pearson, 2009). Dolphins recorded in Admiralty Bay form part of a much wider population extending at least along the east coast of the South Island (Harlin et al., 2003).

For Onapua Bay, the absence of dolphin records in Cross's (2019) survey reflects survey coverage rather than confirmed absence, as the Onapua arm was not surveyed. The immediately adjacent and intensively surveyed Kura Te Au / Tory Channel does not indicate that dolphins are transitory to or from Onapua Bay in significant numbers. Nevertheless, it is conservative to assess the proposed conventional long-line oyster farm at Onapua Bay as having the potential to interact with marine mammals in a manner comparable to the mussel farm structures assessed elsewhere in Kura Te Au / Tory Channel, rather than reducing effect magnitude on the basis of unconfirmed absence of use (McConnell, 2026).

One New Zealand fur seal (Not Threatened) was observed on an existing farm structure during

the field survey at Okuri Bay (Robertson, 2022). This observation is consistent with fur seal use of nearshore reefs and farm structures throughout the Sounds and does not indicate a unique or concentrated ecological sensitivity at Okuri Bay (McConnell, 2026).

Marine mammals within each of the six Site ZOIs are assessed as having **High** ecological value, reflecting the reasonable likelihood that the individual farm areas and adjacent waters may provide local foraging, transit, resting, or other functional habitat for a suite of mobile marine mammals, including TAR taxa. It is applied precautionarily in recognition that absence of records from an individual location, or limited survey coverage, does not demonstrate absence of use by highly mobile species.

The High Site ZOI value does not imply that every proposed farm footprint is mapped significant habitat, a known breeding or calving area, a haul out site, or a location supporting regular and concentrated use by TAR species. Hapūkū Rock has the strongest direct site context because it lies within the mapped Admiralty Bay dusky dolphin habitat, whereas available evidence for the other sites is necessarily more inferential. However, the High rating provides an appropriately consistent basis for assessment of direct and near-field effects at all farms, including vessel activity, operational noise, disturbance, interaction with farm structures, potential entanglement risk, and local effects on foraging or transit behaviour.

Project ZOI

At the Project ZOI scale, the assessment encompasses the wider Marlborough Sounds and relevant Cook Strait marine mammal assemblage, including the population scale movements and habitat use of dolphins, whales and seals that may interact with more than one proposed farm. This scale includes the home ranges and foraging ranges of resident and visiting animals, recognised dusky dolphin feeding habitat in Admiralty Bay and the Current Basin, seasonal whale occurrence, and the wider regional population context for TAR species.

The Project ZOI contains multiple TAR taxa, including killer whale, bottlenose dolphin, Hector's dolphin, southern right whale, goosebeaked whale and humpback whale. It also encompasses the approximately 211-individual Marlborough Sounds bottlenose dolphin population, which ranges across the 890 km² Sounds complex, and the wider populations of dusky dolphins that use Admiralty Bay seasonally as part of a substantially larger east-coast South Island population (McConnell, 2025; Pearson, 2009; Harlin et al., 2003).

At this scale, the recognised ecological importance of Admiralty Bay and the Current Basin as dusky dolphin feeding habitat is relevant, as is the mobility of dolphins and whales across bays, Sounds and Cook Strait. The Project ZOI also captures cumulative pathways that cannot be adequately assessed at a single-site scale, including the aggregate implications of multiple farm structures and associated vessel activity, potential repeated exposure to disturbance or interaction risks, and any cumulative effects on marine mammal movement, foraging opportunities or use of connected habitat across the Sounds.

Marine mammals within the Project ZOI are therefore assessed as having **Very High** ecological value. This rating reflects the presence of TAR taxa; the Marlborough Sounds bottlenose dolphin population; the recognised significant dusky dolphin habitat at Admiralty Bay and the Current Basin; the seasonal use of the area by migratory whale species; and the importance of the wider Sounds as a connected regional habitat network for mobile marine mammals. The Very High Project ZOI value is applied to effects that could reasonably extend beyond an individual farm, including cumulative effects across the six farms, effects on regional movement and habitat connectivity, and effects with potential population level implications.

Table 3-5 Summary of existing ecological values - marine mammals.

Attribute	Site ZOI	Project ZOI
Spatial context	Individual farm structures, consent footprint and immediately surrounding waters; local vessel activity, operational noise, disturbance, farm structure interaction, potential entanglement risk, and local foraging, transit or resting use	Wider Marlborough Sounds and relevant Cook Strait context; home and foraging ranges, recognised feeding habitat, habitat connectivity, regional populations or management units, and cumulative effects across the six farms
Assessment basis	Site-specific assessments and records, incidental observations, desktop information and precautionary consideration of likely use by highly mobile species	Regional marine mammal records, TAR status, population information, recognised significant habitat, broad scale movement ecology and cumulative effects context
Species regularly present	New Zealand fur seal, bottlenose dolphin, dusky dolphin, common dolphin and killer whale; seasonal occurrence also possible for southern right whale and humpback whale	At least 16 species recorded across the wider Marlborough Sounds and Cook Strait, including regular fur seal, dolphin and killer whale occurrence and seasonal southern right and humpback whales
Key TAR species	Potential local use by killer whale (Nationally Critical), bottlenose dolphin and Hector's dolphin (Nationally Vulnerable), southern right whale (Nationally Increasing), goosebeaked whale (At Risk–Uncommon), and humpback whale (Migrant)	Killer whale (Nationally Critical); bottlenose dolphin and Hector's dolphin (Nationally Vulnerable); southern right whale (Nationally Increasing); goosebeaked whale (At Risk–Uncommon); and humpback whale (Migrant)
Significant habitat relationship	Hapū kū Rock overlaps mapped Admiralty Bay significant dusky dolphin (Not Threatened) habitat; the other five sites, including Okuri Bay, do not overlap MEP Appendix 28 mapped significant habitat	Includes Admiralty Bay and the Current Basin significant dusky dolphin habitat, together with the wider connected habitat used by the regional marine mammal assemblage
Evidence of use	Strongest direct site context at Hapū kū Rock; fur seal recorded on existing farm structure at Okuri Bay; site-specific use elsewhere is less certain, but absence of records does not demonstrate absence of use	Recognised regional use by resident and visiting marine mammals, including the approximately 211-individual Marlborough Sounds bottlenose dolphin population and seasonally occurring dusky dolphins and whales
Functional habitat role	Potential local foraging, transit, resting and interaction habitat; no evidence that all individual consent footprints are discrete breeding, calving, haul out or concentrated-use areas	Population, home range, movement, feeding habitat, connectivity and cumulative effects context across the Sounds and relevant Cook Strait area
Overall ecological value	High (all six sites)	Very High

3.2.5 Pelagic Habitat

Pelagic habitat comprises the water column and its physical, chemical and biological processes, including tidal mixing and flushing, light conditions, planktonic production and nutrient cycling. It is assessed separately from seabirds, marine mammals and wild fish, which are considered within domain-specific ZOIs appropriate to their mobility, habitat use and population scales.

For pelagic habitat, the Site ZOI comprises each farm footprint and surrounding water column potentially affected by local changes in plankton depletion, suspended particles, organic matter processing, shading or farm-related hydrodynamics. The Project ZOI comprises the wider outer Marlborough Sounds water body within which indirect or cumulative effects on pelagic productivity, water quality, planktonic communities, nutrient cycling or food web processes could occur.

Four of the six sites (Papatua, Guards Bay, Hapūkū Rock, and Okuri Bay) occur within connected outer Sounds coastal and embayment waters. Richmond Bay and Onapua Bay are a relatively more sheltered, less well flushed embayments rather than an outer Sounds setting; this distinction is addressed further below. Water column conditions support plankton based food webs typical of temperate coastal environments. Although exposure, flushing and residence time vary among sites, available information does not identify discrete water masses, persistent retention or frontal features, unusual planktonic assemblages, or other distinct pelagic habitat units within the Site ZOIs.

Pelagic production supports benthic communities, wild fish, seabirds and marine mammals. However, these functions are widespread across the Project ZOI and are not known to be concentrated, rare or disproportionately important within the Site ZOIs. Potential effects on prey availability and mobile fauna are addressed in the relevant wild fish, seabird and marine mammal assessments.

Available Marlborough Sounds monitoring indicates that phytoplankton and zooplankton depletion may occur locally within farms, but does not identify a clear farm-related decline in chlorophyll *a* at the Sounds scale (NIWA, 2019; Cawthron, 2020). Richmond Bay and Onapua Bay may be more sensitive to local change because of comparatively lower flushing; however, because the proposed sites within these bays are situated within relatively deep (predominantly >15-20 m deep) areas with reasonable proximity to the stronger currents of Kura Te Au / Tory Channel (Onapua) and outer Te Hoiere / Pelorus Sound (Richmond), water residence times are expected to be relatively short, when compared to sheltered bays in the inner Sounds.

For Onapua Bay, the adjoining Opua Bay supports a documented resident population of the toxic dinoflagellate *Alexandrium catenella* and has a history of recurring blooms, including an intense bloom in early to mid 2013 (MacKenzie et al., 2012, 2013). This history identifies a locally important harmful algal bloom and shellfish biotoxin management consideration; however, in the absence of site-specific evidence of a distinct pelagic assemblage, atypical water column condition, or associated ecological function, it does not of itself indicate elevated existing pelagic ecological value relative to the other proposed farm sites or the wider Sounds.

Existing farms create localised, modified water column structure through crop lines, droppers and biofouling communities. These features are relevant to effects pathways and local nutrient cycling but do not indicate that the underlying open water pelagic habitat is rare, distinctive or of elevated inherent value.

TAR seabirds and marine mammals may use the wider pelagic environment around the sites. Relevant king shag use and the overlap of Hapūkū Rock with mapped dusky dolphin habitat are addressed in the seabird and marine mammal domains. Their use of the wider marine environment does not, by itself, indicate elevated value of pelagic habitat within the Site ZOIs.

No TAR fish species have been recorded or are predicted to occur within the project areas.

Against the EclA value matters, pelagic habitat within the Site and Project ZOIs is representative of the outer Marlborough Sounds, with no identified rare or distinctive water column features, unusual planktonic assemblages, or concentrated pelagic ecological functions. It contributes to wider food web and connectivity processes, but no site is identified as a discrete spawning, nursery, retention, refuge or concentrated use area for pelagic receptors.

On this basis, and consistent with the treatment of the representative soft sediment seabed habitat described in Section 3.2.1, the ecological value of the pelagic habitat is rated as **Low** across all six sites. This assessment reflects the representative and non-distinctive character of the water column within the applicable ZOIs. It does not diminish the separate high to very high values assigned to TAR seabirds and marine mammals.

4 Project Features and Implementation

4.1 Farm Structures

All six sites propose conventional subtidal longline culture structures, consistent with standard Marlborough Sounds mussel farming practice (Stenton-Dozey & Broekhuizen, 2019). A typical longline farm comprises a series of parallel horizontal “backbone” lines, each 110-160 m long, suspended at the surface by a series of 50-70 large plastic floats per line, with each float capable of supporting up to approximately one tonne of mussels. Vertical “dropper” or crop lines, seeded with mussel spat, hang from each backbone line; a single 160 m backbone line typically supports 3,500-4,000 m of crop rope in total. Mussels are grown on ropes suspended approximately 10-15 m below the surface, and lines are held in position and tensioned using screw or block anchors at each end.

4.2 Installation

Installation at each site is undertaken from work vessels and involves deployment of screw or block anchors, laying and tensioning of backbone lines, and attachment of floats and droppers. No dredging, blasting, or driven or drilled piling is required for any of the six sites; anchoring is achieved through surface deployed or screw-in systems appropriate to the soft sediment seabed present at each location. Installation activities are short in duration relative to the operational life of each farm and are confined to the water column and the immediate seabed contact points of the anchoring system, avoiding the higher value reef and biogenic habitats identified in Section 3, all of which lie outside the proposed footprints.

4.3 Operation

Once established, ongoing operational activities at each farm include periodic vessel visits for stock inspection, line maintenance and biofouling management; seeding of new crop line (transfer of nursery grown spat from Papatua, Guards Bay and Hapūku Rock to production sites); harvesting of mature stock; and routine structural maintenance, including replacement of floats, lines and anchoring components as required. Farm structures remain in place continuously through the production cycle; Onapua Bay’s oyster crop is managed on a single year class, low stocking density basis with an approximate 2 year 3 month growing cycle to first harvest.

Papatua, Guards Bay and Hapūku Rock are proposed for spat catching and/or nursery holding rather than full mussel production grow out. Accordingly, their standing shellfish biomass and associated filtration, biodeposition effects are expected to be lower than those of an equivalent area, fully stocked mussel production farm. Onapua Bay will similarly operate as a single year class, low stocking density flat oyster farm, rather than a conventional mussel production operation.

4.4 Relationship of Project Design to Ecological Values

The layout of each farm has been informed by the ecological values described in Section 3, with the consistent objective of locating structures over low value soft sediment seabed and away from higher value reef, biogenic habitat, and scheduled seabird colonies:⁷

- At **Papatua**, the consent footprint is sited entirely over the soft sediment seabed confirmed by site-specific survey, with no reef or biogenic habitat within 20 m of the boundary (Robertson,

⁷ The proposed farm blocks at Richmond Bay and Okuri Bay were delineated with reference to the georeferenced habitat shapefiles prepared from the site-specific benthic survey (Robertson 2022, 2025).

2026).

- At **Hapūkū Rock**, the two nursery blocks are positioned to avoid the inshore corner reef and the area of natural shell substratum inshore of the northern block, and are managed with a long-line spacing of approximately 27 m (Davidson et al., 2021b; McConnell, 2025).
- At **Okuri Bay**, the larger western block is configured to avoid mapped biogenic and reef habitats, including habitat immediately adjacent to, but not mapped within, the proposed footprint; the southern block has likewise been positioned to avoid mapped biogenic / reef habitat.
- At **Richmond Bay**, the farm is set back more than 700 m from the Ecologically Significant Marine Richmond Bay Reef ESMS (3.36) and avoids the inshore reef outcrop (Robertson, 2025).
- At **Onapua Bay**, the farm blocks are configured with a 0.068 ha exclusion zone at the foot of the bedrock reef, and are sited to avoid the dense *Chaetopterus* tubeworm beds on the bay edge slopes (Davidson, 2019, 2021c).
- At **Guards Bay**, the additional 76.8 ha nursery area adjoins the existing 12 ha farm (U140631) and is sited away from the nearshore reef identified in the site assessment (Davidson et al., 2021a).

Where biogenic or reef habitat occurs within the broader Site ZOI, including habitat mapped in close proximity to a proposed consent boundary, the Project design has sought to avoid direct occupation of that habitat through delineation of farm blocks and associated operational areas. No direct seabed disturbance or placement of farm infrastructure is proposed within mapped biogenic or reef habitat. Any potential effects on adjacent habitat would therefore be indirect and are assessed in Section 5, including consideration of the relevant effect pathways, scale and site-specific context.

No consent footprint overlaps a scheduled king shag breeding site (KS1-KS11) or its 100 m buffer, and separations to the nearest colonies range from approximately 1.5 km to more than 10 km, consistent with, or exceeding, the proposed conditions (Condition 17) and industry practice of maintaining at least 200 m separation (Bell, 2022; MEP Appendix 27). Operational vessel movements and stock handling practices are designed to minimise attraction of, and interaction with, marine mammals, and are described further in Section 6 in the context of the Marine Mammal Management Plan (MMMP) prepared for the Project (McConnell, 2025, 2026).

Unlike the seabed, seabird and marine mammal domains, occupation of a portion of the pelagic habitat described in Section 3.2.5 is an inherent feature of longline farm structures rather than an effect that can be avoided through siting; backbone lines, floats and droppers necessarily occupy the upper 10-15 m of the water column at each site for the duration of the production cycle (Section 4.1). Given the assessed Low existing ecological value of this domain at all six sites, this occupation is not considered to compromise the Project's overall design objective of avoiding higher value ecological features, and the associated operational effects are addressed in Section 5.3.

5 Assessment of Effects on Ecological Values

This section assesses the potential effects of the Project on the ecological values described in Section 3, applying the EIANZ (2018) EclA Guidelines. As these are predicted effects of a Project not yet constructed or operated, they are considered separately for (i) potential positive effects, (ii) potential adverse effects of establishing the farms (construction), and (iii) potential adverse operational effects of the proposed activity across each of the five ecological domains. Cumulative effects are also considered. Biosecurity is a risk pathway rather than a discrete ecological domain, and is considered separately in Section 5.5.

It is noted that the ecological effects of long-line shellfish farming in New Zealand are well understood (MPI, 2013). Associated effects, whether positive or negative, are generally limited to the farm boundary and its immediate surrounds, and are reversible following removal of the farm.

5.1 Positive Ecological Effects

As discussed below and summarised in **Table 5-1**, long-line shellfish farming can generate several positive ecological effects (see, for example, the review of ecological effects and ecosystem services in NIWA, 2019), in addition to the adverse effects considered.

Table 5-1 Summary of potential positive ecological effect pathways associated with the proposed longline farming structures.

Effect pathway	Mechanism	Site relevance	Weighed against
Fish habitat provision	Reef-like 3D structure vs bare soft sediment	All six sites	—
Marine mammal foraging attraction	Prey aggregation near (not within) structures	All sites, Hapūkū Rock particularly	Habitat loss and entanglement risk (5.3)
Biofouling community and filtration services	Secondary production, nutrient cycling (denitrification)	All sites	Phytoplankton depletion (5.3)
Seabird roosting and foraging opportunities	Resting platform between foraging bouts	All sites	—

Fish habitat provision

- Mussel farm structures provide extensive artificial three-dimensional habitat in the water column that is otherwise largely absent over soft sediment seabed. Research on New Zealand mussel farms has found that farm structures can support enhanced local fish abundance and diversity relative to adjacent open soft sediment habitat, functioning as a surrogate reef-like habitat for reef associated and pelagic species (e.g. Grange, 2002; Underwood & Jeffs, 2023). This effect would be expected to some degree at all six sites, given the consistent farm structure type proposed.
- The anchor and mooring chain infrastructure required to secure the longline structures also introduces small areas of hard substrate to an otherwise soft sediment seabed. Studies of mussel longline farms internationally have recorded epibenthic macrofaunal communities, including crabs, sea stars and lobsters, concentrated directly beneath and around mussel lines and anchor blocks relative to surrounding soft sediment (Drouin et al., 2015; Sean et al., 2022), and a similar

effect may be expected at the anchor points of the proposed structures. This benthic pathway is distinct from the water column reef effect described above and is weighed against the potential for organic enrichment beneath the structures from biodeposition, considered as an adverse effect in Section 5.3 below.

Marine mammal foraging attraction

- Research from Admiralty Bay indicates that habitat patches in proximity to, rather than within, mussel farms can act as an attractant for foraging dusky dolphins, with dolphins reported to use areas near but not in mussel farms for foraging, potentially reflecting aggregation of prey species around farm structures (Pearson, 2008, 2009; Piwetz et al., 2024).
- The same body of research has also characterised mussel farm expansion in Admiralty Bay as representing further habitat loss with the potential to limit dusky dolphin foraging effectiveness, notwithstanding farm structures' potential to aggregate prey (Pearson et al., 2012; Piwetz et al., 2024).
- Taken together, this research presents a consistent picture in which farm adjacent habitat is attractive for foraging while the farm structures themselves are generally avoided and may still constrain foraging efficiency within their footprint; this is a potentially positive interaction at Hapūkū Rock in particular, although it must be weighed against both the habitat loss concerns above and the entanglement risk considered in Section 5.3 below.

Biofouling community and filtration services

- Shellfish farm structures develop diverse biofouling communities (including juvenile echinoderms and other invertebrates) that contribute additional secondary production and habitat complexity to the water column, and shellfish filter feeding activity contributes to local nutrient cycling (Stenton-Dozey & Broekhuizen, 2019).
- This is the principal positive effect pathway for the pelagic habitat domain described above, and is weighed against the potential for filter feeding to deplete phytoplankton and zooplankton concentrations, considered as an adverse operational effect in Section 5.3 below.

Seabird roosting and foraging opportunities

- Farm structures can provide roosting opportunities for king shag and other seabirds; a king shag was recorded roosting on the existing mussel farm at Okuri Bay in September 2020 (McClellan, 2022). A paired study of eight mussel farms and adjacent non-farmed habitats in the Marlborough Sounds recorded 13 king shags at six farms (five roosting only, four foraging only, four both roosting and foraging), together with ten further species including pied shag, little shag, spotted shag, Caspian tern, red-billed gull, black-backed gull, variable oystercatcher and paradise shelduck of which eight foraged within the farms; up to 23 birds were recorded per 15-minute observation interval at farms, compared with control sites that were generally unused (McClellan, 2026). GPS tracking data corroborate this, showing that farm structures elsewhere in the Sounds are used opportunistically by shags and other seabirds for resting between foraging bouts, with 23 of 26 tracked Pelorus Sound king shags foraging within farms for an average of 39% of total foraging time (Bell, 2022).

Overall, the potential positive effects are considered minor in the context of an overall effects assessment but are recorded as genuine, evidence based benefits of the Project.

5.2 Assessment of Construction Effects

Establishment of each farm involves vessel based deployment of anchors, backbone lines, floats and droppers, as described in Section 4.2. These activities are short in duration (typically days to weeks per site), confined to surface waters and discrete anchor contact points on the seabed, and do not involve dredging, blasting or driven piling.

Seabed (benthic) and pelagic habitat

Anchor placement causes localised, temporary disturbance of soft sediment at each anchor point. Given the low ecological value of the soft sediment seabed within all six footprints and the small area of seabed contact relative to the size of each consent area, this effect is assessed as **Negligible** at all sites. At Onapua Bay, the 0.068 ha exclusion zone around the bedrock reef ensures no anchor placement occurs on or adjacent to this higher value habitat, and the effect there is likewise assessed as negligible.

Wild fish

Construction phase vessel activity and localised sediment disturbance may cause brief, localised avoidance behaviour by mobile fish species. The short duration and small spatial extent of works, together with the likely absence of TAR fish species within the footprints, mean this effect is assessed as **Negligible** at all sites.

Seabirds

Construction vessel activity is confined to the immediate farm footprints, all of which are located more than 1 km from the nearest scheduled king shag colony. Given this separation and the short duration of works, disturbance effects on king shag and other seabirds during establishment are assessed as **Negligible** at all sites.

Marine mammals

Construction vessel movements and associated underwater noise have potential to cause temporary avoidance behaviour by dolphins and other marine mammals in the vicinity of works. This effect is of short duration and reversible, and standard vessel operating protocols (see Section 6) further reduce this risk. The effect is assessed as **Negligible** at all sites, including Hapūkū Rock, reflecting the temporary and localised nature of installation activity even within recognised significant dusky dolphin habitat.

5.3 Assessment of Operational Effects

In the absence of efforts to avoid, remedy or mitigate adverse ecological effects, the potential effects on ecological values during the marine farm operation phase are predominantly localised, occurring at approximately the scale of the farm.

Seabed (benthic) habitat

Ongoing operation results in biodeposition (faecal and pseudofaecal material, and shell fall from mortality) beneath farm structures, which can locally enrich sediment organic content and alter infaunal community composition beneath and immediately around the lines. This is a well documented and generally localised effect of long-line shellfish culture (Cawthron, 2020; NIWA,

2019). Given the Low existing ecological value of the affected soft sediment habitat and the confinement of this effect to the direct farm footprint, operational effects on benthic habitat are assessed as **Low** at all six sites. At Onapua Bay, the higher value reef habitat lies outside any biodeposition affected area due to the exclusion zone in place, and effects there are assessed as **Negligible**.

Wild fish

Farm structures may cause localised displacement of some soft sediment associated fish species beneath biodeposition affected areas, offset in part by the habitat enhancement effects on reef associated and pelagic species described in Section 5.1. The absence of TAR fish species, together with the Moderate overall value of the fish assemblage, means this effect is assessed as **Negligible** to low at all sites.

Seabirds

At the Marlborough Sounds-wide scale, recent work shows that king shags do not avoid mussel farms. GPS-based foraging analyses in Bell (2022) found that 23 of 43 tracked birds (56%) foraged within mussel farm footprints. Of all tracked birds, 23 of 43 (56%) foraged within mussel farm footprints. Among birds whose mapped foraging areas came within about 2 km of any mussel farm (i.e. farms were present within their foraging neighbourhood), 23 of 26 (89%) foraged within farms. Mussel farm buoys are also used regularly as roost sites, including by king shag and other shag and gull species, with birds often roosting between foraging bouts. Mussel farms are therefore clearly part of the wider foraging and roosting habitat mosaic for king shag where they occur within the species' foraging range, and the Sounds-wide studies together with McClellan (2026) indicate that overall farm effects on king shag are neutral at the population scale, with observed colony- and individual-level variation in farm use.

The six Project sites are all located at least 1 km from scheduled king shag breeding colonies identified in the Marlborough Environment Plan, and in areas that have not been identified as core king shag foraging habitat in the Sounds-wide GPS and observational studies. None of the proposed nursery or production farms are near colonies, and the closest site (Papatua) is approximately 1.6 km to the KS5 Hunia Rock colony, well beyond distances at which king shags are likely to be disturbed by farm operations.

On this basis, and given the neutral overall relationship between king shags and mussel farms, the distance of all six sites from colonies and the limited importance of the local farm settings as king shag foraging habitat mean that the magnitude of operational effects on king shag is assessed as **Negligible** at all sites. Other seabird species using the farms primarily as safe roosts or opportunistic foraging habitat (e.g. other shag species, gulls and terns) are likewise expected to experience at most neutral to minor positive effects, and the magnitude of operational effects on seabirds more broadly is assessed as **Negligible**.

Marine mammals

According to McConnell (2026), the principal operational effect pathway for marine mammals is entanglement risk associated with farm lines and ropes. New Zealand aquaculture-related marine mammal entanglement records over approximately the past 50 years show five fatalities associated with mussel or spat catching farms nationally (two Bryde's whales in the Hauraki Gulf, one humpback whale in the Firth of Thames, one Sei whale at Port Ligar, and one Minke whale in Admiralty Bay in 2021), compared with sixteen fatalities associated with finfish farms over the same period (six NZ fur seals, seven dusky dolphins, two Hector's dolphins and one bottlenose

dolphin). Three of the five mussel farm fatalities (the Firth of Thames humpback, the Port Ligar sei whale, and the Admiralty Bay minke whale) were found in an advanced state of decomposition and were likely already dead before becoming entangled⁸, while the details of the two Bryde's whale records remain uncertain and are the subject of ongoing, unresolved discussion between Aquaculture Direct and the Department of Conservation (McConnell, 2026). This context indicates that entanglement risk associated with mussel farm structures of the type proposed is materially lower than for finfish farms, and that fatal entanglements in mussel farms remain rare events against a backdrop of a substantial existing national consented mussel farm area (19,382 ha as at 2026, NZ wide; McConnell, 2026)⁹.

Entanglement risk is influenced by species echolocation ability, behaviour, morphology, agility and age, with juvenile and less agile animals at relatively greater risk (McConnell, 2026). Since the late 1990s, the industry standard practice of using weighted, taut spat and crop lines (rather than slack lines) has substantially reduced entanglement risk by minimising loose rope in the water column (McConnell, 2026).

At Hapū kū Rock, the location within mapped significant dusky dolphin habitat (Admiralty Bay/Current Basin, MEP Appendix 28) means that habitat modification and entanglement risk are most relevant at this site. However, as mentioned above, Admiralty Bay's resident and visiting dusky dolphin population represents only approximately 6–9% of the Kaikōura dusky dolphin population and approximately 2–4% of the national population, and dolphins typically reside in Admiralty Bay for only days to weeks at a time before returning to their wider range (Pearson, 2009; Clement & Halliday, 2014; Piwetz et al., 2024). The existing mussel farm footprint in Admiralty Bay occupies approximately 217 ha (2.54% of the bay), which would increase to approximately 245 ha (2.87%) with the addition of the Hapū kū Rock blocks (McConnell, 2025). On this basis, operational effects magnitude on marine mammals at Hapū kū Rock are assessed as **Negligible** to **Low** at the Site ZOI, but **Negligible** when considered against the scale of the wider dusky dolphin population and the existing pattern of farming in Admiralty Bay.

At the other five sites (none of which is mapped as significant marine mammal habitat under MEP Appendix 28), operational effects on marine mammals are assessed as **Negligible**, reflecting the wide ranging and largely transient nature of cetacean use of these areas and the entanglement risk reduction measures described in Section 6. This applies equally to Onapua Bay on the conservative basis that its farm structures are treated as posing a similar risk profile to other longline marine farm sites in the Sounds rather than being assumed risk free (McConnell, 2026).

Pelagic habitat

The principal operational effect pathway for this domain is depletion of phytoplankton and zooplankton concentrations through shellfish filter feeding, offset in part by the positive filtration and nutrient cycling services described in Section 5.1. As set out in Section 3.2.5, the best available Sounds-wide evidence indicates that depletion effects are measurable in water passing directly through individual farms. However, against the backdrop of existing mussel farming in the Marlborough Sounds, any resulting reduction in chlorophyll *a* at the broader bay or Sounds scale appears to be minor, inconsistently evident among monitoring locations, and not strongly correlated with the

⁸ The Admiralty Bay minke whale was recovered by farm harvest crew showing no rope cut injuries and is understood to have drifted into the farm already dead (M. Mandeno, Marine Farming Association, pers. comm., 10 August 2026).

⁹ REL note that a comprehensive national total of anthropogenic marine mammal fatalities in New Zealand suitable for comparative purposes does not appear to be currently available.

extent of marine farming (Cawthron, 2020; NIWA, 2019). Recent monthly monitoring in Clova Bay (a comparatively densely farmed and relatively sheltered Pelorus Sound embayment) similarly found that, although some seston and chlorophyll *a* measures were numerically lower than at a central Beatrix Bay reference site, the differences were generally not statistically significant, were small relative to spatial and interannual variability elsewhere in Pelorus Sound, and remained within the range of seston concentrations commonly recorded elsewhere in Pelorus Sound (Broekhuizen, 2026).

Given the Low existing ecological value of this domain at all six sites and the modest scale of the Project relative to this existing baseline, operational effects on pelagic habitat are assessed as **Negligible to Low** at all six sites. Data remain more limited for the comparatively less well flushed setting at Onapua Bay than for the other five sites (Cawthron, 2020).

5.4 Cumulative Effects

Consistent with EIANZ guidelines, this assessment considers cumulative positive and adverse ecological effects within an appropriate spatial and temporal context. For the Project, the relevant context is the coastal receiving environment of the six Sites across the wider Marlborough Sounds (the Project ZOI), including interactions with existing aquaculture activity and vessel traffic. Effects are expected to occur principally at site scale because the Sites are geographically distributed across six distinct coastal marine units (CMUs).

The proposed farms total approximately 280 ha, representing a 8.4% increase on the approximately 3,325 ha of authorised aquaculture activity across the Marlborough Sounds (Fisheries NZ, 2024). At Admiralty Bay, the Hapū kū Rock blocks would increase marine farm coverage from approximately 217 ha (2.54% of the bay) to 245 ha (2.87%), while substantial unfarmed habitat would remain in outer Admiralty Bay (McConnell, 2025). No other major pressures such as further finfish farming, dredging, or large infrastructure works have been identified that would materially interact with the ecological effects assessed for the Project.

The Marlborough Sounds and Cook Strait Important Marine Mammal Area (IMMA) is an advisory, non-statutory designation rather than a Marine Protected Area or a scheduled MEP protection. Richmond Bay and Onapua Bay are outside the IMMA boundary. Its exclusion of inner Admiralty Bay also appears inconsistent with recent research identifying greater dusky dolphin use there (Pietz et al., 2024). Ecological values and effects have therefore been assessed from the available species and habitat evidence, rather than IMMA status; however, the designation remains relevant context for considering cumulative marine mammal effects.

Seabed habitat

The farms would be established over already degraded, low value soft sediment habitat. Any bio-deposition effects would be expected to remain localised rather than accumulate across a contiguous seabed area, because the Sites are dispersed among six CMUs. Long-line mussel farming may also be ecologically generative by introducing mid-water structure and enhancing benthic processes through organic deposition.

Wild fish

Existing fish values are moderate and no Threatened At Risk (TAR) fish species are present. Farm structures may create localised mid-water habitat and refuge; however, the additional habitat change would be modest in the wider Marlborough Sounds context. The Project is not expected to

materially alter fish community structure or the overall quality of available fish habitat.

Seabirds, including king shag

The proposed farm footprints and associated buffers do not intersect scheduled seabird breeding colonies. King shags already forage within and around established farms elsewhere in the Sounds (Bell, 2022). This proposal is materially different from the “necklace” scenario considered in *R J Davidson Family Trust v Marlborough District Council NZCA 316*, which involved 38 farms clustered within a small bay. In contrast, the six proposed Sites are distributed across multiple bays and retain appropriate colony buffers. King shag habitat protection has also since been substantially incorporated into the MEP.

Marine mammals

The Project constitutes a relatively small addition to the established regional mussel farm footprint. Threatened species, including dusky dolphin, bottlenose dolphin, and killer whale, currently occur in a seascape containing existing farms. Nationally, five fatal entanglements have been recorded over approximately 50 years across up to 19,382 ha consented NZ wide for mussel farming (McConnell, 2026). Outer Admiralty Bay would remain largely free of farm structures, and the Hapūkū Rock layout avoids forming a continuous barrier to animal movement. Any localised avoidance or displacement, if detected, would be managed through the Marine Mammal Management Plan (MMMP), noting the inherent complexity of establishing a causal relationship between farm operations and marine mammal movement in this context.

Pelagic habitat

The additional 280 ha of consent area represents a modest increase in the area available for shellfish farming; however, it does not represent an equivalent increase in fully stocked mussel-production biomass or regional filter-feeding capacity. Three proposed mussel operations are limited to spat catching and/or nursery holding, and the proposed Onapua Bay flat oyster operation will be managed at low stocking density. The resulting cumulative effects associated with shellfish biomass, including filtration, biodeposition and related water column effects, are therefore expected to be lower than if the full proposed area were operated as conventional mussel production farming.

At the scale of Marlborough Sounds bays and reaches, analysis of available historical chlorophyll data found no evidence that variation in chlorophyll anomalies was correlated with expansion in the approved area of marine farms (Newcombe and Broekhuizen, 2020). The study concluded that mussel farms were not the dominant influence on phytoplankton at this broader spatial scale, while recognising that the available evidence was less conclusive for zooplankton. This finding does not exclude localised, transient depletion of phytoplankton as water passes through or immediately downstream of individual farms. Long-line mussel farms also alter nutrient and particle pathways through filtration, biodeposition and nutrient regeneration; whether these changes constitute an adverse ecological effect depends on their magnitude, duration, spatial extent and consequences for the pelagic food web.

Overall, the Project would add a modest and spatially dispersed area of mussel farming to an established aquaculture environment. Taking account of the degraded soft sediment receiving environment, the retention of substantial unfarmed habitat, the absence of identified interacting large scale pressures, the site-specific design and buffers, and the potential for long-line farming to provide generative ecosystem services, the Project’s cumulative ecological effects are assessed as negligible in magnitude and **Very Low** overall. At some spatial scales, the Project may contribute

to a net improvement in existing ecological conditions.

5.5 Biosecurity Considerations

Biosecurity risk is an overarching consideration relevant to all six sites, rather than a discrete ecological receptor comparable to the five domains addressed above. Marine farm structures and associated vessel traffic are recognised biosecurity risk pathways nationally (Stenton-Dozey & Broekhuizen, 2019). Within the Marlborough Sounds, farm structures are routinely monitored for pest species including the clubbed tunicate (*Styela clava*), Japanese carpet sea squirt (*Didemnum vexillum*), Mediterranean fanworm (*Sabella spallanzanii*) and the caprellid amphipod *Caprella mutica*; of these, only *D. vexillum* and *C. mutica* have to date been detected on Marlborough Sounds mussel farms, and both have been subject to effective management (Stenton-Dozey & Broekhuizen, 2019). The exotic seaweed *Undaria pinnatifida* is also well established and stable within Tory Channel, including in the vicinity of Onapua Bay, and a related exotic species, *Grateloupia turuturu*, appears among the “commonly consented” species applied for at Onapua Bay; it has been recommended for exclusion from farming there on biosecurity grounds (Davidson, 2021c).

All Applicants operate, or will operate, in accordance with the A+ Biosecurity Standards, an industry wide programme with the explicit objective that farming activities do not cause an unacceptable biosecurity risk, under which all members are also required to recognise the Biosecurity Act 1993 and the Hazardous Substances and New Organisms Act 1996. It is also understood that the Applicants have engaged directly with Biosecurity New Zealand in relation to the Project. The Project does not propose use of chemical additives such as antibiotics, parasiticides or antifoulants. On this basis, general biosecurity risk associated with establishing and operating the six farms is assessed as very low at all sites.

This assessment addresses general biosecurity risk pathways associated with the Project’s farm structures, vessels and cultivated shellfish and seaweed species, at an ecological context level consistent with the ecological scope of this report. It expressly excludes the disease management context specific to the proposed New Zealand flat oyster component of the Onapua Bay farm, in particular management of *Bonamia ostreae*, which is the subject of a separate, dedicated biosecurity assessment being prepared for that component of the Project.

5.6 Summary of Ecological Effects

Table 5-2 summarises the assessment of potential adverse effects by ecological domain, including the relevant ecological value, magnitude and level of effect under the EIANZ Guidelines, and any required avoidance, remediation, or mitigation measures.

Table 5-2 Summary of potential ecological effects, EIANZ assessment, and management response.

Ecological domain	Ecological value	Potential adverse effect	Magnitude of effect (EIANZ)	Level of effect (EIANZ)	Avoid, remedy or mitigate
Seabed (benthic) habitat	Low: soft sediment, all Sites; High: reef, Onapua Bay	Temporary anchor disturbance; localised operational biodeposition beneath structures altering soft sediment conditions	C: Negligible; O: Negligible in soft sediment; Negligible at reef tip	C: Very Low; O: Very Low in soft sediment and at reef tip	Avoid reef effects at Onapua Bay through the 0.068 ha exclusion zone; no further measures required
Wild fish	Low-Moderate	Brief vessel/sediment-disturbance avoidance; potential localised displacement from biodeposition affected seabed	C: Negligible; O: Negligible	C: Very Low; O: Very Low	No further measures required; works are brief, no TAR species recorded, and structures may provide refuge
Seabirds, including king shag	High-Very High	Localised disturbance or change in access to foraging habitat	C: Negligible; O: Negligible	C: Very Low; O: Very Low	Maintain proposed Site locations and colony buffers; no further measures required
Marine mammals	High-Very High	Temporary construction-related avoidance; potential operational avoidance, habitat-use change and entanglement risk	C: Negligible; O: Negligible at five Sites; Negligible–Low at Hapūkū Rock Site ZOI and Negligible at Project ZOI/population scale	C: Very Low; O: Very Low at five Sites; Very Low–Low at Hapūkū Rock Site ZOI	Implement MMMP and vessel protocols; retain non-continuous Hapūkū Rock layout and movement space
Pelagic habitat	Low	Localised, temporary phytoplankton and zooplankton reduction in water passing through farms	C: Negligible; O: Negligible	C: Very Low; O: Very Low	No further measures required
Cumulative ecological effects (Project ZOI)	Low-Very High across domains	Incremental addition of approximately 280 ha of dispersed mussel farms to an existing approximately 3,325 ha regional footprint	Negligible	Very Low	Embedded design, reef exclusion, colony buffers, MMMP and vessel protocols are sufficient; no further cumulative measures required

Notes: C = construction; O = operation; TAR = Threatened At Risk; MMMP = Marine Mammal Management Plan; ZOI = Zone of Influence.

6 Impact Management

6.1 Recommendations for avoiding or minimising potential adverse effects

In accordance with the EIANZ guidelines, measures to avoid, remedy, or mitigate adverse effects are directed to ecological domains for which the assessed level of effect is Moderate, High, or Very High.

For this Project, no ecological domain has been assessed as having a Moderate or higher level of effect during construction or operation. The assessed level of effect is Very Low across all domains, except for marine mammals at the Hapūku Rock Site ZOI, where the operational level of effect is assessed as Very Low to Low. At the Project ZOI and population scale, marine mammal effects are assessed as Very Low.

Having regard to the magnitude, scale, duration, and extent of the assessed effects, and the embedded design measures and operational commitments on which the assessment relies, the effects can reasonably be characterised as not more than minor in RMA terms¹⁰. This includes cumulative effects, which are assessed as Very Low.

Notwithstanding this, the embedded design measures and operational commitments set out in **Table 6-1** are required to maintain the assessed outcomes. These measures include avoidance of the mapped reef at Onapua Bay, retention of the proposed Site locations and king shag colony separation distances, implementation of the MMMP, vessel operating protocols, and routine aquaculture and biosecurity good practice.

The management commitments are to be implemented through the final farm layout, relevant consent conditions, the MMMP, and the Applicants' operational procedures.

Table 6-1 Ecological management commitments.

Commitment	Requirement	Implementation mechanism
EC-1: Reef avoidance	The 0.068 ha mapped reef exclusion area at Onapua Bay will be retained. Farm infrastructure will not be located within that exclusion area.	Final farm layout and consent conditions
EC-2: Benthic good practice	Stocking densities will be managed appropriately, and farm structures will be routinely maintained to minimise unnecessary shell fall, debris, and associated localised seabed effects.	Operational procedures
EC-3: King shag colony separation	No vessel operation, navigation, mooring, or anchoring will occur within 200 m of a scheduled king shag breeding site (KS1–KS11). A separation distance of at least 200 m from active colonies will be maintained where practicable.	Consent conditions, MEP, and operational procedures

¹⁰ We note this EclA provides the ecological basis for the consent authority to determine the relevant RMA effects characterisation; however, the assessed effects are considered consistent with a finding of not more than minor adverse effects.

Commitment	Requirement	Implementation mechanism
EC-4: Retention of farm locations	The proposed Site locations and their separation from identified king shag colonies will be retained.	Final farm layout and consent conditions
EC-5: Marine mammal management	The MMMP, including vessel operating protocols, marine mammal response procedures, and staff training, will be implemented.	MMMP and operational procedures
EC-6: Hapū kū Rock movement space	The proposed non-continuous layout at Hapū kū Rock will be retained to provide marine mammal movement space through the Site.	Final farm layout and consent conditions
EC-7: Biosecurity practice	The Applicants will continue to apply the A+ Biosecurity Standards and vessel and equipment hygiene procedures to minimise marine pest transfer between Sites.	Operational procedures
EC-8: Onapua Bay species-specific biosecurity	Biosecurity and disease management requirements for the proposed New Zealand flat oyster component will be addressed through the separate biosecurity assessment and management plan.	Operational procedures and separate biosecurity plan

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

Following implementation of the measures in Section 6.1, residual ecological effects are expected to remain less than minor, consistent with the assessment in **Table 5-2**. No biodiversity offset, ecological compensation, or additional ecological mitigation is proposed. Any monitoring or reporting requirements will be addressed through the MMMP, the separate Onapua Bay flat oyster biosecurity framework, and relevant consent conditions.

7 Conclusion

The design and operation of the Project incorporates a range of measures to avoid or minimise potential effects on ecological values within the Marlborough Sounds. These include locating farm infrastructure to avoid the mapped reef at Onapua Bay, retaining the proposed Site locations and separation from king shag breeding colonies, maintaining the non-continuous layout and associated marine mammal movement space at Hapūkū Rock, and implementing the MMMP, vessel operating protocols, routine aquaculture good practice, and biosecurity procedures.

The EclA has assessed the potential construction and operational effects of the six new or expanded marine farms at Papatua, Guards Bay, Hapūkū Rock, Okuri Bay, Richmond Bay, and Onapua Bay across seabed and benthic and pelagic habitats, wild fish, seabirds, marine mammals. Construction effects are assessed as Very Low across all ecological domains. Operational effects are similarly assessed as Very Low, except for marine mammals at the Hapūkū Rock Site ZOI, where the operational effect is assessed as Very Low to Low. At the wider Project ZOI and population scale, marine mammal effects are assessed as Very Low.

Applying the effects management hierarchy, the Project relies principally on avoidance through Site selection, farm layout, and operational practice. No biodiversity offset or ecological compensation is required or proposed, as no ecological domain has been assessed as having a Moderate or higher level of effect. The management commitments identified in Section 6 are required to maintain the assessment outcomes and are to be implemented through the final farm layout, relevant consent conditions, the MMMP, and the Applicants' operational procedures.

In our opinion, the potential adverse ecological effects of the Project have been appropriately addressed through the embedded design measures and management commitments outlined in this EclA. With these measures implemented, all assessed ecological effects, including cumulative effects, are considered to be no more than minor.

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Appendix A:

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- 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

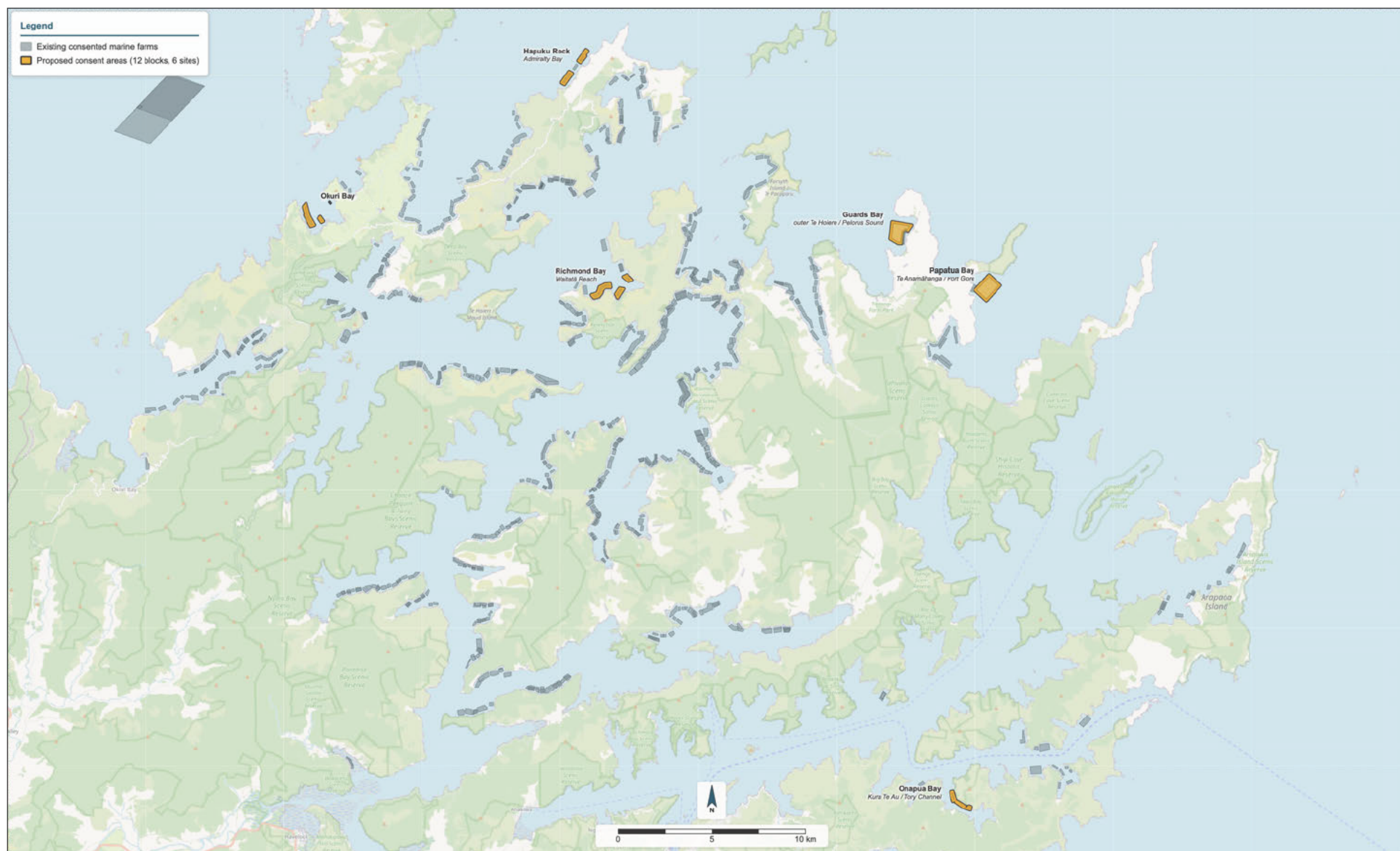


Figure 1-1 Overview of the location of the proposed shellfish farms, Marlborough Sounds. Existing marine farms layer source: <https://gis.marlborough.govt.nz/server/rest/services/DataPublic/MarineActivity/MapServer/6> (accessed 30 July 2026).

PROJECT: MARLBOROUGH SOUNDS AQUACULTURE

Project Area Overview

| Date: 12 Aug 2026 | Revision: A | Aerial: N/A
 Plan map prepared for ADL by Robertson Environmental Limited

Project Manager: [REDACTED]

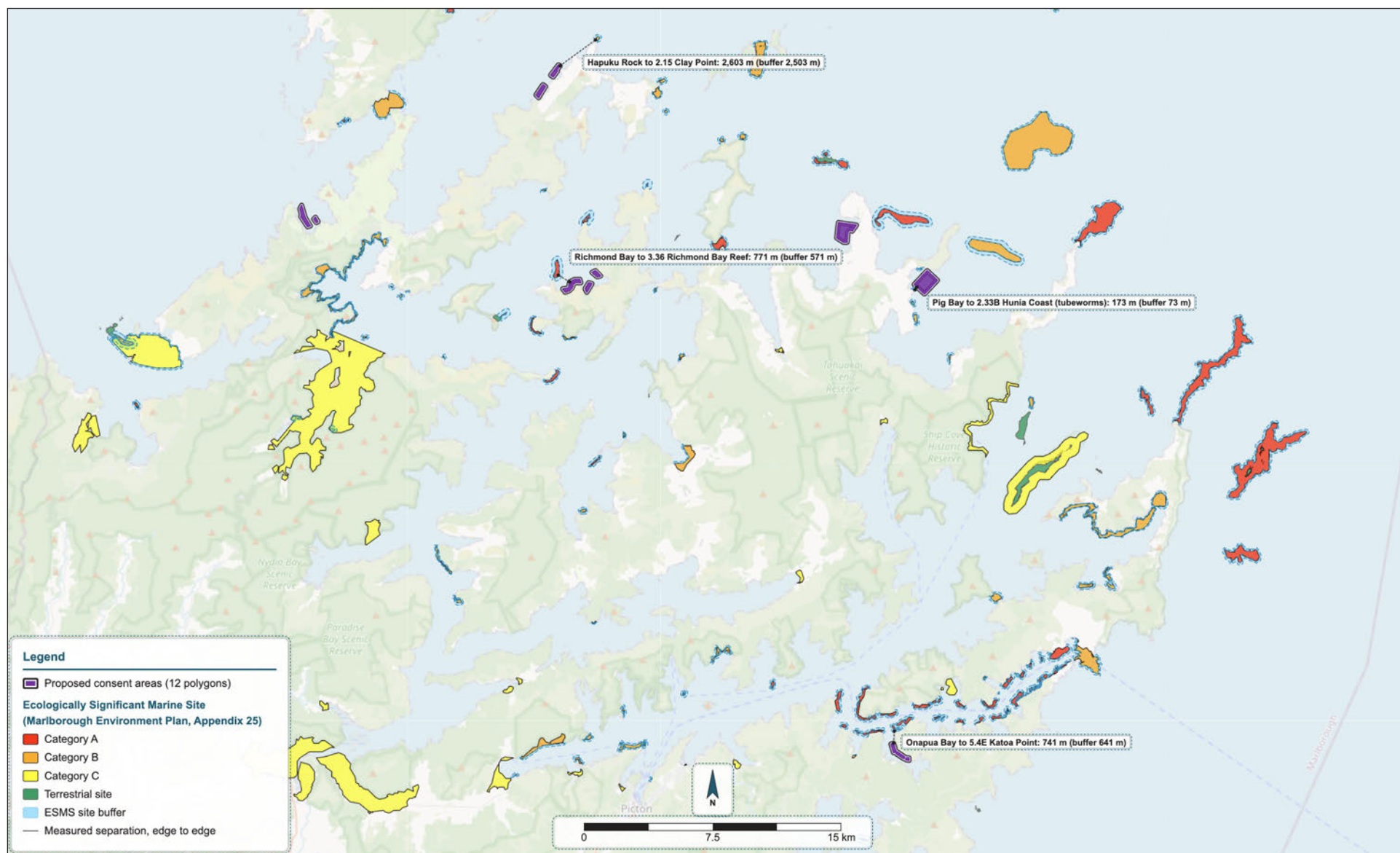


Figure 3-1 Distances between relevant MEP ESMSs and proposed shellfish farms, Marlborough Sounds. ESMS layer source: <https://gis.marlborough.govt.nz/server/rest/services/DataPublic/ZonesMEPDecisionOverlays/MapServer/14> (accessed 30 July 2026).



Figure 3-2 Distances between relevant King Shag Breeding Sites and proposed shellfish farms, Marlborough Sounds. King Shag Breeding Sites layer source: <https://gis.marlborough.govt.nz/server/rest/services/DataPublic/ZonesMEPDecisionOverlays/MapServer/200> (accessed 30 July 2026).

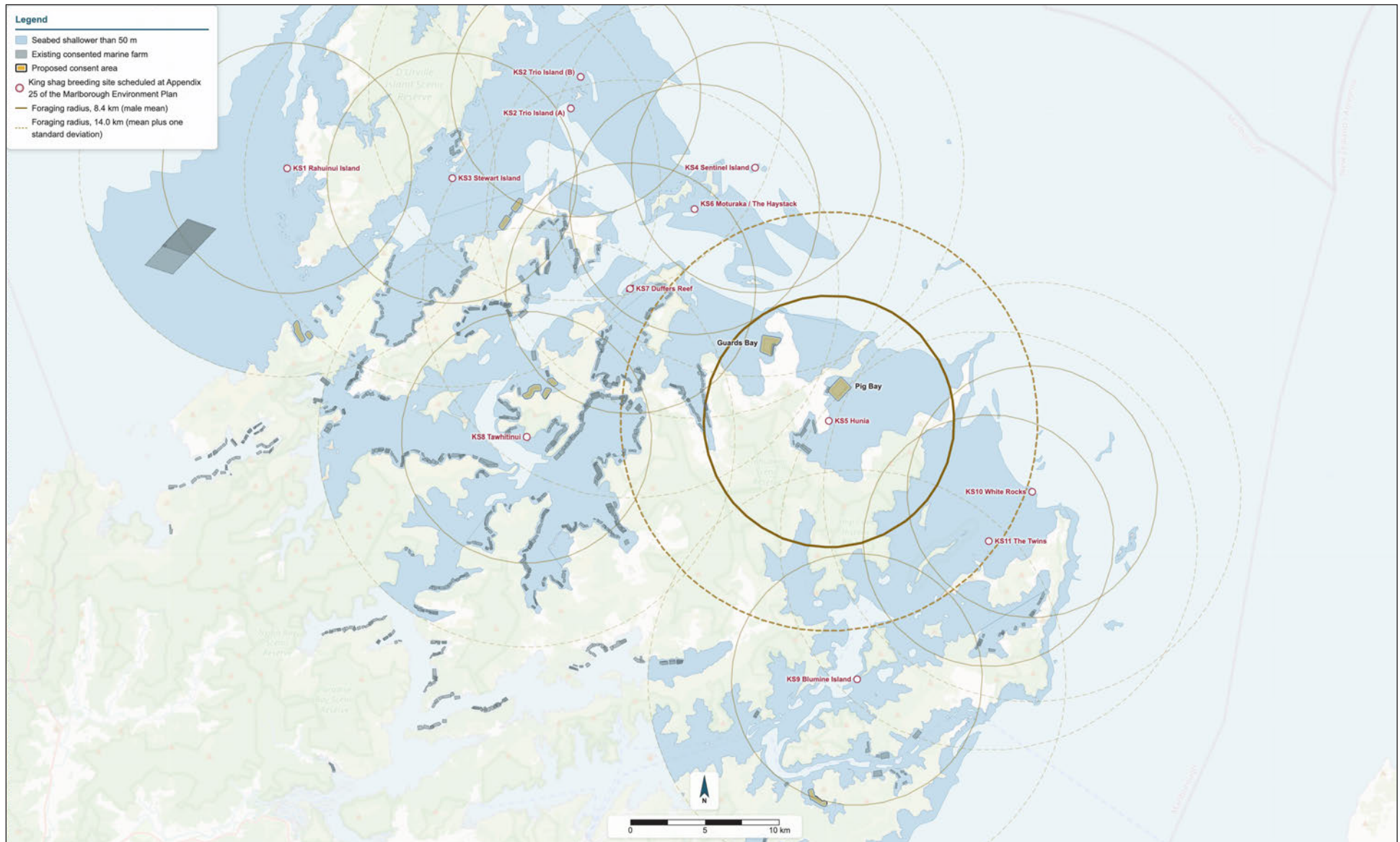


Figure 3-3 Predicted King Shag foraging zones based on relevant colony proximity data in Bell (2022) overlaid with proposed marine farm sites. Seabed shallower than 50 m is the LINZ ENC Depth Area set intersected with the MDC Coastal Marine Zone, clipped to the 14.0 km discs and simplified to 15 m.

Appendix C:

EIANZ Ecological Impact Assessment Methodology & Zone of Influence (ZOI) Framework

Assessment methodology applied in this Ecological Impact Assessment (EclA) follows the EIANZ Guidelines for use in New Zealand terrestrial and freshwater ecosystems (2nd Edition, 2018) (Roper-Lindsay et al. 2018), including its Marine Addendum, adapted here for a multi-site marine farming proposal across the Marlborough Sounds. The methodology addresses the requirements of section 88 and Schedule 4 of the Resource Management Act 1991 (RMA), and is structured around the EIANZ six-step EclA process: scoping, description of the existing environment, assigning ecological value, assessing effects, impact management, and monitoring.

C-1 Overview of the EIANZ EclA Framework

EclA is defined as an independent, scientifically defensible process for identifying, quantifying and evaluating the potential impacts of a defined action on ecosystems or their components, distinct from general ecological assessment because it explicitly translates ecological findings into a common language for use in RMA decision-making. The Guidelines set out an iterative sequence of stages rather than a strictly linear process, since project design, baseline investigations and impact findings continue to inform one another as a proposal develops.

The key stages applied in this assessment are:

- Scoping – a preliminary assessment identifying valued ecological features potentially affected, prioritising further investigation, and feeding into project shaping to avoid effects where possible.
- Description – detailed characterisation of ecological features within the Zone of Influence (ZOI), providing the scientific basis for evaluation and impact assessment.
- Evaluation (assigning value) – determining the ecological value or importance of features within the ZOI, using criteria of representativeness, rarity/distinctiveness, diversity and pattern, and ecological context.
- Assessment of impacts and effects – identifying and predicting the nature, degree and magnitude of potential effects, both adverse and positive.
- Impact management – establishing measures to avoid, remedy, mitigate, offset or compensate for adverse effects, and assessing residual effects.
- Monitoring – developing monitoring requirements to verify predicted effects and the performance of impact management measures.

The Guidelines emphasise a three-step matrix approach for combining findings: (1) ranking ecological value on a scale from Negligible to Very High; (2) ranking the magnitude of effect on a comparable scale; and (3) combining value and magnitude to determine an overall level of effect (**Table C-1**). This matrix approach is intended to support, not replace, professional ecological judgement, and its use is most valuable for large or complex projects such as multi-site consenting proposals.

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).

Table C-1 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

C-2 Zone of Influence (ZOI)

The ZOI is defined in the Guidelines as the areas and resources that may be affected by the biophysical changes caused by a project and its associated activities, including receiving environments beyond the works themselves where indirect effects (such as discharges) may extend. ZOI boundaries must extend to mobile species, habitat connectivity, and regional or national populations, not just the immediate activity footprint. Its extent depends on the species, communities and ecosystems likely to be affected, and the temporal and spatial scale of effects on them, and is revisited as investigations progress.

In this assessment, that single concept is applied at two scales: Site ZOI (per farm) and Project ZOI (all six farms), recognising that ZOI can be assessed at a local scale, then extended to cover regional or population-level effects where relevant.

C-3 Domain-Specific ZOI

Consistent with the EIANZ framework, a separate ZOI has been defined for each of the five ecological domains assessed for the six marine farm sites, distinguishing near-field direct/local (Site ZOI) and far-field indirect/regional (Project ZOI) extents (**Table C-3**). Each ZOI reflects the domain's relevant receiving environment, species mobility, and effect pathway, and should be refined iteratively if additional information relevant to assessing potential effects is obtained.

Table C-3 Domain-specific ZOI applied in this report.

Ecological domain	Site ZOI	Project ZOI
Wild fish	Farm structures and expected depositional gradient extending to affect the foraging range of demersal and benthic fish using that area	Sounds/embayment scale area covering regional fish populations, spawning and migration corridors, and cumulative nutrient effects across all farms
Marine mammals	Area around the farm covering vessel traffic, noise and entanglement risk, and typical foraging/transit range of animals using that area	Home range/foraging range of resident or visiting pods, haul-out and resting areas, and management-unit scale for threatened species

Seabirds	Farm structures and immediate waters (attraction, disturbance, lighting), extending to the foraging range of nearby breeding colonies	Sounds-wide extent covering multiple colonies where prey supply could be altered cumulatively
Pelagic habitat	Expected plume of altered nutrients, oxygen and turbidity around the farm, and the adjacent area of altered plankton community	Sounds/embayment-scale area capturing cumulative or system-level pelagic change
Seabed (benthic) habitat	Seabed beneath and adjacent to farm structures, and the depositional gradient affecting nearby sensitive habitats (e.g. reef, biogenic structures)	Combined depositional footprint and connectivity effects across all farm sites

C-4 Assigning Ecological Value within the ZOI

Once ZOI boundaries are defined, ecological features within each ZOI are described and assigned a value on a five-point scale from Negligible to Very High, based on four matters: representativeness, rarity/distinctiveness, diversity and pattern, and ecological context. The spatial scale of valuation (site, Ecological District, regional or national) is chosen according to the ZOI and the ecological feature in question (e.g. a fish species may be assessed both for its role at a specific farm site and for its regional or national threat status). Values for individual species, habitats or communities are not averaged or amalgamated where their sensitivities differ, though features with similar values and mitigation needs may be grouped for reporting efficiency.

C-5 Assessing Magnitude & Level of Effect

Magnitude of effect on each valued feature is assessed within its Site ZOI and, where relevant, the Project ZOI, against criteria of spatial extent, duration, frequency and reversibility, ranked Negligible to Very High. Combining value and magnitude gives the overall level of effect, following the matrix approach in Section C-1. Cumulative effects across all six Site ZOIs, assessed together as the Project ZOI, and in combination with other activities in the Sounds, are addressed separately, consistent with the RMA definition of “effect,” which includes cumulative effects arising over time or in combination with other effects.

C-6 Impact Management

Results from the matrix in **Table C-1** is used to determine the type of responses that may be required to mitigate potential direct and indirect impacts, considering the following EclA 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 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, even without taking into account mitigation measures. However, mitigation measures are proposed for specific attributes below to ensure a best practise ecological outcomes.

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